

BMJ Open

BMJ Open is committed to open peer review. As part of this commitment we make the peer review history of every article we publish publicly available.

When an article is published we post the peer reviewers' comments and the authors' responses online. We also post the versions of the paper that were used during peer review. These are the versions that the peer review comments apply to.

The versions of the paper that follow are the versions that were submitted during the peer review process. They are not the versions of record or the final published versions. They should not be cited or distributed as the published version of this manuscript.

BMJ Open is an open access journal and the full, final, typeset and author-corrected version of record of the manuscript is available on our site with no access controls, subscription charges or pay-per-view fees (<http://bmjopen.bmj.com>).

If you have any questions on BMJ Open's open peer review process please email info.bmjopen@bmj.com

BMJ Open

The Incidence and Risk Factors of Postpartum Depression, General Depressive Symptoms, Anxiety and Stress (PODSAS) among Mothers at First Follow-up Postnatally in Five Public Health Clinics in Perak: A Study Protocol for a Cross-sectional Study

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2019-034458
Article Type:	Protocol
Date Submitted by the Author:	20-Sep-2019
Complete List of Authors:	Mohammad Redzuan, Saidatul; Kementerian Kesihatan Malaysia Ganasan, Venotha ; Kementerian Kesihatan Malaysia Palaniyappan, Thenmoli ; Kementerian Kesihatan Malaysia Megat Abu Bakar, Puteri ; Kementerian Kesihatan Malaysia Suntharalingam, Priyasini; Kementerian Kesihatan Malaysia Kaur, Paream ; Kementerian Kesihatan Malaysia Ambigapathy, Subashini ; Family Health Development Division, Ministry of Health Malaysia Marmuji, Lili ; Kementerian Kesihatan Malaysia V. , Paranthaman; Kementerian Kesihatan Malaysia Chew, Boon; Universiti Putra Malaysia, Serdang
Keywords:	PRIMARY CARE, Adult psychiatry < PSYCHIATRY, MENTAL HEALTH

SCHOLARONE™
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

The Incidence and Risk Factors of Postpartum Depression, General Depressive Symptoms, Anxiety and Stress (PODSAS) among Mothers at First Follow-up Postnatally in Five Public Health Clinics in Perak: A Study Protocol for a Cross-sectional Study

Saidatul Akmar Mohammad Redzuan¹; akmar.redz@gmail.com

Paream Kaur²; drpaream@yahoo.com

Priyasini Suntharalingam³; priya_divine@yahoo.com.sg

Thenmoli Palaniyappan⁴; pthenmoli_88@hotmail.com

Venotha Ganasan¹; gvenotha@yahoo.com.my

Puteri Normalina Megat Abu Bakar⁵; puterinormalina@gmail.com

Lili Zuryani Marmuji¹; lilizuryani@yahoo.co.uk

Subashini Ambigapathy³; subaambigapathy@gmail.com

V. Paranthaman²; drparan@gmail.com

Boon-How Chew⁶; chewboonhow@upm.edu.my

Author Affiliations

¹ Klinik Kesihatan Gunung Rapat, Pejabat Kesihatan Daerah Kinta, Perak

² Klinik Kesihatan Greentown, Pejabat Kesihatan Daerah Kinta, Perak.

³ Klinik Kesihatan Buntong, Pejabat Kesihatan Daerah Kinta, Perak.

⁴ Klinik Kesihatan Pasir Pinji, Pejabat Kesihatan Daerah Kinta, Perak.

⁵ Klinik Kesihatan Bagan Serai, Pejabat Kesihatan Daerah Kerian, Perak.

⁶ Department of Family Medicine, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Serdang, Selangor, Malaysia.

Correspondence to: Boon-How Chew, Department of Family Medicine, Faculty of Medicine & Health Sciences, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia.

Email: chewboonhow@upm.edu.my

ABSTRACT

Introduction: Postpartum depression, general depressive symptoms, anxiety and stress are often overlooked, and they can cause a considerable amount of morbidity to new mothers, their babies and families. The aim of this study is to determine the incidence of depression (postpartum and general), anxiety and stress among postpartum mothers in five public health clinics in Perak, and to identify their associated risk factors. Findings from this study may inform the needs for early screening, detection and encourage development of interventions to reduce its occurrence and to support mothers with postpartum depression, general depressive symptoms, anxiety and stress.

Methods and Analysis: This cross-sectional study will recruit 459 postpartum mothers consecutively during their first-month postnatal follow-up in five selected public health clinics in Perak from September 2019 to February 2020. Mothers aged 18 years and above with all modes of deliveries, within six weeks post-delivery, and able to understand the English and Malay language will be invited to participate. Non-Malaysians and mothers with known diagnosis of psychotic disorders will be excluded from the study. A set of validated questionnaires will capture sociodemographic and possible risk factors, postpartum depression will be measured with the Edinburgh Postpartum Depression Scale questionnaire, and general depressive symptoms, anxiety and stress will be measured with the 21-item Depression, Stress and Anxiety Scale. Data analysis will be conducted using SPSS version 25.0 (IBM, Chicago, IL). Besides descriptive statistics, possible risk factors will be identified, and their independent associations with postpartum depression, general depressive symptoms, anxiety and stress will be estimated with multivariable regressions analyses.

Ethics and Dissemination The study protocol has been reviewed and approved by the Medical Research and Ethics Committee, Ministry of Health Malaysia on 7th August 2019.

1
2
3 All results from this study will be reported and shared with the local health stakeholders, and
4
5 disseminated through conferences proceedings as well as publication in journals.
6
7
8
9

10 **Article Summary**

11 **Strengths and Limitations of This Study**

- 12 • This study compares postpartum depression with general depression and other
13 psychological well-being that have not been well studied before.
14
- 15 • Five public health clinics in urban and sub-urban areas of Perak may have limitation
16 in representativeness of the participants to the nationwide population.
17
- 18 • Self-administration of the questionnaires is encouraged and facilitated to improve data
19 quality.
20
- 21 • Respondents will be postpartum mothers at one-month post-partum, will not reflect
22 the incidence of depression, anxiety and stress during the first few weeks after
23 delivery, and months later in the postpartum period.
24
25
26
27
28
29
30
31
32
33
34
35
36
37

38 Word count: 3793 (Main text until Expect Outcome, excluding title page, abstract,
39 acknowledgement, references, figures and tables).
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

INTRODUCTION

After a childbirth, a woman undergoes multiple changes that is associated with physical and emotional domains.¹ Some of the common physical changes experienced during pregnancy includes weight gain, hair growth, and stretch marks; after pregnancy, weight loss, hair loss, and sagging breasts are the most common changes.¹ Mothers with a new or additional baby also experience emotional changes related to the demands of breastfeeding, childcare stress, maternal neuroticism and difficult infant temperament.² There are also social demands that may contribute to general depressive symptoms and stress such as compliance to the traditional postpartum care practices, financial strain related to low socioeconomic status, social and sexual relationship with the partner and caretaker of the child.^{3,4} Other emotionally draining aspects include biological, obstetric, clinical, psychological, social, and infant factors may also contribute to the incidence of postpartum depression, general depression and stress.^{2,3} Risk factors for postpartum depression (PPD) are different between developing and developed countries. Klianin et al reported that PPD among Asian countries such as Pakistan and Malaysia ranged between 3.4% to 63.9%,³ compared to that in Europe between 4.4% to 48%.⁴ Many studies have described the association between socio-demographic factors and PPD, but few have explored the association between other stressors in women's lives after having a baby and a more general psychological morbidity.³

PPD is a significant health issue that can impact the health of the mother, her marital relationship, and interaction with the newborn as well as infant growth.⁴ Although rates of depression do not appear to be higher in women in the period after childbirth compared to age-matched control women which are between 10-15%, but the rates of first onset and severe general depression are elevated by at least three-fold.⁵ Depression at this critical period of life carries special meanings and risks to the woman and her family.⁵ It is possible to identify

1
2
3 women with increased risk factors for PPD but the unacceptably low positive predictive values
4 of many currently available antenatal screening tools make it difficult to recommend them for
5 routine care.⁶
6
7
8
9

10
11
12 Depression is the most common psychological disorder during pregnancy and postpartum
13 period. The first symptoms usually appear between the fourth and sixth week postpartum,⁷ and
14 the symptoms can range from mild to severe.⁸ According to WHO, PPD begins with symptoms
15 of depressed mood, anhedonia and low energy within a few days of delivery, most commonly
16 on day 3 or day 4, also termed as postpartum blues.⁵ It can persist up to several months, and
17 untreated postpartum depression may lead to subsequent emotional, behavioral and cognitive
18 problems of the child.⁹ Despite these concerns, PPD remains under-diagnosed and under-
19 treated in clinical practices in Malaysia.¹⁰⁻¹² This might be due to the social taboo that is
20 associated with diseases that are related to psychiatry.¹³ Other factors that contribute to the low
21 detection rate includes low screening rate for PPD, and reduced awareness of the illness
22 amongst mothers and caretakers.¹⁰ In Malaysia, few studies reported that PPD ranged between
23 3.9% to 20.7%.^{2,11,12} A study in 2002 noted that the incidence of PPD amongst Malay women
24 in Bachok, Kelantan was 9.8%.¹² Another study in 2005 showed that the prevalence of PPD in
25 Hospital University Sains Malaysia was 20.7%.² A systematic review suggested that a history
26 of general depression, stressful life events, low social support, antenatal anxiety, unplanned
27 pregnancy, preference of infant's gender, and low income were risk factors leading to PPD in
28 Asian countries such as India and Bangladesh.¹⁴ Another study in Thailand reported that a
29 history of lifetime major depression, and depression during pregnancy were the most important
30 risk factors for PPD.¹⁵ For Malaysian women, depressive symptoms during late pregnancy, an
31 emergency delivery, application of traditional postpartum practices, marital problems, as well
32 as low income were associated with an increased risk of developing PPD.^{5,16,17} A recent
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 systematic review supported the association between preterm birth and PPD.¹⁸ In contrary, a
4
5 local study suggested that a planned pregnancy may prevent the risk of PPD.¹¹
6
7
8
9

10 The *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed (DSM-5) categorizes
11
12 general depression based on symptoms such as depressed mood or loss of interest for a duration
13
14 of 2 weeks, while categorizing PPD based on symptoms such as sadness, anxiety or worry after
15
16 the birth of a child.¹⁹ General depressive symptoms during postpartum period includes
17
18 continuous low mood or sadness, feeling hopeless and helpless, having low self-esteem, and
19
20 feeling tearful that the mother is unable to take care of the child. Psychosocial predictors of a
21
22 general depression in a postpartum women includes lower occupational status, prenatal
23
24 depression level, more distal stressors and personal psychiatric history, which reflected past
25
26 and present experiences, showed an indirect effect.²⁰ While symptoms of major depressive
27
28 disorder include excessive worry, feeling nervous or on edge, not being able to stop or control
29
30 worrying, trouble relaxing, easily irritable or annoyed and feeling awful as if something bad is
31
32 going to happen. Based on the Depression Anxiety Stress Scale (DASS) screening
33
34 questionnaire, general depressive symptoms include not feeling positive, no initiative to do
35
36 daily things, nothing to look forward to, feeling down-hearted and blue, not enthusiastic,
37
38 absence of self-worth, and a feeling that life is meaningless. The DSM-5 does not distinguish
39
40 between postpartum major depression and major depressive disorder, but does provide a
41
42 postpartum onset specifier for major depressive disorder, defined as onset within four weeks
43
44 of delivery.²¹ Care for women who suffered from mild to moderate depressive symptoms may
45
46 be overlooked, resulting in a late diagnosis and increased chances of aggravating PPD, which
47
48 in turn raises the burden of healthcare costs, and negatively impacting the family relationships.¹
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 In Malaysia, far less is known about postpartum anxiety. Anxiety disorders are more common
4
5 in postpartum women than in the general population, with estimates of its incidence during the
6
7 first 6 months of postpartum ranging from 6.1% to 27.9%,^{22,23} with the prevalence of 4.4% to
8
9 8.2% at 6 to 8 weeks postpartum.²⁴ Characteristics of anxiety includes excessive worry that last
10
11 is accompanied by restlessness, fatigue, poor concentration, muscle tension and sleep
12
13 disturbance.¹⁹ While a certain degree of anxiety in response to becoming a new mother is
14
15 normal and even adaptive, some mothers can experience anxieties that are excessive and
16
17 debilitating.²⁵ Excessive anxiety may have long-term effects on the mothers and their infants.
18
19 Some of the experiences identified in relation to postpartum anxiety disorders were feeling of
20
21 loss, frustration and guilt, accompanied by physical symptom of tension.⁸ Postpartum anxiety
22
23 is associated with disrupted mother–infant attachment, postpartum depression, reduced
24
25 likelihood of breastfeeding, increased risk of infant abuse, delayed cognitive and social
26
27 development in infants, and an increased likelihood of anxiety in children.²⁴ Some studies
28
29 pointed to the importance of distinguishing anxiety from depression in order to provide
30
31 appropriate treatments that target the symptoms and etiology of anxiety.²³
32
33
34
35
36
37
38
39

40 Symptoms of stress during the postpartum period includes difficulty to wind down, over-
41
42 reacting to situations, nervousness, agitation, difficult to relax, and very sensitive to changes.
43
44 Prevalence rate of stress varied between 20% to 40%.²⁵ A study done in Taiwan, identified
45
46 three most common factors that contributes to postpartum stress which includes maternity role
47
48 attainment, lack of social support, and body changes.²⁶ The study also concluded that the level
49
50 of postpartum stress varied based on the duration of postpartum.²⁶ Women who underwent
51
52 caesarean delivery had higher antenatal stress, besides anxiety and depression levels, compared
53
54 to women who did not undergo the procedure.²⁷ In contrary, a study in Lebanon showed that
55
56 an intervention with a postpartum film that addresses common stressors during the postpartum
57
58
59
60

1
2
3 period and making available a 24-hour telephone hotline service, reduces stress in the
4
5 postpartum period.²⁸ In Malaysia, however, no studies have been done to study the prevalence
6
7 of stress during the postpartum period.
8
9

10
11
12 Many studies have been looking into the psychological well-being of mothers using only a
13
14 brief unidimensional instrument such as the Edinburgh Postnatal Depression Scale (EPDS),
15
16 without looking at the other aspects of the psychological well-being of postpartum mothers and
17
18 its associated risk factors.^{22,25,28} Furthermore, studies in Malaysia were conducted in
19
20 Kelantan,¹² Negeri Sembilan¹⁰ and Sabah¹⁰ which have limited external validity to our
21
22 population in Perak in terms of ethnicity and socioeconomic profiles. For example, the study
23
24 done in Kelantan only studies the Malay ethnicity. Meanwhile, in Sabah, the cultural and
25
26 sociodemographic background differs from that of the population in peninsular Malaysia. Risk
27
28 factors such as confinement with in-laws, observing cultural taboos during confinement, lack
29
30 of sleep, postpartum wound pain and other somatic symptoms are not well studied or
31
32 established in the Malaysian context.²⁹ Additionally, studies restricted to women admitted to
33
34 the hospital could be misleading.¹⁶
35
36
37
38
39
40
41

42 Accordingly, this study aims to determine the incidence and risk factors of postpartum
43
44 depression, general depressive symptoms, anxiety and stress among mothers at one-month
45
46 follow-up at public health clinics in Perak.
47
48
49
50

51 **METHODS AND ANALYSIS**

52 **Study design**

53
54 This will be a cross-sectional study over a period of six months from September 2019 to
55
56 February 2020.
57
58
59
60

Setting

The study will be conducted among postpartum mothers who are followed-up postnatally in five public health clinics in Perak, four from Kinta District (urban) and one from Kerian District (sub-urban). The four clinics from Kinta District will be Health Clinic Pasir Pinji, Health Clinic Gunung Rapat, Health Clinic Buntong and Health Clinic Greentown. Whereas the other clinic, Health Clinic Bagan Serai is in Kerian district. These clinics are where the researchers will be practising at the time of this study. These clinics provide antenatal care starting from booking, until postnatal after the mothers have delivered in hospitals. Postnatally, the health of the mothers and babies will be examined during follow-up home visits by nurses from these clinics within days and weeks. The mothers and babies will also be seen by medical officers at the health clinics one month after delivery for general health checks, counselling on contraception and review of the baby including immunization.

Participants

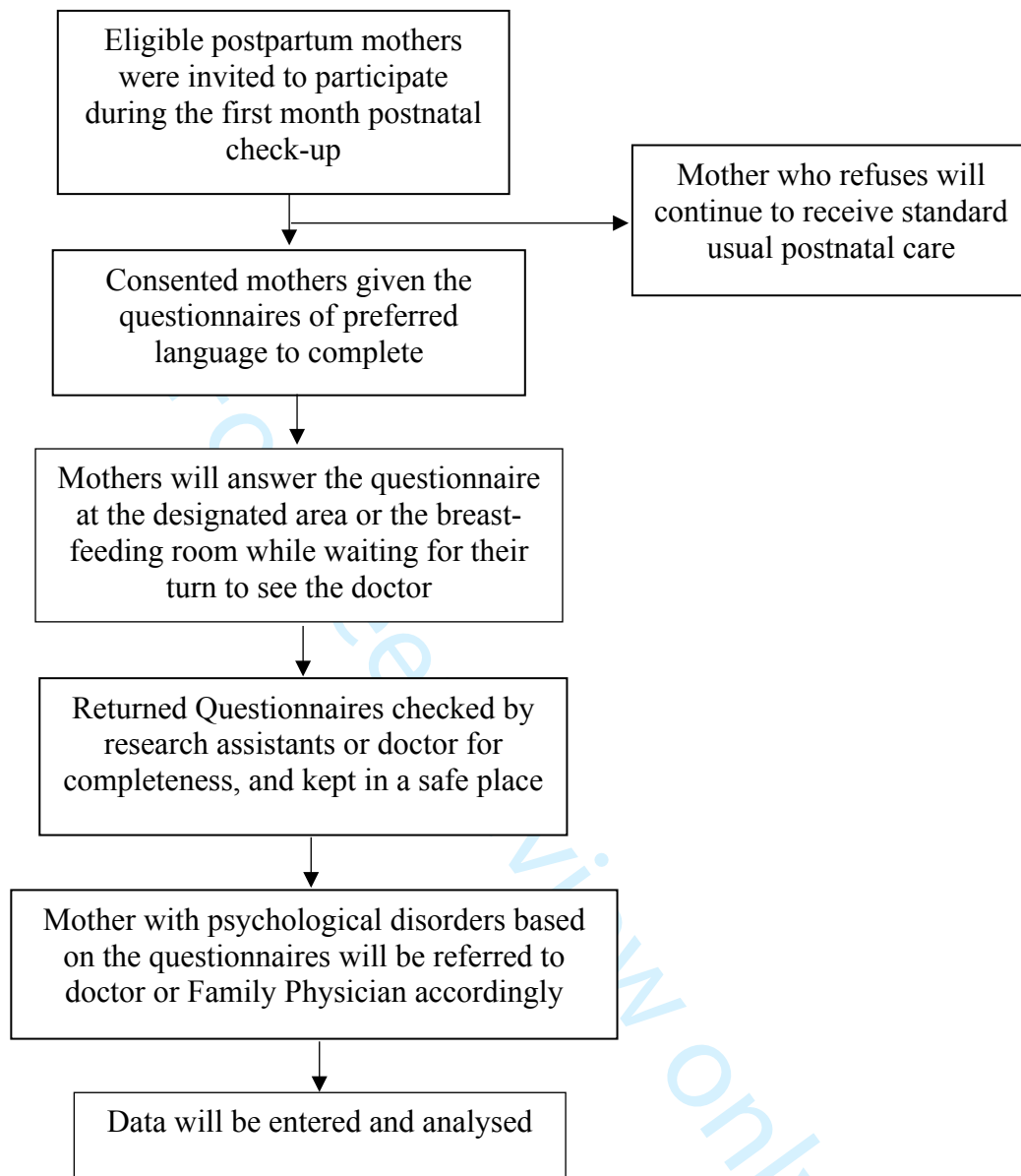
Postnatal mothers who are followed-up at the participating public health clinics during their first month scheduled postnatal visit. These postpartum mothers are those aged 18 years and above, within six weeks post-delivery irrespective of mode of delivery. They must be able to read and understand the Malay or English language, and give written consent. Mothers with a known diagnosis of psychotic disorders such as bipolar mood disorder and schizophrenia as documented in the antenatal book or by self-report from family members are excluded because they may not be able to respond appropriately to the questionnaire. At the same time, non-Malaysian mothers are excluded because of differences in psychosocial background and they are very few in numbers.

Sampling

All eligible postnatal mothers attending the one-month postnatal check-up will be invited to participate. The eligibility will be screened a day earlier based on the clinic copy of the antenatal medical records. For those who fulfil the eligibility criteria, the questionnaires and consent form will be attached to the clinic copy of the antenatal medical records. When the mothers present to the postnatal clinic's registration counter, their eligibility will further be confirmed, followed by an explanation regarding the study, and those who agree to participate will sign the consent form before given the study questionnaires. They will self-administer the questionnaires at a designated waiting area for their turn to the medical consultation. After returning the completed questionnaires, every participant will be given a token of appreciation, which includes a fact sheet on postpartum depression, general depression, anxiety and stress for educational purposes.

All returned questionnaires will be checked for completeness by a research assistant or the doctors on duty at the postnatal clinics. Participants who are found to have postpartum depression based on the EPDS questionnaire or severe psychological disorders based on the DASS-21 will be referred to the doctors or family physicians at the clinic for further management. Patients with mild or moderate score psychological disorders based on the questionnaires will be given appropriate counselling and follow-up care in the health clinics. Confidentiality of the participants will be guarded throughout the study.

Figure 1: Flow of the participants during the data collection



Research Tools

The research tools used in this study include the following three parts and the estimated time required to complete the whole questionnaire is about 30 minutes. Part 1 covers questions on the subject's sociodemographic characteristics and Part 2 covers questions which explores the risk factors according to the variables used. Part 1 and 2 questions were created based on the literature review. The variables used in the questionnaire and their definitions are available in

1
2
3 the Supplementary Material Table S1. Face and content validity of Part 1 and 2 will be further
4 tested in a pilot study with 50 postnatal mothers (10 each in the five health clinics) with the
5 same eligibility (see further below).
6
7
8
9

10
11
12 Part 3 consists of the validated English or Malay version of the Edinburgh Postpartum
13 Depression Scale questionnaire (EPDS) and the Depression Anxiety and Stress Scales (DASS-
14 21).³⁰⁻³⁵ EPDS was originally in the English language and developed in 1987 by Cox, Holden
15 and Saqovsky.¹⁷ The available Malay language version of the EPDS was developed by Azidah
16 et al in 2004 and was validated on a sample of postpartum Malaysian women in Kelantan,
17 North East of Peninsular Malaysia.³⁰ The questionnaire has 10 questions with the total scores
18 ranging from 0 to 30. Items scores range from zero to three on a 4-point Likert scale and scores
19 are summed to get an overall score, with some items reversed scored.³¹ The study findings
20 suggested an EPDS cut-off score value of 11.5 for depression with the sensitivity of 72.7% and
21 specificity of 92.6%.³⁰ The Malay version of the EPDS was also shown to have good internal
22 consistency (Cronbach's alpha = 0.86) and good split-half reliability (Spearman split half
23 coefficient = 0.83). Based on the study conducted by Wan Mahmud and Mohamed, the
24 instrument also showed satisfactory discriminant and concurrent validity. The cut-off point of
25 11 were considered optimal for screening a population of Malay-speaking women at 4 to 12
26 weeks postpartum.³²
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48

49 The DASS-21 scale will be used to determine the incidence of other psychological disorders
50 (general depression, anxiety and stress) among the participants.³³ The DASS-21 consists of
51 seven self-report items for the three different subscales of general depression (DASS-21-D),
52 anxiety (DASS-21-A) and stress (DASS-21-S).^{34,35} Each item is scored on a 4-point Likert
53 scale ranging from 0 ("did not apply to me at all") to 3 ("applied to me very much"). The scores
54
55
56
57
58
59
60

1
2
3 for the total DASS-21 and for each subscale are summed. DASS is suitable to be used in many
4 different clinical settings.^{36,37} The score ranges from 0-21 for each of the subscales with a
5 separate scoring each. For general depression, scores 5 and below indicate no depression,
6 scores 6-10 indicate moderate depression and scores higher than 10 indicate major depressive
7 symptoms. For the anxiety subscale, scores 4 and below indicate no anxiety, scores 5-8 indicate
8 moderate anxiety symptoms and scores higher than 8 indicate major anxiety. For the stress
9 category, scores 7 and below excludes stress, score 8-13 indicates moderate stress and scores
10 13 and above shows major stress.³³ The Malay version DASS-21 had a Cronbach's alpha values
11 of 0.75, 0.74, and 0.79 for depression, anxiety and stress subscales, respectively.³⁵ A systematic
12 review of the measurement properties of DASS-21 showed significant association with other
13 similar constructs such as with the Hospital Anxiety and Depression Scale (pooled $r= 0.69$ for
14 depression, and pooled $r= 0.66$ for anxiety), the Beck Depression Inventory (pooled $r= 0.73$),
15 Beck Anxiety Inventory (pooled $r= 0.75$), and Positive and Negative Affect Schedule (pooled
16 $r= 0.56$).³⁸ The overall construct validity was rated as high in the hypotheses testing.³⁹

17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38 By using both EPDS and DASS-21, we will also be able to determine the incidence of
39 postpartum depression and other psychological well-beings among the postpartum mothers at
40 the same setting.
41
42
43
44
45
46

47 **Pilot study**

48
49 We have pilot tested the data collection process in August 2019 at each participating health
50 clinic until 10 eligible participants completed the questionnaires. Improvement on the
51 questionnaires and process were carried out based on the findings from this testing. The 50
52 samples from this pilot study will not be included in the actual study.
53
54
55
56
57
58
59
60

Sample size calculation

Based on the various study done in Malaysia, the incidence of postpartum depression and psychological disorders range from 3.9 to 28.8%. There was no past study with a population that is the same to our study. We take the approach of best estimation of the incidence rate for postpartum depression and psychological disorders to be at 10%. Using logistic regression in the GPower 3.1.2 and with estimated proportion of postpartum depression and psychological disorders as 10%, with the smallest odd ratio of 2.5 of the potential risk factor⁴⁰ with 0.80 power and significance at two-sided α of 0.05, the estimated sample size is 321. Taking into consideration of about 30% of non-response rate and incomplete or missing data in patient's medical record and questionnaires returned, the sample size needed becomes 459.

Data analysis

The investigators have the overall responsibility for compilation, maintenance and management of the study questionnaires and database. The database is stored on a password-protected computer in a locked office. In making sure that data entry is of good quality, all research assistants will be trained to facilitate in the administration of the questionnaires in a standardized manner and to check on the completeness of the returned questionnaires. Data will be entered and checked for accuracy by two separate persons from two different clinics before analysis. Multiple imputation (with 10 runs) may be used to replace missing data in variables. Imputed variables will be set within a pre-defined clinically possible range. Data cleaning will be done using SPSS to check that each data point is entered within plausible ranges or else verification from the original data source will be conducted. Data analysis will be done using SPSS version 25.0 (IBM, Chicago, IL).

1
2
3 Descriptive statistics will be used to summarize the sociodemographic data. We will report the
4 sociodemographic and clinical characteristics (age, ethnicity, education level, parity and mode
5 of delivery) of the non-participants and refusals, to compare to that of the participants.
6
7 Numerical data will be presented as mean (standard deviation) or median (interquartile range)
8 based on the normality of their distribution. Categorical data will be presented as frequency
9 (percentage). Some categorical variables will be further merged: marital status into married/not
10 married and divorced or widowed; educational levels into primary/ secondary/ diploma or
11 technical studies/ tertiary education and never been schooling; occupation into unemployed/
12 routine and manual occupation/ intermediate occupation/ higher managerial, administrative
13 and professional occupations; household income into less than RM1000, RM1000 – RM5000,
14 RM5000 – RM 10,000 and more than RM 10,000; with whom mother observed postnatal care
15 into with parents, parents-in-law, husband, confinement lady or confinement centre, alone, and
16 others; mode of delivery into normal vaginal delivery/ instrumental delivery/ planned caesarean
17 section and emergency caesarean section. Outcomes of the baby include alive or not, gender
18 male or female, baby weight, number of babies whether one or more than one, term or preterm,
19 admission during postpartum period, any medical complication. Correlation between the total
20 scores for postpartum depression, general depressive symptoms, anxiety and stress will be done
21 using the Pearson's or the Spearman's according to the distribution of the total scores, normally
22 or non-normally distributed, respectively.
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48

49 To analyze the association between the sociodemographic and clinical variables with PPD,
50 general depressive symptoms, anxiety and stress, multiple or multinomial logistic regressions
51 analyses will be used after categorization of these outcomes according to the recommended
52 cut-offs. A cut-off points of 11 based on the EDPS will be considered as having PPD.³² For
53 general depression, scores 5 and below indicates no depressive sign, scores 6-10 indicate
54
55
56
57
58
59
60

1
2
3 moderate depression and scores higher than 10 indicate major depressive symptoms. For the
4
5 anxiety subscale, scores 4 and below indicate no anxiety, score 5-8 indicate moderate anxiety
6
7 symptoms and scores higher than 8 indicate major anxiety. For the stress category, scores 7
8
9 and below excludes stress, score 8-13 indicates moderate stress and scores 13 and above shows
10
11 major stress.³³ The lowest scored category will be used as the referent group, and the PPD,
12
13 general depressive symptoms, anxiety and stress will be represented by the two higher scored
14
15 categories, respectively. We may run additional multinomial logistic regression analyses with
16
17 the three categories and to compare the results if the sample size within each of the categories
18
19 allow. Those sociodemographic and clinical factors with a *P* value < 0.20 from the simple
20
21 logistics regression analyses (crude odds ratio) will be included in the final multiple logistics
22
23 regression analyses (adjusted odds ratio). Multicollinearity between any independent variables
24
25 will be checked according to the tolerance < 0.4 ($VIF \geq 2.5$). In the present of multicollinearity,
26
27 the more meaningful or important variable from clinical perspectives will be selected for use
28
29 in the final regression analysis. Odds ratio (OR) will be presented with 95% confidence interval
30
31 (CI). *P* value of <0.05 is considered statistically significant. In all the final models, Q-Q plots
32
33 will be checked for normality of residuals, the residual plots will be checked for linearity and
34
35 homogeneity assumptions to ensure statistical assumptions are acceptably met.
36
37
38
39
40
41
42
43
44

45 **Expected outcomes**

46
47 This study aims to obtain accurate estimates of the incidences of postpartum depression,
48
49 general depression, anxiety and stress among the postpartum mothers in public health clinics
50
51 in Perak. The five public health clinics chosen for this study are likely to be representative of
52
53 the Perak population from the aspects of ethnicity distribution. Although all ethnicities in
54
55 Malaysia can read and understand the Malay language to some extent but without having the
56
57 Chinese and Tamil versions of the questionnaires available, may impair responses from
58
59
60

1
2
3 mothers of these ethnicities with lower educational background. We will assess the
4 representativeness of the participants to the population of postpartum mothers in Perak and
5 nationwide from other socio-demographic aspects and clinical characteristics from the most
6 recent report of the National Obstetrics Registry.⁴¹
7
8
9
10
11
12

13
14 All the five participating clinics have a separate service for Maternal and Child Health care
15 with the estimated live birth ranging from 450 to 1500 babies per year in each clinic. Thus, we
16 will be able to reach the target sample size. General depressive symptoms, anxiety and stress
17 are novel variables that have been shown to be predictors of postpartum depression but have
18 been rarely explored in the Malaysian setting. As these concepts are personal and sensitive, the
19 study adopts self-administration approach and facilitated by a trained research assistant only to
20 clarify difficult items faced by the respondents. Furthermore, a quiet designated area provided
21 will hopefully help to improve quality responses.
22
23
24
25
26
27
28
29
30
31
32
33

34
35 By identifying the demographic and clinical risk factors associated with depression, anxiety
36 and stress in postpartum mothers, effective counselling and awareness programs can be
37 designed for high risk pregnant mothers. The findings of this study may inform the public for
38 better awareness on psychological well-being during the postpartum period. This may further
39 help in reducing the incidences of postpartum depression, anxiety and stress in mothers with a
40 newborn.
41
42
43
44
45
46
47
48
49
50

51 **Patient and Public Involvement**

52
53 Based on feedbacks from the patients involved in the pilot study, improvement on the
54 questionnaires and process were implemented.
55
56
57
58
59
60

ACKNOWLEDGEMENTS

Author Contributions

All authors conceived the study from the beginning. TP assisted with development of the questionnaire and variables, VG and PS contributed to the study design, PNMAB assisted with the sample size calculation, PK and PNMAB will assist with the data analysis, SAMR drafted the initial manuscript, study design, and drafted the final study protocol. LZM, SA and VP provided local guidance and general administrative support for the study at the clinic level. BHC supervised and contributed to all aspects of the study. All authors critically revised the study protocol and approved the final manuscript for publication. BHC is the guarantor of the study.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors. However, it is supported by the Academy of Family Physicians Malaysia.

Competing Interest

None

ETHICS AND DISSEMINATION

Ethical consideration

This study is registered on the National Medical Research Register (NMRR-19-868-47647) and ethics approval has been obtained from the Medical Research and Ethics Committee (MREC) Ministry of Health Malaysia with the reference number of KKM/NIHSEC/P19-1129(11) on 07 August 2019. All collected data and responses obtained from the observation

1
2
3 will be kept strictly confidential and no unique identifier(s) will be present on the
4
5 questionnaire package. Results and data presented will not identify individual mothers.
6
7 Participation in this study will not bring any risk or harm to the current treatment of postnatal
8
9 mothers.
10
11
12
13

14 **Privacy and Confidentiality**

15
16 Participant's name will be linked to the study identification number for this research only on
17
18 the Consent Form. The study identification number instead of patient identifiers will be used
19
20 on the data sheet. All data will be entered into a computer that is protected. On completion of
21
22 the study, data in the computer will be copied to CDs and data in the computer will be erased.
23
24 CDs and any hardcopy data will be safeguarded in a locked cabinet in the Sister's room in the
25
26 designated public health clinics of the investigators and maintained for a minimum of seven
27
28 years after the completion of the study. The CDs and data will be destroyed after the period
29
30 of storage. Subjects will not be allowed to view their personal data, as the data will be
31
32 consolidated into a database. Subjects can write to the investigators to request access to the
33
34 study findings if the need arises.
35
36
37
38
39
40
41
42

43 **Publication Policy**

44
45 No personal information will be disclosed and participants will not be identified when the
46
47 findings of the research are published. If name and details of patients need to be disclosed, a
48
49 written expressed consent will be obtained prior to presentation and publication.
50
51
52
53

54 **Data sharing statement**

55
56 Collected data will be made available upon request to the corresponding author. All requests
57
58 are to provide a clear study protocol to the principal investigator. Deidentified and
59
60

1
2
3 anonymised participant data for all the outcomes will be shared once the results have been
4
5 published. There is no time period or limit. Data use will be advised to refer to the published
6
7 study protocol.
8
9
10

11 REFERENCES

- 12
13
14
15 1. McMahon, Catherine & Barnett, et al. Postnatal depression, anxiety and unsettled
16
17 infant behaviour. *The Australian and New Zealand journal of psychiatry* 2001. 35.
18
19 581-8. 10.1080/0004867010060505
20
- 21
22 2. Abdul Kadir, Azidah & Nordin, et al. Postnatal depression in mothers attending
23
24 primary care clinics in Kelantan, Malaysia. *International Medical Journal* 2005. 12.
25
26 105-109.
27
- 28
29 3. Klainin P, Arthur DG. Postpartum depression in Asian cultures: A literature review.
30
31 *International Journal of Nursing Studies* 2009;46: 1355–1373.
32
- 33
34 4. Siti R.M. Arifin, A. Ahmad, Rasnah A. Rahman, et al. Postpartum depression in
35
36 Malaysian women: the association with the timing of pregnancy and sense of personal
37
38 control during childbirth. *International Journal of Academic Research Part B*; 2014;
39
40 6(3), 143-149. DOI: 10.7813/2075-4124.2014/6-3/B.21.
41
- 42
43 5. Stewart DE, Robertson E, Dennis CL, et al. Postpartum depression: literature review
44
45 of risk factors and interventions. Toronto: University Health Network Women's Health
46
47 Program for Toronto Public Health; 2003.
48
- 49
50 6. Stewart DE, Robertson E, Dennis CL, et al. An evidence-based approach to post-
51
52 partum depression. *World Psychiatry*. 2004;3(2):97-8. PubMed PMID: 16633465;
53
54 PubMed Central PMCID: PMC1414677
55
56
57
58
59
60

- 1
2
3 7. Teissedre F, Chabrol H. A study of the Edinburgh Postnatal Depression Scale (EPDS)
4 on 859 mothers: detection of mothers at risk for postpartum depression. *Encephale*.
5
6 2004;30(4):376-81. PubMed PMID:15538313
7
- 8
9
10 8. Ali E. Women's experiences with postpartum anxiety disorders: a narrative literature
11 review. *Int J Womens Health* 2018;10:237-249. doi:10.2147/IJWH.S158621. PubMed
12 PMID: 29881312; PubMed Central PMCID: PMC5983016
13
14
- 15 9. Sohr-Preston SL, Scaramella LV. Implications of timing of maternal depressive
16 symptoms for early cognitive and language development. *Clin Child Fam Psych Rev*.
17 2006;9(1):65-83.
18
19
- 20 10. Grace J, Lee KK, Ballard C, et al. The relationship between post-natal depression,
21 somatization and behaviour in Malaysian women. *Transcult Psychiatry*
22 2001;38(1):27-34.
23
24
- 25 11. Azidah AK, Shaiful BI, Rusli N, et al. Postnatal Depression and Socio-Cultural
26 Practices Among Postnatal Mothers in Kota Bahru, Kelantan, Malaysia. *Med J*
27 *Malaysia* 2006; 61(1): 76-83.
28
29
- 30 12. Wan Mohd Rushidi Wan Mahmud, & Mohd. Jamil Yaacob. Postpartum depression: A
31 survey of the incidence and risk factors among Malay women in Beris Kubor Besar,
32 Bachok, Kelantan *Malaysian Journal of Medical Sciences* 2002;9(1): 41-48.
33
34
- 35 13. Ravi Prakash U, Ranadip Chowdury, Aslyeh S, et al. Postpartum depression in India:
36 a systematic review and data analysis. *Bulletin of the World Health Organization*
37 2017; 95:706-717C. doi: <http://dx.doi.org/10.2471/BLT.171.192237>
38
39
- 40 14. Alessandra B., Susan C., Susan P., et al. Identifying the women at risk of antenatal
41 anxiety and depression: systematic review. *Journal of Affective Disorders*
42 2016;191(2):62-67. <https://doi.org/10.1016/j.jad.2015.11.014>
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

- 1
2
3 15. Chutima Roomruangwong, Sinaporn Withayavanitchai, Michael Maes. Antenatal and
4
5 postnatal risk factors of postpartum depression symptoms in Thai women: A case-
6
7 control study. *Reproductive Healthcare* 2016;10: 25–31.
8
9
- 10 16. Alipour Z., Lamyian M., Hajizadeh E. Anxiety and fear of childbirth as predictors of
11
12 postnatal depression in nulliparous women. *Women Birth*. 2012;25: e37–e43.
13
14
- 15 17. Cox J., Holden J., Sagovsky R. Detection of postnatal depression. Development of the
16
17 10-item Edinburgh Postnatal Depression Scale. *The British Journal of Psychiatry*.
18
19 1987;150(6):782–6.
20
21
- 22 18. de Paula Eduardo JAF, de Rezende MG, Menezes PR, et al. Preterm birth as a risk
23
24 factor for postpartum depression: A systematic review and meta-analysis. *J Affect*
25
26 *Disord*. 2019;259:392-403. doi:10.1016/j.jad.2019.08.069
27
28
- 29 19. American Psychiatric Association . Diagnostic and Statistical Manual of Mental
30
31 Disorders. 5th ed. Washington, DC: American Psychiatric Association; 2013
32
- 33 20. Wenzel A, Haigen E, Jackson L, et al. Anxiety symptoms and disorders at eight
34
35 weeks postpartum. *J Anxiety Disord*. 2005;19(3):295–311.
36
37
- 38 21. Odette Bernazzani, Jean-François Saucier, H el ene David, et al. Psychosocial
39
40 predictors of depressive symptomatology level in postpartum women. *Journal of*
41
42 *Affective Disorders* 1997; 46(1): 39-49.
43
44
- 45 22. Heron J, O Connor TG, Evans J, et al. The course of anxiety and depression through
46
47 pregnancy and the postpartum in a community sample. *Journal of Affective Disorder*.
48
49 2004; 80 (1) 65-73.
50
51
- 52 23. Milgrom J, Martin PR, Negri LM: Treating postnatal depression: a psychological
53
54 approach for health care practitioners. Chichester, John Wiley and Sons; 1999.
55
- 56 24. Wenzel A, Haugen E, Jackson L, et al. Prevalence of generalized anxiety at eight
57
58 weeks postpartum. *Arch Womens Ment Health*. 2003;6(1):43–49
59
60

- 1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
25. Anniverno R, Bramante A, Mencacci C, Durbano F. New Insights into anxiety disorders. In: Durbano F, editor. *Anxiety Disorders in Pregnancy and the Postpartum Period*. London, UK: INTECH Open Access Publisher; 2013. pp. 260–285
 26. Hung, C. and Chung, H. (2001), The effects of postpartum stress and social support on postpartum women's health status. *Journal of Advanced Nursing* 2001; 36: 676-684. doi:[10.1046/j.1365-2648.2001.02032.x](https://doi.org/10.1046/j.1365-2648.2001.02032.x)
 27. Danielle Clout, Rhonda Brown. Sociodemographic, pregnancy, obstetric, and postnatal predictors of postpartum stress, anxiety and depression in new mothers. *Journal of Affective Disorders* 2015; 188: 60-67.
 28. Osman H, Saliba M, Chaaya M, et al. Interventions to reduce postpartum stress in first-time mothers: a randomized-controlled trial. *BMC Womens Health*. 2014;14:125. Published 2014 Oct 15. doi:10.1186/1472-6874-14-125
 29. Zainab AM, Pereira XV. Depression in primary care. Part 1: Screening and diagnosis. *Malaysian Family Physician*. 2007;2(3):94-101
 30. Kadir AA, Nordin R, Ismail SB, et al. Validation of the Malay Version of Edinburgh Postnatal Depression Scale for Postnatal Women in Kelantan, Malaysia. *Asia Pac Fam Med*. 2004;3:9–18.
 31. Kernot, J., Olds, T., Lewis, L.K. & Maher, C. (2015) Test-retest reliability of the English version of the Edinburgh Postnatal Depression Scale. *Arch Womens Ment Health*, 18, 255-257. DOI: 10.1007/s00737-014-0461-4.
 32. Mahmud WM, Awang A, Mohamed MN. Revalidation of the Malay version of the Edinburgh postnatal depression scale (EPDS) among Malay postpartum women attending the Bakar Bata health Center in Alor Setar, Kedah, north west of peninsular Malaysia. *The Malaysian journal of medical sciences: MJMS*. 2003;10(2):71

- 1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
33. Lovibond SH, Lovibond PF. Manual for the Depression Anxiety Stress Scales. Sydney: Psychology Foundation; 1995
 34. Henry JD, Crawford JR. The shortform version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *Br J Clin Psychol* 2005; 44:227-239.
 35. Ramli M, MA Fadzil, Zain Z. Translation, validation and psychometric properties of Bahasa Malaysia version of the Depression Anxiety and Stress Scales (DASS). *ASEAN Journal of Psychiatry* 2007;8 (2):82-89.
 36. Lovibond PF. Long-term stability of depression, anxiety, and stress syndromes. *J Abnorm Psychol.* 1998;107(3):520-26.
 37. Crawford JR, Henry JD. The Depression Anxiety Stress Scale (DASS): Normative data and latent structure in a large non-clinical sample. *Br J Clin Psychol.* 2003; 42:111-31.
 38. Lee, J., Lee, EH. & Moon, S.H. Systematic review of the measurement properties of the Depression Anxiety Stress Scales-21 by applying updated COSMIN methodology. *Qual Life Res* 2019;28(9):2325-2339. doi.org/10.1007/s11136-019-0217-x
 39. Sherina MS, Arroll B, Goodyear-Smith F, et al. Prevalence of depression among women attending a primary urban care clinic in Malaysia. *Singapore Med J* 2012; 53(7): 468-73.
 40. ASM Yusuff, L Tang, CW Binns, et al. Prevalence and risk factors for postnatal depression in Sabah, Malaysia: a cohort study. *Women and Birth* 2014: 28(1), 25-29.
 41. Ravichandran Jeganathan (Eds). Preliminary Report of National Obstetrics Registry, Jan 2013 – Dec 2015. Kuala Lumpur, Malaysia: National Obstetrics Registry 2013-2015. Available on www.acrm.org.my

Supplementary Table S1: Definitions of the variables

No.	Variables (Operational definition)	Description	Type of variable
1	Antenatal code	<ul style="list-style-type: none"> • White • Green • Yellow 	Categorical
2	Age	Maternal age in completed years	Interval
3	Ethnicity -according to the paternal side	<ul style="list-style-type: none"> • Malay • Chinese • Indian • Others 	Categorical
4	Religion	<ul style="list-style-type: none"> • Islam • Buddha • Hindu • Christian • Others 	Categorical
5	Marital status	<ul style="list-style-type: none"> • Single • Married • Divorced/ • Widow 	Categorical
6	Educational level - highest attained	<ul style="list-style-type: none"> • Primary education • Secondary education • Diploma/ Technical studies • Tertiary education • Never school 	Categorical
7	Maternal Occupation	<ul style="list-style-type: none"> • Unemployed • Routine and manual occupations • Intermediate occupations • Higher managerial, administrative and professional occupations 	Categorical
8	Duration of marriage	Duration of marriage in completed years	Interval
9	Husband occupation	<ul style="list-style-type: none"> • Unemployed • Routine and manual occupations • Intermediate occupations • Higher managerial, administrative and professional occupations 	Categorical
10	Combined household income	<ul style="list-style-type: none"> • <RM1000 • RM1000-RM5000 • RM5000-RM10,000 • >RM10,000 	Categorical
11	Smoking status -all types	<ul style="list-style-type: none"> • Yes, intensity – no of stick(s) • No • Ex-smoker 	Categorical

12	Alcohol status -all types	<ul style="list-style-type: none"> • Yes • No • Currently stopped 	Categorical
13	Husband practicing polygamy	<ul style="list-style-type: none"> • Yes • No 	Categorical
14	If polygamy, wife no	<ul style="list-style-type: none"> • 1 • 2 • 3 • 4 	Categorical
15	No of children	<ul style="list-style-type: none"> • 0 • 1 • 2 • 3 • 4 • >5 	Ordinal
16	Pre pregnancy baby gender preference	<ul style="list-style-type: none"> • Male • Female • No preference 	Categorical
17	Antenatal care	<ul style="list-style-type: none"> • Government • Private • None 	Categorical
18	Planned pregnancy -Is the current pregnancy planned and not unexpected?	<ul style="list-style-type: none"> • Yes • No 	Categorical
19	Satisfied with marriage -self-report	<ul style="list-style-type: none"> • Yes • No 	Categorical
20	Marital problems -respondent's own perception of her marriage	<ul style="list-style-type: none"> • Yes • No 	Categorical
21	Period of marital problems	<ul style="list-style-type: none"> • Before child delivery • After child delivery 	Categorical
22	Stable relationship with husband - self-report	<ul style="list-style-type: none"> • Yes • No 	Categorical
23	Domestic violence -Self-report of physical or emotional abuse at home during young before marriage	<ul style="list-style-type: none"> • Yes • No 	Categorical
24	Domestic violence in this marriage and during pregnancy	<ul style="list-style-type: none"> • Yes • No 	Categorical
25	Relationship with parents -respondent's own perception of the relationship between mother and her parents	<ul style="list-style-type: none"> • Yes • No 	Categorical

26	Relationship with parent in law - respondent's own perception of the relationship with her in parent in law	<ul style="list-style-type: none"> • Yes • No 	Categorical
27	Underlying medical illness before pregnancy -Any underlying diabetes, hypertension, asthma or any other chronic illnesses	<ul style="list-style-type: none"> • Yes • No 	Categorical
28	Underlying medical illness during pregnancy -Hypertension, gestational diabetes etc	<ul style="list-style-type: none"> • Yes • No 	Categorical
29	History of miscarriage -any history of abortion before 22 weeks in the previous pregnancy	<ul style="list-style-type: none"> • Yes • No 	Categorical
30	Underlying mental illness -Diagnosed of having mental illness prior to pregnancy	<ul style="list-style-type: none"> • Yes • No 	Categorical
31	History of mental illness during pregnancy -Diagnosed of having mental illness during her current pregnancy	<ul style="list-style-type: none"> • Yes • No 	Categorical
32	History of mental illness during postpartum period -Diagnosed of having mental illness during her postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical
33	Family history of mental illness -Is there any parents of 1 st degree relative being diagnosed of having mental illness?	<ul style="list-style-type: none"> • Yes • No 	Categorical
34	Inadequate help from spouse during postpartum period - respondent's own perception of inadequate support during postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical
35	Inadequate help from other family members during postpartum period - respondent's own perception of inadequate support during postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical
36	Inadequate help from others during postpartum period - respondent's own perception of inadequate support during postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical

37	Inability to establish breast feeding -the inability to exclusively breast feed, requiring top up using formula milk	<ul style="list-style-type: none"> • Yes • No 	Categorical
38	No confidence to care for the child -the inability of mother to care for the baby, thus being dependent on others	<ul style="list-style-type: none"> • Yes • No 	Categorical
39	Undergone stressful life events -any recent events, occurred during antenatal and postpartum period, such as financial burden, passing of her loved ones or events that are perceived as stressful by respondent herself	<ul style="list-style-type: none"> • Yes • No 	Categorical
40	Any cultural taboos observed during postnatal care that contributed to mother's stress	<ul style="list-style-type: none"> • Yes • No 	Categorical
41	With whom respondent observed postnatal care during confinement	<ul style="list-style-type: none"> • Parents • Parents in law • Husband • Confinement lady/ centre • Alone 	Categorical
42	Inadequate help to take care of newborn at night - self-report	<ul style="list-style-type: none"> • Yes • No 	Categorical
43	Inadequate sleep/rest - respondent's own perception of inadequate sleep or rest during postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical
44	Dissatisfied with body weight and appearance post delivery - respondent's own perception on the satisfaction of her body weight and appearance post delivery	<ul style="list-style-type: none"> • Yes • No 	Categorical
45	Intrapartum experience - respondent's own perception of having bad experiences during labour. E.g.: unbearable pain	<ul style="list-style-type: none"> • Yes • No 	Categorical
46	Mode of delivery	<ul style="list-style-type: none"> • SVD • Instrumental delivery • Planned caesarean section • Emergency caesarean section 	Categorical

47	Postnatal complication -experienced wound pain, wound breakdown, readmission to ward	<ul style="list-style-type: none"> • Yes • No • 	Categorical
48	Type of complication	List complication.	Categorical
49	Readmission after discharge during postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical
50	Outcome of the baby	<ul style="list-style-type: none"> • Alive • Gender • Birth weight • Twins • Gestational weight • Admission to ward • Medical complication 	Categorical
51	Edinburgh Postpartum Depression scale scoring (Less than 11 – no postpartum depression 11 or more – postpartum depression)	<p>Total score (range 0 - 30)</p> <ul style="list-style-type: none"> • Less than 11 – no postpartum depression • 11 or more – postpartum depression 	Interval Categorical
52	Depression anxiety stress scale (DASS) scoring	<p>Total scores (range 0-21)</p> <ul style="list-style-type: none"> • Depression <ul style="list-style-type: none"> - Mild: 6-7 - Moderate: 8-10 - Severe: 11-14 - Very severe: 15 to 21 • Anxiety <ul style="list-style-type: none"> - Mild: 5-6 - Moderate: 7-8 - Severe: 9-10 - Very severe: 11 to 21 • Stress <ul style="list-style-type: none"> - Mild: 8-9 - Moderate: 10-13 - Severe: 14-17 - Very severe: 18 to 21 	Interval Ordinal Ordinal Ordinal

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of cross-sectional studies

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-8
Objectives	3	State specific objectives, including any prespecified hypotheses	2
Methods			
Study design	4	Present key elements of study design early in the paper	8
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	9-11
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	9-10
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	11-13, Supplementary Table S1
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	14-16
Bias	9	Describe any efforts to address potential sources of bias	16-17
Study size	10	Explain how the study size was arrived at	14
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	14-16
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	14-16
		(b) Describe any methods used to examine subgroups and interactions	14-16
		(c) Explain how missing data were addressed	14-16
		(d) If applicable, describe analytical methods taking account of sampling strategy	14-16
		(e) Describe any sensitivity analyses	14-16

Results			NA
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	NA
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	11
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	NA
		(b) Indicate number of participants with missing data for each variable of interest	NA
Outcome data	15*	Report numbers of outcome events or summary measures	NA
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA
		(b) Report category boundaries when continuous variables were categorized	NA
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	NA
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	16-17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	NA
Generalisability	21	Discuss the generalisability (external validity) of the study results	NA
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	18

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

The Incidence and Risk Factors of Postpartum Depression, General Depressive Symptoms, Anxiety and Stress (PODSAS) among Mothers at First Follow-up Postnatally in Five Public Health Clinics in Perak: A Study Protocol for a Cross-sectional Study

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2019-034458.R1
Article Type:	Protocol
Date Submitted by the Author:	18-Dec-2019
Complete List of Authors:	Mohammad Redzuan, Saidatul; Kementerian Kesihatan Malaysia Kaur, Paream ; Kementerian Kesihatan Malaysia Suntharalingam, Priyasini; Kementerian Kesihatan Malaysia Palaniyappan, Thenmoli ; Kementerian Kesihatan Malaysia Ganasan, Venotha ; Kementerian Kesihatan Malaysia Megat Abu Bakar, Puteri ; Kementerian Kesihatan Malaysia Marmuji, Lili ; Kementerian Kesihatan Malaysia Ambigapathy, Subashini ; Family Health Development Division, Ministry of Health Malaysia V. , Paranthaman; Kementerian Kesihatan Malaysia Chew, Boon; Universiti Putra Malaysia, Serdang
Primary Subject Heading:	General practice / Family practice
Secondary Subject Heading:	General practice / Family practice, Mental health, Obstetrics and gynaecology
Keywords:	PRIMARY CARE, Adult psychiatry < PSYCHIATRY, MENTAL HEALTH

SCHOLARONE™
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

The Incidence and Risk Factors of Postpartum Depression, General Depressive Symptoms, Anxiety and Stress (PODSAS) among Mothers at First Follow-up Postnatally in Five Public Health Clinics in Perak: A Study Protocol for a Cross-sectional Study

Saidatul Akmar Mohammad Redzuan¹; akmar.redz@gmail.com

Paream Kaur²; drpaream@yahoo.com

Priyasini Suntharalingam³; priya_divine@yahoo.com.sg

Thenmoli Palaniyappan⁴; pthenmoli_88@hotmail.com

Venotha Ganasan¹; gvenotha@yahoo.com.my

Puteri Normalina Megat Abu Bakar⁵; puterinormalina@gmail.com

Lili Zuryani Marmuji¹; lilizuryani@yahoo.co.uk

Subashini Ambigapathy³; subaambigapathy@gmail.com

V. Paranthaman²; drparan@gmail.com

Boon-How Chew⁶; chewboonhow@upm.edu.my

Author Affiliations

¹ Klinik Kesihatan Gunung Rapat, Pejabat Kesihatan Daerah Kinta, Perak

² Klinik Kesihatan Greentown, Pejabat Kesihatan Daerah Kinta, Perak.

³ Klinik Kesihatan Buntong, Pejabat Kesihatan Daerah Kinta, Perak.

⁴ Klinik Kesihatan Pasir Pinji, Pejabat Kesihatan Daerah Kinta, Perak.

⁵ Klinik Kesihatan Bagan Serai, Pejabat Kesihatan Daerah Kerian, Perak.

⁶ Department of Family Medicine, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Serdang, Selangor, Malaysia.

Correspondence to: Boon-How Chew, Department of Family Medicine, Faculty of Medicine & Health Sciences, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia.

Email: chewboonhow@upm.edu.my

ABSTRACT

Introduction: Postpartum depression, general depressive symptoms, anxiety and stress are often overlooked, and they can cause a considerable amount of morbidity to new mothers, their babies and families. The aim of this study is to determine the incidence of depression (postpartum and general), anxiety and stress among postpartum mothers in five public health clinics in Perak, and to identify their associated risk factors. Findings from this study may inform the needs for early screening, detection and encourage development of interventions to reduce its occurrence and to support mothers with postpartum depression, general depressive symptoms, anxiety and stress.

Methods and Analysis: This cross-sectional study will recruit 459 postpartum mothers consecutively during their first-month postnatal follow-up in five selected public health clinics in Perak from September 2019 to February 2020. Mothers aged 18 years and above with all modes of deliveries, at one month post-delivery, and able to understand the English and Malay language will be invited to participate. Non-Malaysians and mothers with known diagnosis of psychotic disorders will be excluded from the study. A set of validated questionnaires will capture sociodemographic and possible risk factors, postpartum depression will be measured with the Edinburgh Postpartum Depression Scale questionnaire, and general depressive symptoms, anxiety and stress will be measured with the 21-item Depression, Stress and Anxiety Scale. Data analysis will be conducted using SPSS version 25.0 (IBM, Chicago, IL). Besides descriptive statistics, possible risk factors will be identified, and their independent associations with depression (postpartum depression and general depressive symptoms combined and separately), anxiety and stress will be estimated with multivariable regressions analyses.

Ethics and Dissemination The study protocol has been reviewed and approved by the Medical Research and Ethics Committee, Ministry of Health Malaysia on 7th August 2019.

1
2
3 All results from this study will be reported and shared with the local health stakeholders, and
4
5 disseminated through conferences proceedings as well as publication in journals.
6
7
8
9

10 **Article Summary**

11 **Strengths and Limitations of This Study**

- 12 • This study will examine the incidence proportion of depression (postpartum
13 depression and general depressive symptoms combined and separately), and other
14 psychological well-being (anxiety and stress) that have not been well studied before at
15 one month postpartum.
16
- 17 • Five public health clinics in urban and sub-urban areas of Perak may have limitation
18 in representativeness of the participants to the nationwide population.
19
- 20 • Self-administration of the questionnaires is encouraged and facilitated to improve data
21 quality.
22
- 23 • Respondents will not reflect the incidence of depression, anxiety and stress at other
24 time points, or prevalence of these conditions during the first few weeks after delivery
25 or months later in the postpartum period.
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41

42 Word count: 4793 (Main text until Expect Outcome, excluding title page, abstract,
43 acknowledgement, references, figures and tables).
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

INTRODUCTION

After a childbirth, a woman undergoes multiple changes that is associated with physical and emotional domains.¹ Some of the common physical changes experienced during pregnancy includes weight gain, hair growth, and stretch marks; after pregnancy, weight loss, hair loss, and sagging breasts are the most common changes.¹ Mothers with a new or additional baby also experience emotional changes related to the demands of breastfeeding, childcare stress, maternal neuroticism and difficult infant temperament. In addition, there are also social demands that may contribute to general depressive symptoms and stress such as compliance to the traditional postpartum care practices, financial strain related to low socioeconomic status, social and sexual relationship with the partner and caretaker of the child.^{3,4} Other emotionally draining aspects including biological, obstetric, clinical, psychological, social, and infant factors may also contribute to the incidence of postpartum depression, general depression and stress.^{2,3} Some of the risk factors for postpartum depression (PPD) are different between developing and developed countries such as history of physical abuse, mode of delivery and sex of baby.³ In a research done by Villengas et al entitled *Postpartum Depression Among Rural Women From Developed and Developing Countries: A Systematic Review* The increased risk of PPD in developing countries are related to some unique risk factors which are associated with poor relationship with partner or in laws, having an unemployed and uneducated husband, husband's psychopathology, years of marriage, having more than 5 children, having 2 or more children under the age of 7, infants gender and infants gender. Although the risk factors for PPD are considered multifactorial, studies have consistently identified the significant role of social support. Studies in both developed and developing countries show that the lack of social support is an independent predictor of PPD.^{3,4} Example of other stressors is that Asian cultures dictates that they follow certain traditional rituals after delivery to protect the mother and child and the more general

1
2
3 psychological morbidity refers to cognitive, behavioural, learned helplessness, and self-
4
5 control.³
6
7
8
9

10 PPD is a significant health issue that can impact the health of the mother, her marital
11 relationship, and interaction with the newborn as well as infant growth.⁴ Although the
12 incidence rates of depression do not appear to be higher in women in the period after
13 childbirth compared to age-matched control women which are between 10-15%, but the rates
14 of first onset and severe general depression are elevated by at least three-fold.⁵ Depression at
15 this critical period of life carries special meanings and risks to the woman and her family.⁵ It
16 is possible to identify women with increased risk factors for PPD but the unacceptably low
17 positive predictive values of many currently available antenatal screening tools make it
18 difficult to recommend them for routine care.⁶
19
20
21
22
23
24
25
26
27
28
29
30
31
32

33 Depression is the most common psychological disorder during the postpartum period. The
34 first symptoms usually appear within 4 weeks of delivery,⁷ and the symptoms can range from
35 mild to severe.⁸ According to WHO, PPD begins with symptoms of depressed mood,
36 anhedonia and low energy within a few days of delivery, most commonly on day 3 or day 4,
37 also termed as postpartum blues.⁵ It can persist up to several months, and untreated
38 postpartum depression may lead to subsequent emotional, behavioural and cognitive
39 problems of the child.⁹ Despite these concerns, PPD remains under-diagnosed and under-
40 treated in clinical practices in Malaysia.¹⁰⁻¹² This might be due to the social taboo that is
41 associated with diseases that are related to psychiatry.¹³ Other factors that contribute to the
42 low detection rate includes low screening rate for PPD, and reduced awareness of the illness
43 amongst mothers and caretakers.¹⁰ Studies show that the prevalence of PPD ranged between
44 10 to 15% within 12 months postpartum in the Western societies between 1990 to 2002, and
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 the prevalence were 3.4% to 63.9% within 12 months postpartum among the Asian countries
4
5 between 1998 and 2008.^{3,5} In Malaysia, few studies reported that PPD ranged between 3.9%
6
7 to 20.7%.^{2,11,12} A study in 2002 noted that the incidence of PPD amongst Malay women in
8
9 Bachok, Kelantan was 9.8%.¹² Another study in 2005 showed that the incidence rate of PPD
10
11 at 4-6 weeks postpartum in Hospital University Science Malaysia was 20.7%.² A systematic
12
13 review suggested that a history of general depression, stressful life events, low social support,
14
15 antenatal anxiety, unplanned pregnancy, preference of infant's gender, and low income were
16
17 risk factors leading to PPD in Asian countries such as India and Bangladesh.¹⁴ Another study
18
19 in Thailand reported that a history of lifetime major depression, and depression during
20
21 pregnancy were the most important risk factors for PPD.¹⁵ For Malaysian women, depressive
22
23 symptoms during late pregnancy, an emergency delivery, application of traditional
24
25 postpartum practices, marital problems, as well as low income were associated with an
26
27 increased risk of developing PPD.^{5,16,17} A recent systematic review supported the association
28
29 between preterm birth and PPD.¹⁸ In contrary, a local study suggested that a planned
30
31 pregnancy may prevent the risk of PPD.¹¹
32
33
34
35
36
37
38
39

40 The *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed (DSM-5) categorizes
41
42 general depression based on symptoms such as depressed mood or loss of interest for a
43
44 duration of 2 weeks, while categorizing PPD based on symptoms such as sadness, anxiety or
45
46 worry after the birth of a child.¹⁹ General depressive symptoms during postpartum period
47
48 includes continuous low mood or sadness, feeling hopeless and helpless, having low self-
49
50 esteem, and feeling tearful that the mother is unable to take care of the child. Psychosocial
51
52 predictors of a general depression in a postpartum women includes lower occupational status,
53
54 prenatal depression level, more distal stressors and personal psychiatric history, which
55
56 reflected past and present experiences, showed an indirect effect.²⁰ Based on the Depression
57
58
59
60

1
2
3 Anxiety Stress Scale (DASS) screening questionnaire, general depressive symptoms include
4 not feeling positive, no initiative to do daily things, nothing to look forward to, feeling down-
5 hearted and blue, not enthusiastic, absence of self-worth, and a feeling that life is
6 meaningless. The DSM-5 does not distinguish between postpartum major depression and
7 major depressive disorder, but does provide a postpartum onset specifier for major depressive
8 disorder, defined as onset within four weeks of delivery.²¹ Care for women who suffered from
9 mild to moderate depressive symptoms may be overlooked, resulting in a late diagnosis and
10 increased chances of aggravating PPD, which in turn raises the burden of healthcare costs,
11 and negatively impacting the family relationships.¹
12
13
14
15
16
17
18
19
20
21
22
23
24
25

26 In Malaysia, far less is known about postpartum anxiety. Anxiety disorders are more common
27 in postpartum women than in the general population, with estimates of its incidence based on
28 studies done in the United States²² during the first 6 months of postpartum ranging from 6.1%
29 to 27.9%,^{23,24} with the prevalence of 4.4% to 8.2% at 6 to 8 weeks postpartum.²² A study in
30 Croatia reported 17% prevalence of high anxiety immediately after childbirth, 20% six weeks
31 postpartum, and the comorbidity of anxiety and PPD was 75%.²⁵ Characteristics of anxiety
32 includes excessive worry that lasts and is accompanied by restlessness, fatigue, poor
33 concentration, muscle tension and sleep disturbance.¹⁹ Other symptoms include excessive
34 worry, feeling nervous or on edge, not being able to stop or control worrying, trouble
35 relaxing, easily irritable or annoyed and feeling awful as if something bad is going to happen.
36 While a certain degree of anxiety in response to becoming a new mother is normal and even
37 adaptive, some mothers can experience anxieties that are excessive and debilitating.^{26,27}
38 Examples of postpartum panic disorders include “maternal neurosis” which centrally presents
39 as overvigilance and excess checking on baby’s breathing.²⁶ Excessive anxiety may have
40 long-term effects on the mothers and their infants. Some of the experiences identified in
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 relation to postpartum anxiety disorders were feeling of loss, frustration and guilt,
4 accompanied by physical symptom of tension.⁸ Postpartum anxiety is associated with
5 disrupted mother–infant attachment, postpartum depression, reduced likelihood of
6 breastfeeding, increased risk of infant abuse, delayed cognitive and social development in
7 infants, and an increased likelihood of anxiety in children.²² Some studies pointed to the
8 importance of distinguishing anxiety from depression in order to provide appropriate
9 treatments that target the symptoms and aetiology of anxiety.²⁴

10
11
12
13
14
15
16
17
18
19
20
21 Symptoms of stress during the postpartum period which is the first 6 weeks post-delivery
22 include difficulty to wind down, over-reacting to situations, nervousness, agitation, difficult
23 to relax, and very sensitive to changes. Prevalence rate of stress varied between 20% to
24 40%.²⁶ A study done in Taiwan, identified three most common factors that contributes to
25 postpartum stress which includes maternity role attainment, lack of social support, and body
26 changes.²⁸ The study also concluded that the level of postpartum stress varied based on the
27 duration of postpartum.²⁸ Women who underwent caesarean delivery had higher antenatal
28 stress, besides anxiety and depression levels, compared to women who did not undergo the
29 procedure.²⁹ In contrast, an Islamic lifestyle has been shown to be protective against
30 pregnancy-specific stress.³⁰ A study in Lebanon showed that an intervention with a
31 postpartum film that addresses common stressors during the postpartum period and making
32 available a 24-hour telephone hotline service, reduces stress in the postpartum period.³¹ In
33 Malaysia, however, no studies have been done to study the prevalence of stress during the
34 postpartum period.

35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999
1000

Many studies have been looking into the psychological well-being of mothers using only a brief unidimensional instrument such as the Edinburgh Postnatal Depression Scale (EPDS),

1
2
3 without looking at the other aspects of the psychological well-being of postpartum mothers
4 and its associated risk factors.^{23,26,31} Furthermore, studies in Malaysia were conducted in
5 Kelantan,¹² Negeri Sembilan¹⁰ and Sabah¹⁰ which have limited external validity to our
6 population in Perak in terms of ethnicity and socioeconomic profiles. For example, the study
7 done in Kelantan only studies the Malay ethnicity. Meanwhile, in Sabah, the cultural and
8 sociodemographic background differs from that of the population in peninsular Malaysia.
9 Risk factors such as confinement with in-laws, observing cultural taboos during confinement,
10 lack of sleep, postpartum wound pain and other somatic symptoms are not well studied or
11 established in the Malaysian context.³² Additionally, studies restricted to women admitted to
12 the hospital and data collected solely through interviewing could be misleading as a result of
13 Hawthorne effect and socially pleasing answers.¹⁶
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30

31 Accordingly, this study aims to determine the incidence proportions and risk factors of
32 postpartum depression, general depressive symptoms, anxiety and stress among mothers at
33 one month follow-up at public health clinics in Perak. It will look into an overall depression
34 from the combined EPDS and DASS general depression subscale measures. It will also
35 explore the relationship of these two established measures for any possible contextual
36 differences because few studies if any have examined this.
37
38
39
40
41
42
43
44
45
46

47 **METHODS AND ANALYSIS**

48 **Study design**

49 This will be a cross-sectional study over a period of six months from September 2019 to
50 February 2020. It will measure incidence proportions instead of prevalence because the study
51 is designed to measure the number of new PPD over the number at risk after a specified
52 period of time (one month postpartum).
53
54
55
56
57
58
59
60

Setting

The study will be conducted among postpartum mothers who are followed-up postnatally in five public health clinics in Perak, four from Kinta District (urban) and one from Kerian District (sub-urban). The four clinics from Kinta District will be Health Clinic Pasir Pinji, Health Clinic Gunung Rapat, Health Clinic Buntong and Health Clinic Greentown. Whereas the other clinic, Health Clinic Bagan Serai is in Kerian district. These clinics are where the researchers will be practising at the time of this study. These clinics provide antenatal care starting from booking, until postnatal after the mothers have delivered in hospitals. Postnatally, the health of the mothers and babies will be examined during follow-up home visits by nurses from these clinics within days and weeks. The mothers and babies will also be seen by medical officers at the health clinics one month after delivery for general health checks, counselling on contraception and review of the baby including immunization.

Participants

Postnatal mothers who are followed-up at the participating public health clinics during their first month scheduled postnatal visit. These postpartum mothers are those aged 18 years and above, at one month post-delivery irrespective of mode of delivery, are able to read and understand the Malay or English language, and able to give a written consent. Those who are illiterate will not be included in the study. Mothers with a known diagnosis of depression, neurosis or psychotic disorders such as bipolar mood disorder and schizophrenia as documented in the antenatal book or by self-report from family members are excluded because they may not be able to respond appropriately to the questionnaire. At the same time, non-Malaysian mothers are excluded because of differences in psychosocial background and they are very few in numbers.

Sampling

All eligible postnatal mothers attending the one month postnatal check-up will be invited to participate. The eligibility will be screened a day earlier based on the clinic copy of the antenatal medical records. For those who fulfil the eligibility criteria, the questionnaires and consent form will be attached to the clinic copy of the antenatal medical records. When the mothers present to the postnatal clinic's registration counter, their eligibility will further be confirmed, followed by an explanation regarding the study, and those who agree to participate will sign the consent form before being given the study questionnaires. They will self-administer the questionnaires at a designated waiting area while waiting for their turn to the medical consultation. After returning the completed questionnaires, every participant will be given a token of appreciation, which includes a fact sheet on postpartum depression, general depression, anxiety and stress for educational purposes.

All returned questionnaires will be checked for completeness by a research assistant or the doctors on duty at the postnatal clinics. Participants who are found to have postpartum depression based on the EPDS questionnaire or severe psychological disorders based on the DASS-21 will be referred to the doctors or family physicians at the clinic within the same week of questionnaire completion for further management. Patients with mild or moderate score psychological disorders based on the questionnaires will be given appropriate counselling and follow-up care in the health clinics within a month of questionnaire completion. Confidentiality of the participants will be guarded throughout the study (Figure 1).

Research Tools

The research tools used in this study include the following three parts and the estimated time required to complete the whole questionnaire is about 30 minutes. Part 1 covers questions on the subject's sociodemographic characteristics and Part 2 covers questions which explores the risk factors according to the variables used. Part 1 and 2 questions were created based on the literature review. The variables used in the questionnaire and their definitions are available in the Supplementary Material Table S1. Face and content validity of Part 1 and 2 will be further tested in a pilot study with 50 postnatal mothers (10 each in the five health clinics) with the same eligibility (see further below).

Part 3 consists of the validated English or Malay version of the Edinburgh Postpartum Depression Scale questionnaire (EPDS) and the Depression Anxiety and Stress Scales (DASS-21).³³⁻³⁸ EPDS was originally in the English language and developed in 1987 by Cox, Holden and Saqovsky.¹⁷ The available Malay language version of the EPDS was developed by Azidah et al in 2004 and was validated on a sample of postpartum Malaysian women in Kelantan, North East of Peninsular Malaysia.³³ The questionnaire has 10 questions assessing feelings in the past seven days. Items scores range from zero to three on a 4-point Likert scale and scores are summed to get an overall score ranging from 0 to 30, with some items reversed scored.³⁴ The study findings suggested an EPDS cut-off score value of 11.5 for depression with the sensitivity of 72.7% and specificity of 92.6%.³³ The Malay version of the EPDS was also shown to have good internal consistency (Cronbach's alpha = 0.86) and good split-half reliability (Spearman split half coefficient = 0.83). Based on the study conducted by Wan Mahmud and Mohamed, the instrument also showed satisfactory discriminant and concurrent validity. The cut-off point of 11 were considered optimal for screening a population of Malay-speaking women at 4 to 12 weeks postpartum.³⁵

1
2
3
4
5
6 The DASS-21 scale will be used to determine the incidence of other psychological disorders
7 (general depression, anxiety and stress) among the participants.³⁶ The DASS-21 consists of
8 seven self-report items for the three different subscales of general depression (DASS-21-D),
9 anxiety (DASS-21-A) and stress (DASS-21-S).^{37,38} Each item is scored on a 4-point Likert
10 scale ranging from 0 (“did not apply to me at all”) to 3 (“applied to me very much”). The
11 scores for the total DASS-21 and for each subscale are summed. DASS is suitable to be used
12 in many different clinical settings assessing emotional states over the past one week.^{39,40} The
13 score ranges from 0-21 for each of the subscales with a separate scoring each. For general
14 depression, scores 5 and below indicate no depression, scores 6-10 indicate moderate
15 depression and scores higher than 10 indicate major depressive symptoms. For the anxiety
16 subscale, scores 4 and below indicate no anxiety, scores 5-8 indicate moderate anxiety
17 symptoms and scores higher than 8 indicate major anxiety. For the stress category, scores 7
18 and below excludes stress, score 8-13 indicates moderate stress and scores 13 and above
19 shows major stress.³⁶ The Malay version DASS-21 had a Cronbach’s alpha values of 0.75,
20 0.74, and 0.79 for depression, anxiety and stress subscales, respectively.³⁸ A systematic
21 review of the measurement properties of DASS-21 showed significant association with other
22 similar constructs such as with the Hospital Anxiety and Depression Scale (pooled $r= 0.69$
23 for depression, and pooled $r= 0.66$ for anxiety), the Beck Depression Inventory (pooled $r=$
24 0.73), Beck Anxiety Inventory (pooled $r= 0.75$), and Positive and Negative Affect Schedule
25 (pooled $r= 0.56$).⁴¹ The overall construct validity was rated as high in the hypotheses testing.

26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54 By using both EPDS and DASS-21, we will also be able to determine the incidence of
55 postpartum depression and other psychological well-beings among the postpartum mothers at
56 the same setting.
57
58
59
60

Pilot study

We have pilot tested the data collection process in August 2019 at each participating health clinic until 10 eligible participants completed the questionnaires. Improvement on the questionnaires and process were carried out based on the findings from this testing. The 50 samples from this pilot study will not be included in the actual study.

Sample size calculation

Based on the various study done in Malaysia, the incidence of postpartum depression and psychological disorders range from 3.9 to 28.8%.^{3,4,42} There was no past study with a population that is the same for our study. We take the approach of best estimation of the incidence rate for postpartum depression and psychological disorders to be at 10%. Using logistic regression in the GPower 3.1.2 and with estimated proportion of postpartum depression and psychological disorders as 10%, with the smallest odd ratio of 2.5 of the potential risk factor⁴² with 0.80 power and significance at two-sided α of 0.05, the estimated sample size is 321. Taking into consideration of about 30% of non-response rate and incomplete or missing data in patient's medical record and questionnaires returned, the sample size needed becomes 459.

Data analysis

The investigators have the overall responsibility for compilation, maintenance and management of the study questionnaires and database. The database is stored on a password-protected computer in a locked office. In making sure that data entry is of good quality, all research assistants will be trained to facilitate in the administration of the questionnaires in a standardized manner and to check on the completeness of the returned questionnaires. Data

1
2
3 will be entered and checked for accuracy by two separate persons from two different clinics
4 before analysis. Multiple imputation (with 10 runs) may be used to replace missing data in
5 variables. Imputed variables will be set within a pre-defined clinically possible range. Data
6 cleaning will be done using SPSS to check that each data point is entered within plausible
7 ranges or else verification from the original data source will be conducted. Data analysis will
8 be done using SPSS version 25.0 (IBM, Chicago, IL).
9
10
11
12
13
14
15
16
17
18

19 Descriptive statistics will be used to summarize the sociodemographic data. We will report
20 the sociodemographic and clinical characteristics (age, ethnicity, education level, parity and
21 mode of delivery) of the non-participants and refusals, to compare to that of the participants.
22 Numerical data will be presented as mean (standard deviation) or median (interquartile range)
23 based on the normality of their distribution. Categorical data will be presented as frequency
24 (percentage). Incidence proportion or risk of the occurrence of depression (postpartum
25 depression and general depressive symptoms combined and separately), anxiety and stress
26 will reported based on the recommended cut-offs. A cut-off points of 11 based on the EDPS
27 will be considered as having PPD.³⁵ For general depression, DASS-21-D scores 5 and below
28 indicates no depressive sign, scores 6-10 indicate moderate depression and scores higher than
29 10 indicate major depressive symptoms. The $EDPS \geq 11$ and $DASS-21-D \geq 6$ will be
30 combined to indicate an overall depression. For the anxiety subscale, DASS-21-A scores 4
31 and below indicate no anxiety, score 5-8 indicate moderate anxiety symptoms and scores
32 higher than 8 indicate major anxiety. For the stress category, DASS-21-S scores 7 and below
33 excludes stress, score 8-13 indicates moderate stress and scores 13 and above shows major
34 stress.³⁶ Some categorical variables will be further merged: marital status into married/not
35 married and divorced or widowed; educational levels into primary/ secondary/ diploma or
36 technical studies/ tertiary education and never been schooling; occupation into unemployed/
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 routine and manual occupation/ intermediate occupation/ higher managerial, administrative
4 and professional occupations; household income into less than RM1000, RM1000 –
5 RM5000, RM5000 – RM 10,000 and more than RM 10,000; who supported the mother with
6 postnatal care - parents, parents-in-law, husband, confinement lady or confinement centre,
7 alone, and others; mode of delivery into normal vaginal delivery/ instrumental delivery/
8 planned caesarean section and emergency caesarean section. Outcomes of the baby include
9 alive or not, gender male or female, baby weight, number of babies whether one or more than
10 one, term or preterm, admission during postpartum period, any medical complication.
11 Correlation between the total scores for postpartum depression, general depressive symptoms,
12 anxiety and stress will be done using the Pearson's or the Spearman's according to the
13 distribution of the total scores, normally or non-normally distributed, respectively.
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30

31 To analyse the association between the sociodemographic and clinical variables with PPD,
32 general depressive symptoms, anxiety and stress, multiple or multinomial logistic regressions
33 analyses will be used after categorization of these outcomes according to the recommended
34 cut-offs (see above). The lowest scored category will be used as the referent group, and the
35 PPD, general depressive symptoms, anxiety and stress will be represented by the two higher
36 scored categories, respectively. We may run additional multinomial logistic regression
37 analyses with the three cut-offs categories and to compare the results if the sample size within
38 each of the categories allow. Those sociodemographic and clinical factors with a P value <
39 0.20 from the simple logistics regression analyses (crude odds ratio) will be included in the
40 final multiple logistics regression analyses (adjusted odds ratio). Multicollinearity between
41 any independent variables will be checked according to the tolerance < 0.4 ($VIF \geq 2.5$). In the
42 present of multicollinearity, the more meaningful or important variable from clinical
43 perspectives will be selected for use in the final regression analysis. Odds ratio (OR) will be
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 presented with 95% confidence interval (CI). *P* value of <0.05 is considered statistically
4
5 significant. In all the final models, Q-Q plots will be checked for normality of residuals, the
6
7 residual plots will be checked for linearity and homogeneity assumptions to ensure statistical
8
9 assumptions are acceptably met.
10
11
12
13

14 **Expected outcomes**

15
16 This study aims to obtain accurate estimates of the incidence proportions of postpartum
17
18 depression, general depression, anxiety and stress among the postpartum mothers in public
19
20 health clinics in Perak. We propose to measure an incidence instead of a prevalence or
21
22 prevalence rate because the study designed to measure the number of new conditions (PPD,
23
24 general depressive symptoms, anxiety and stress) over the number of women at risk and free
25
26 from the psychological conditions at immediate postpartum, after a specified period of time
27
28 (one month postpartum). Therefore, it is an incidence proportion or risk of the occurrence of
29
30 the conditions. It is not an incidence rate because the study is cross-sectional in its sampling
31
32 method and does not follow-up the participants. A prevalence would be the effect estimate if
33
34 the study proposes to study the conditions in a defined population such as all women within
35
36 the first month postpartum. We recognise that the distinction between incidence proportion
37
38 and prevalence rate for depression, anxiety and stress is slim when the condition-free status at
39
40 the immediate postpartum is based on self-report without objective measures. However,
41
42 based on the study designs the effect estimate is closer to an incidence proportion than
43
44 prevalence rate.⁴³ For a study to determine the prevalence rate of PPD within one month
45
46 postpartum, it will need a cross-sectional survey among representative women at 1-week, 2-
47
48 week, 3-week and 4-week postpartum using the EPDS.
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 The five public health clinics chosen for this study are likely to be representative of the Perak
4 population from the aspects of ethnicity distribution. Although all ethnicities in Malaysia can
5 read and understand the Malay language to some extent but without having the Chinese and
6 Tamil versions of the questionnaires available, may impair responses from mothers of these
7 ethnicities with lower educational background. We will assess the representativeness of the
8 participants to the population of postpartum mothers in Perak and nationwide from other
9 socio-demographic aspects and clinical characteristics from the most recent report of the
10 National Obstetrics Registry.⁴⁴ All the five participating clinics have a separate service for
11 Maternal and Child Health care with the estimated live birth ranging from 450 to 1500 babies
12 per year in each clinic. Thus, we will be able to reach the target sample size. General
13 depressive symptoms, anxiety and stress are novel variables that have been shown to be
14 predictors of postpartum depression but have been rarely explored in the Malaysian setting.
15 As these concepts are personal and sensitive, the study adopts self-administration approach
16 and facilitated by a trained research assistant only to clarify difficult items faced by the
17 respondents. Furthermore, a quiet designated area provided will hopefully help to improve
18 quality responses.

19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42 By identifying the demographic and clinical risk factors associated with depression, anxiety
43 and stress in postpartum mothers, effective counselling and awareness programs can be
44 designed for high risk pregnant mothers. The findings of this study may inform the public for
45 better awareness on psychological well-being during the postpartum period. This may further
46 help in reducing the incidences of postpartum depression, anxiety and stress in mothers with
47 a newborn.

58 **Patient and Public Involvement**

59
60

1
2
3 Based on feedbacks from the patients involved in the pilot study, improvement on the
4 questionnaires and process were implemented.
5
6
7
8
9

10 **ACKNOWLEDGEMENTS**

11 **Author Contributions**

12 All authors conceived the study from the beginning. TP assisted with development of the
13 questionnaire and variables, VG and PS contributed to the study design, PNMAB assisted
14 with the sample size calculation, PK and PNMAB will assist with the data analysis, SAMR
15 drafted the initial manuscript, study design, and drafted the final study protocol. LZM, SA
16 and VP provided local guidance and general administrative support for the study at the clinic
17 level. BHC supervised and contributed to all aspects of the study. All authors critically
18 revised the study protocol and approved the final manuscript for publication. BHC is the
19 guarantor of the study.
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34

35 **Funding**

36 This research received no specific grant from any funding agency in the public, commercial
37 or not-for-profit sectors. However, it is supported by the Academy of Family Physicians
38 Malaysia.
39
40
41
42
43
44
45
46

47 **Competing Interest**

48 None
49
50
51
52

53 **ETHICS AND DISSEMINATION**

54 **Ethical consideration**

55
56
57
58
59
60

1
2
3 This study is registered on the National Medical Research Register (NMRR-19-868-47647)
4 and ethics approval has been obtained from the Medical Research and Ethics Committee
5 (MREC) Ministry of Health Malaysia with the reference number of KKM/NIHSEC/P19-
6 1129(11) on 07 August 2019. All collected data and responses obtained from the observation
7 will be kept strictly confidential and no unique identifier(s) will be present on the
8 questionnaire package. Results and data presented will not identify individual mothers.
9
10 Participation in this study will not bring any risk or harm to the current treatment of postnatal
11 mothers.
12
13
14
15
16
17
18
19
20
21
22
23

24 **Privacy and Confidentiality**

25
26 Participant's name will be linked to the study identification number for this research only on
27 the Consent Form. The study identification number instead of patient identifiers will be used
28 on the data sheet. All data will be entered into a computer that is protected. On completion of
29 the study, data in the computer will be copied to CDs and data in the computer will be erased.
30
31 CDs and any hardcopy data will be safeguarded in a locked cabinet in the Sister's room in the
32 designated public health clinics of the investigators and maintained for a minimum of seven
33 years after the completion of the study. The CDs and data will be destroyed after the period
34 of storage. Subjects will not be allowed to view their personal data, as the data will be
35 consolidated into a database. Subjects can write to the investigators to request access to the
36 study findings if the need arises.
37
38
39
40
41
42
43
44
45
46
47
48
49
50

51 **Publication Policy**

52
53 No personal information will be disclosed and participants will not be identified when the
54 findings of the research are published. If name and details of patients need to be disclosed, a
55 written expressed consent will be obtained prior to presentation and publication.
56
57
58
59
60

Data sharing statement

Collected data will be made available upon request to the corresponding author. All requests are to provide a clear study protocol to the principal investigator. Deidentified and anonymised participant data for all the outcomes will be shared once the results have been published. There is no time period or limit. Data use will be advised to refer to the published study protocol.

REFERENCES

1. Zaheri F, Nasab LH, Ranaei F, et al. The relationship between quality of life after childbirth and the childbirth method in nulliparous women referred to healthcare centers in Sanandaj, Iran. *Electron Physician*. 2017 Dec 25;9(12):5985-5990. doi: 10.19082/5985. eCollection 2017 Dec.
2. Rai S, Pathak A, Sharma I. Postpartum psychiatric disorders: Early diagnosis and management. *Indian J Psychiatry*. 2015;57(Suppl 2):S216-S221. doi: 10.4103/0019-5545.161481
3. M.N Norhayati, N.H. Nik Azlina, A.R. Asrenee, et al. Magnitude and risk factors for postpartum symptoms: A literature review. *J Affect Disord*. 2015 Apr 1;175:34-52. doi: 10.1016/j.jad.2014.12.041. Epub 2014Dec 31.
4. Siti R.M. Arifin, A. Ahmad, Rasnah A. Rahman, et al. Postpartum depression in Malaysian women: the association with the timing of pregnancy and sense of personal control during childbirth. *International Journal of Academic Research Part B*; 2014; 6(3), 143-149. DOI: 10.7813/2075-4124.2014/6-3/B.21.

- 1
2
3 5. Shorey S., Chee C.Y.I., Ng E. D., et al. Prevalence and incidence of postpartum
4 depression among healthy mothers: A systematic review and meta analysis. J.
5
6 Psychiatr Res. 2018 Sep;104:235-248.doi.10.1016/j.psychres.2018.08.001
7
8
9
- 10 6. Stewart DE, Robertson E, Dennis CL, et al. An evidence-based approach to post-
11 partum depression. *World Psychiatry*. 2004;3(2):97-8. PubMed PMID: 16633465;
12 PubMed Central PMCID: PMC1414677
13
14
- 15 7. Teissedre F, Chabrol H. A study of the Edinburgh Postnatal Depression Scale (EPDS)
16 on 859 mothers: detection of mothers at risk for postpartum depression. *Encephale*.
17 2004;30(4):376-81. PubMed PMID:15538313
18
19
- 20 8. Ali E. Women's experiences with postpartum anxiety disorders: a narrative literature
21 review. *Int J Womens Health* 2018;10:237-249. doi:10.2147/IJWH.S158621. PubMed
22 PMID: 29881312; PubMed Central PMCID: PMC5983016
23
24
- 25 9. Sohr-Preston SL, Scaramella LV. Implications of timing of maternal depressive
26 symptoms for early cognitive and language development. *Clin Child Fam Psych Rev*.
27 2006;9(1):65-83.
28
29
- 30 10. Grace J, Lee KK, Ballard C, et al. The relationship between post-natal depression,
31 somatization and behaviour in Malaysian women. *Transcult Psychiatry*
32 2001;38(1):27-34.
33
34
- 35 11. Azidah AK, Shaiful BI, Rusli N, et al. Postnatal Depression and Socio-Cultural
36 Practices Among Postnatal Mothers in Kota Bahru, Kelantan, Malaysia. *Med J*
37 *Malaysia* 2006; 61(1): 76-83.
38
39
- 40 12. Wan Mohd Rushidi Wan Mahmud, & Mohd. Jamil Yaacob. Postpartum depression: A
41 survey of the incidence and risk factors among Malay women in Beris Kubor Besar,
42 Bachok, Kelantan *Malaysian Journal of Medical Sciences* 2002;9(1): 41-48.
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

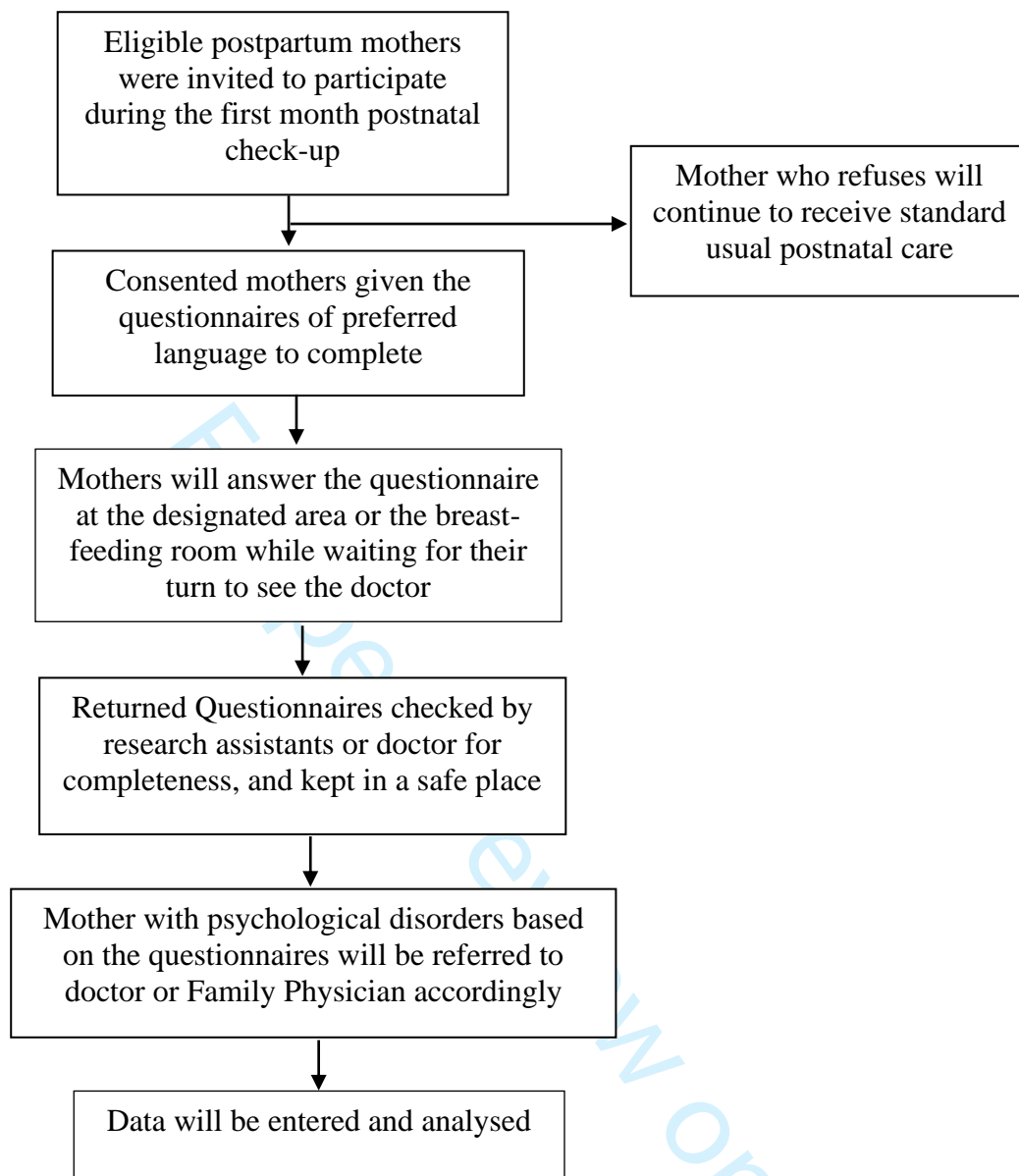
- 1
2
3 13. Ravi Prakash U, Ranadip Chowdury, Aslyeh S, et al. Postpartum depression in India:
4 a systematic review and data analysis. *Bulletin of the World Health Organization*
5 2017; 95:706-717C. doi: <http://dx.doi.org/10.2471/BLT.171.192237>
6
7
- 8
9
10 14. Alessandra B., Susan C., Susan P., et al. Identifying the women at risk of antenatal
11 anxiety and depression: systematic review. *Journal of Affective Disorders*
12 2016;191(2):62-67. <https://doi.org/10.1016/j.jad.2015.11.014>
13
14
- 15 15. Chutima Roomruangwong, Sinaporn Withayavanitchai, Michael Maes. Antenatal and
16 postnatal risk factors of postpartum depression symptoms in Thai women: A case-
17 control study. *Reproductive Healthcare* 2016;10: 25–31.
18
19
- 20 16. Alipour Z., Lamyian M., Hajizadeh E. Anxiety and fear of childbirth as predictors of
21 postnatal depression in nulliparous women. *Women Birth*. 2012;25: e37–e43.
22
23
- 24 17. Cox J., Holden J., Sagovsky R. Detection of postnatal depression. Development of the
25 10-item Edinburgh Postnatal Depression Scale. *The British Journal of Psychiatry*.
26 1987;150(6):782-6.
27
28
- 29 18. de Paula Eduardo JAF, de Rezende MG, Menezes PR, et al. Preterm birth as a risk
30 factor for postpartum depression: A systematic review and meta-analysis. *J Affect*
31 *Disord*. 2019;259:392-403. doi:10.1016/j.jad.2019.08.069
32
33
- 34 19. American Psychiatric Association . Diagnostic and Statistical Manual of Mental
35 Disorders. 5th ed. Washington, DC: American Psychiatric Association; 2013
36
37
- 38 20. Wenzel A, Haigen E, Jackson L, et al. Anxiety symptoms and disorders at eight
39 weeks postpartum. *J Anxiety Disord*. 2005;19(3):295–311.
40
41
- 42 21. Odette Bernazzani, Jean-François Saucier, H el ene David, et al. Psychosocial
43 predictors of depressive symptomatology level in postpartum women. *Journal of*
44 *Affective Disorders* 1997; 46(1): 39-49.
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

- 1
2
3 22. Wenzel A, Haugen E, Jackson L, et al. Prevalence of generalized anxiety at eight
4 weeks postpartum. *Arch Womens Ment Health*. 2003;6(1):43–49
5
6
7
8 23. Heron J, O Connor TG, Evans J, et al. The course of anxiety and depression through
9 pregnancy and the postpartum in a community sample. *Journal of Affective Disorder*.
10 2004; 80 (1) 65-73.
11
12
13
14 24. Milgrom J, Martin PR, Negri LM: Treating postnatal depression: a psychological
15 approach for health care practitioners. Chichester, John Wiley and Sons; 1999.
16
17
18 25. Nakić Radoš S, Tadinac M, Herman R. Anxiety During Pregnancy and Postpartum:
19 Course, Predictors and Comorbidity with Postpartum Depression. *Acta Clin Croat*.
20 2018;57(1):39-51. doi: 10.20471/acc.2018.57.01.05.
21
22
23
24 26. Anniverno R, Bramante A, Mencacci C, Durbano F. New Insights into anxiety
25 disorders. In: Durbano F, editor. *Anxiety Disorders in Pregnancy and the Postpartum*
26 *Period*. London, UK: INTECH Open Access Publisher; 2013. pp. 260–285
27
28
29 27. Roman M, Bostan CM, Diaconu-Gherasim LR, Constantin T. Personality Traits and
30 Postnatal Depression: The Mediated Role of Postnatal Anxiety and Moderated Role
31 of Type of Birth. *Front Psychol*. 2019;10:1625. doi:10.3389/fpsyg.2019.01625.
32
33
34 28. Hung, C. and Chung, H. (2001), The effects of postpartum stress and social support
35 on postpartum women’s health status. *Journal of Advanced Nursing* 2001; 36: 676-
36 684. doi:[10.1046/j.1365-2648.2001.02032.x](https://doi.org/10.1046/j.1365-2648.2001.02032.x)
37
38
39 29. Danielle Clout, Rhonda Brown. Sociodemographic, pregnancy, obstetric, and
40 postnatal predictors of postpartum stress, anxiety and depression in new mothers.
41 *Journal of Affective Disorders* 2015; 188: 60-67.
42
43
44
45 30. Pakzad M, Dolatian M, Jahangiri Y, Nasiri M, Dargah FA. The Correlation between
46 Islamic Lifestyle and Pregnancy-Specific Stress: A Cross-Sectional, Correlational
47 Study. *Open Access Maced J Med Sci*. 2018 Jun 16;6(6):1163-1167. doi:
48 10.3889/oamjms.2018.104.
49
50
51
52
53
54
55
56
57
58
59
60

- 1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
31. Osman H, Saliba M, Chaaya M, et al. Interventions to reduce postpartum stress in first-time mothers: a randomized-controlled trial. *BMC Womens Health*. 2014;14:125. Published 2014 Oct 15. doi:10.1186/1472-6874-14-125
 32. Zainab AM, Pereira XV. Depression in primary care. Part 1: Screening and diagnosis. *Malaysian Family Physician*. 2007;2(3):94-101
 33. Kadir AA, Nordin R, Ismail SB, et al. Validation of the Malay Version of Edinburgh Postnatal Depression Scale for Postnatal Women in Kelantan, Malaysia. *Asia Pac Fam Med*. 2004;3:9–18.
 34. Kernot, J., Olds, T., Lewis, L.K. & Maher, C. (2015) Test-retest reliability of the English version of the Edinburgh Postnatal Depression Scale. *Arch Womens Ment Health*, 18, 255-257. DOI: 10.1007/s00737-014-0461-4.
 35. Mahmud WM, Awang A, Mohamed MN. Revalidation of the Malay version of the Edinburgh postnatal depression scale (EPDS) among Malay postpartum women attending the Bakar Bata health Center in Alor Setar, Kedah, north west of peninsular Malaysia. *The Malaysian journal of medical sciences: MJMS*. 2003;10(2):71
 36. Lovibond SH, Lovibond PF. Manual for the Depression Anxiety Stress Scales. Sydney: Psychology Foundation; 1995
 37. Henry JD, Crawford JR. The shortform version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *Br J Clin Psychol* 2005; 44:227-239.
 38. Ramli M, MA Fadzil, Zain Z. Translation, validation and psychometric properties of Bahasa Malaysia version of the Depression Anxiety and Stress Scales (DASS). *ASEAN Journal of Psychiatry* 2007;8 (2):82-89.

- 1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
39. Lovibond PF. Long-term stability of depression, anxiety, and stress syndromes. *J Abnorm Psychol.* 1998;107(3):520-26.
 40. Crawford JR, Henry JD. The Depression Anxiety Stress Scale (DASS): Normative data and latent structure in a large non-clinical sample. *Br J Clin Psychol.* 2003; 42:111-31.
 41. Lee, J., Lee, EH. & Moon, S.H. Systematic review of the measurement properties of the Depression Anxiety Stress Scales-21 by applying updated COSMIN methodology. *Qual Life Res* 2019;28(9):2325-2339. doi.org/10.1007/s11136-019-0217-x
 42. ASM Yusuff, L Tang, CW Binns, et al. Prevalence and risk factors for postnatal depression in Sabah, Malaysia: a cohort study. *Women and Birth* 2014; 28(1), 25-29.
 43. Centers for Disease Control and Prevention (CDC). Principles of Epidemiology in Public Health Practice, Third Edition. An Introduction to Applied Epidemiology and Biostatistics. Lesson 3: Measures of Risk. Centers for Disease Control and Prevention, Office of Public Health Scientific Services, Center for Surveillance, Epidemiology, and Laboratory Services, Division of Scientific Education and Professional Development. May 18, 2012. Available on <https://www.cdc.gov/csels/dsepd/ss1978/lesson3/section2.html>
 44. Ravichandran Jeganathan (Eds). Preliminary Report of National Obstetrics Registry, Jan 2013 – Dec 2015. Kuala Lumpur, Malaysia: National Obstetrics Registry 2013-2015. Available on www.acrm.org.my

Figure 1: Flow of the participants during the data collection



Supplementary Table S1: Definitions of the variables

No.	Variables (Operational definition)	Description	Type of variable
1	Antenatal code	<ul style="list-style-type: none"> • White • Green • Yellow 	Categorical
2	Age	Maternal age in completed years	Interval
3	Ethnicity -according to the paternal side	<ul style="list-style-type: none"> • Malay • Chinese • Indian • Others 	Categorical
4	Religion	<ul style="list-style-type: none"> • Islam • Buddha • Hindu • Christian • Others 	Categorical
5	Marital status	<ul style="list-style-type: none"> • Single • Married • Divorced/ • Widow 	Categorical
6	Educational level - highest attained	<ul style="list-style-type: none"> • Primary education • Secondary education • Diploma/ Technical studies • Tertiary education • Never school 	Categorical
7	Maternal Occupation	<ul style="list-style-type: none"> • Unemployed • Routine and manual occupations • Intermediate occupations • Higher managerial, administrative and professional occupations 	Categorical
8	Duration of marriage	Duration of marriage in completed years	Interval
9	Husband occupation	<ul style="list-style-type: none"> • Unemployed • Routine and manual occupations • Intermediate occupations • Higher managerial, administrative and professional occupations 	Categorical
10	Combined household income	<ul style="list-style-type: none"> • <RM1000 • RM1000-RM5000 • RM5000-RM10,000 • >RM10,000 	Categorical
11	Smoking status -all types	<ul style="list-style-type: none"> • Yes, intensity – no of stick(s) • No • Ex-smoker 	Categorical

12	Alcohol status -all types	<ul style="list-style-type: none"> • Yes • No • Currently stopped 	Categorical
13	Husband practicing polygamy	<ul style="list-style-type: none"> • Yes • No 	Categorical
14	If polygamy, wife no	<ul style="list-style-type: none"> • 1 • 2 • 3 • 4 	Categorical
15	No of children	<ul style="list-style-type: none"> • 0 • 1 • 2 • 3 • 4 • >5 	Ordinal
16	Pre pregnancy baby gender preference	<ul style="list-style-type: none"> • Male • Female • No preference 	Categorical
17	Antenatal care	<ul style="list-style-type: none"> • Government • Private • None 	Categorical
18	Planned pregnancy -Is the current pregnancy planned and not unexpected?	<ul style="list-style-type: none"> • Yes • No 	Categorical
19	Satisfied with marriage -self-report	<ul style="list-style-type: none"> • Yes • No 	Categorical
20	Marital problems -respondent's own perception of her marriage	<ul style="list-style-type: none"> • Yes • No 	Categorical
21	Period of marital problems	<ul style="list-style-type: none"> • Before child delivery • After child delivery 	Categorical
22	Stable relationship with husband - self-report	<ul style="list-style-type: none"> • Yes • No 	Categorical
23	Domestic violence -Self-report of physical or emotional abuse at home during young before marriage	<ul style="list-style-type: none"> • Yes • No 	Categorical
24	Domestic violence in this marriage and during pregnancy	<ul style="list-style-type: none"> • Yes • No 	Categorical
25	Relationship with parents -respondent's own perception of the relationship between mother and her parents	<ul style="list-style-type: none"> • Yes • No 	Categorical

26	Relationship with parent in law - respondent's own perception of the relationship with her in parent in law	<ul style="list-style-type: none"> • Yes • No 	Categorical
27	Underlying medical illness before pregnancy -Any underlying diabetes, hypertension, asthma or any other chronic illnesses	<ul style="list-style-type: none"> • Yes • No 	Categorical
28	Underlying medical illness during pregnancy -Hypertension, gestational diabetes etc	<ul style="list-style-type: none"> • Yes • No 	Categorical
29	History of miscarriage -any history of abortion before 22 weeks in the previous pregnancy	<ul style="list-style-type: none"> • Yes • No 	Categorical
30	Underlying mental illness -Diagnosed of having mental illness prior to pregnancy	<ul style="list-style-type: none"> • Yes • No 	Categorical
31	History of mental illness during pregnancy -Diagnosed of having mental illness during her current pregnancy	<ul style="list-style-type: none"> • Yes • No 	Categorical
32	History of mental illness during postpartum period -Diagnosed of having mental illness during her postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical
33	Family history of mental illness -Is there any parents of 1 st degree relative being diagnosed of having mental illness?	<ul style="list-style-type: none"> • Yes • No 	Categorical
34	Inadequate help from spouse during postpartum period - respondent's own perception of inadequate support during postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical
35	Inadequate help from other family members during postpartum period - respondent's own perception of inadequate support during postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical
36	Inadequate help from others during postpartum period - respondent's own perception of inadequate support during postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical

37	Inability to establish breast feeding -the inability to exclusively breast feed, requiring top up using formula milk	<ul style="list-style-type: none"> • Yes • No 	Categorical
38	No confidence to care for the child -the inability of mother to care for the baby, thus being dependent on others	<ul style="list-style-type: none"> • Yes • No 	Categorical
39	Undergone stressful life events -any recent events, occurred during antenatal and postpartum period, such as financial burden, passing of her loved ones or events that are perceived as stressful by respondent herself	<ul style="list-style-type: none"> • Yes • No 	Categorical
40	Any cultural taboos observed during postnatal care that contributed to mother's stress	<ul style="list-style-type: none"> • Yes • No 	Categorical
41	With whom respondent observed postnatal care during confinement	<ul style="list-style-type: none"> • Parents • Parents in law • Husband • Confinement lady/ centre • Alone 	Categorical
42	Inadequate help to take care of newborn at night - self-report	<ul style="list-style-type: none"> • Yes • No 	Categorical
43	Inadequate sleep/rest - respondent's own perception of inadequate sleep or rest during postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical
44	Dissatisfied with body weight and appearance post delivery - respondent's own perception on the satisfaction of her body weight and appearance post delivery	<ul style="list-style-type: none"> • Yes • No 	Categorical
45	Intrapartum experience - respondent's own perception of having bad experiences during labour. E.g.: unbearable pain	<ul style="list-style-type: none"> • Yes • No 	Categorical
46	Mode of delivery	<ul style="list-style-type: none"> • SVD • Instrumental delivery • Planned caesarean section • Emergency caesarean section 	Categorical

47	Postnatal complication -experienced wound pain, wound breakdown, readmission to ward	<ul style="list-style-type: none"> • Yes • No • 	Categorical
48	Type of complication	List complication.	Categorical
49	Readmission after discharge during postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical
50	Outcome of the baby	<ul style="list-style-type: none"> • Alive • Gender • Birth weight • Twins • Gestational weight • Admission to ward • Medical complication 	Categorical
51	Edinburgh Postpartum Depression scale scoring (Less than 11 – no postpartum depression 11 or more – postpartum depression)	<p>Total score (range 0 - 30)</p> <ul style="list-style-type: none"> • Less than 11 – no postpartum depression • 11 or more – postpartum depression 	Interval Categorical
52	Depression anxiety stress scale (DASS) scoring	<p>Total scores (range 0-21)</p> <ul style="list-style-type: none"> • Depression <ul style="list-style-type: none"> - Mild: 6-7 - Moderate: 8-10 - Severe: 11-14 - Very severe: 15 to 21 • Anxiety <ul style="list-style-type: none"> - Mild: 5-6 - Moderate: 7-8 - Severe: 9-10 - Very severe: 11 to 21 • Stress <ul style="list-style-type: none"> - Mild: 8-9 - Moderate: 10-13 - Severe: 14-17 - Very severe: 18 to 21 	Interval Ordinal Ordinal Ordinal

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of cross-sectional studies

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-8
Objectives	3	State specific objectives, including any prespecified hypotheses	2
Methods			
Study design	4	Present key elements of study design early in the paper	8
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	9-11
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	9-10
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	11-13, Supplementary Table S1
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	14-16
Bias	9	Describe any efforts to address potential sources of bias	16-17
Study size	10	Explain how the study size was arrived at	14
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	14-16
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	14-16
		(b) Describe any methods used to examine subgroups and interactions	14-16
		(c) Explain how missing data were addressed	14-16
		(d) If applicable, describe analytical methods taking account of sampling strategy	14-16
		(e) Describe any sensitivity analyses	14-16

Results			NA
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	NA
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	11
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	NA
		(b) Indicate number of participants with missing data for each variable of interest	NA
Outcome data	15*	Report numbers of outcome events or summary measures	NA
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA
		(b) Report category boundaries when continuous variables were categorized	NA
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	NA
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	16-17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	NA
Generalisability	21	Discuss the generalisability (external validity) of the study results	NA
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	18

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

The Prevalence and Risk Factors of Postpartum Depression, General Depressive Symptoms, Anxiety, and Stress (PODSAS) among Mothers at First Follow-up at 4-Week Postnatally in Five Public Health Clinics in Perak: A Study Protocol for a Cross-sectional Study

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2019-034458.R2
Article Type:	Protocol
Date Submitted by the Author:	08-May-2020
Complete List of Authors:	Mohammad Redzuan, Saidatul; Kementerian Kesihatan Malaysia Kaur, Paream ; Kementerian Kesihatan Malaysia Suntharalingam, Priyasini; Kementerian Kesihatan Malaysia Palaniyappan, Thenmoli ; Kementerian Kesihatan Malaysia Ganasan, Venotha ; Kementerian Kesihatan Malaysia Megat Abu Bakar, Puteri ; Kementerian Kesihatan Malaysia Marmuji, Lili ; Kementerian Kesihatan Malaysia Ambigapathy, Subashini ; Family Health Development Division, Ministry of Health Malaysia V. , Paranthaman; Kementerian Kesihatan Malaysia Chew, Boon; Universiti Putra Malaysia, Serdang
Primary Subject Heading:	General practice / Family practice
Secondary Subject Heading:	General practice / Family practice, Mental health, Obstetrics and gynaecology
Keywords:	PRIMARY CARE, Adult psychiatry < PSYCHIATRY, MENTAL HEALTH, Maternal medicine < OBSTETRICS

SCHOLARONE™
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

The Prevalence and Risk Factors of Postpartum Depression, General Depressive Symptoms, Anxiety, and Stress (PODSAS) among Mothers at First Follow-up at 4-Week Postnatally in Five Public Health Clinics in Perak: A Study Protocol for a Cross-sectional Study

Saidatul Akmar Mohammad Redzuan¹; akmar.redz@gmail.com

Paream Kaur²; drpaream@yahoo.com

Priyasini Suntharalingam³; priya_divine@yahoo.com.sg

Thenmoli Palaniyappan⁴; pthenmoli_88@hotmail.com

Venotha Ganasan¹; gvenotha@yahoo.com.my

Puteri Normalina Megat Abu Bakar⁵; puterinormalina@gmail.com

Lili Zuryani Marmuji¹; lilizuryani@yahoo.co.uk

Subashini Ambigapathy³; subaambigapathy@gmail.com

V. Paranthaman²; drparan@gmail.com

Boon-How Chew⁶; chewboonhow@upm.edu.my

Author Affiliations

¹ Klinik Kesihatan Gunung Rapat, Pejabat Kesihatan Daerah Kinta, Perak

² Klinik Kesihatan Greentown, Pejabat Kesihatan Daerah Kinta, Perak

³ Klinik Kesihatan Buntong, Pejabat Kesihatan Daerah Kinta, Perak

⁴ Klinik Kesihatan Pasir Pinji, Pejabat Kesihatan Daerah Kinta, Perak

⁵ Klinik Kesihatan Bagan Serai, Pejabat Kesihatan Daerah Kerian, Perak

⁶ Department of Family Medicine, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Serdang, Selangor, Malaysia

Correspondence author: Boon-How Chew, Department of Family Medicine, Faculty of Medicine & Health Sciences, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia.

Email : chewboonhow@upm.edu.my

ABSTRACT

Introduction Postpartum depression, general depressive symptoms, anxiety and stress are often overlooked, and may cause morbidity to new mothers, their babies and families. This study aims to determine the point prevalence of depression (postpartum and general), anxiety and stress among mothers in five public health clinics in Perak at four weeks post-delivery and identify their associated risk factors. Findings from this study will be used to identify the needs for early screening and detection, encourage development of interventions to reduce its occurrence, and support mothers with postpartum depression, general depressive symptoms, anxiety, and stress.

Methods and Analysis This cross-sectional study will recruit 459 postpartum mothers during their 4-week postnatal follow-up in five selected public health clinics in Perak from September 2019 to May 2020. Participants will be mothers aged 18 years and above at 4 weeks post-delivery who are able to understand the English and Malay languages. Non-Malaysians and mothers with known diagnosis of psychotic disorders will be excluded from the study. Sociodemographic information and possible risk factors of the participants will be captured via a set of validated questionnaires, postpartum depression will be measured using the Edinburgh Postpartum Depression Scale questionnaire, and general depressive symptoms, anxiety, and stress will be measured using the 21-item Depression, Anxiety and Stress Scale. Data analysis will be conducted using SPSS version 25.0 (IBM, Chicago, IL). Besides descriptive statistics, multivariable regression analyses will be done to identify possible risk factors and their independent associations with depression (postpartum depression and general depressive symptoms, combined and separately), anxiety, and stress.

Ethics and Dissemination The study protocol was reviewed and approved by the Medical Research Ethics Committee, Ministry of Health Malaysia on 7th August 2019. Results of this

1
2
3 study will be reported and shared with the local health stakeholders and disseminated through
4
5 conference proceedings and journal publications.
6
7
8
9

10 **Article Summary**

11 **Strengths and Limitations of the Study**

- 12
13
14
15
16 • This study will examine the point prevalence of depression (postpartum depression
17 and general depressive symptoms, combined and separately), and other psychological
18 well-being (anxiety and stress) at 4-week postpartum that have not been studied in
19 depth before.
20
21
- 22
23
24
25 • Five public health clinics in urban and sub-urban areas of Perak may not be
26 representative enough as to attribute the findings to the nationwide population.
27
- 28
29
30 • Self-administration of the questionnaire is encouraged and facilitated to improve data
31 quality.
32
- 33
34
35 • Respondents will not reflect the incidence or prevalence rate of depression, anxiety,
36 and stress at other time points, or prevalence of these conditions during the first few
37 weeks after delivery or months later in the postpartum period.
38
39
40
41
42
43
44
45

46 **INTRODUCTION**

47
48 After childbirth, a woman undergoes multiple changes associated with physical and
49 emotional domains.¹ Some common physical changes experienced during pregnancy are
50 weight gain, hair growth, and stretch marks, while after pregnancy, the most common
51 changes are weight loss, hair loss, and sagging breasts.¹ Mothers with a new or additional
52 baby also experience emotional changes related to breastfeeding demands, childcare stress,
53 and problems relating to maternal dissonance and difficult infant temperament.² In addition,
54
55
56
57
58
59
60

1
2
3 there are also social demands that may contribute to the general depressive symptoms and
4 stress such as compliance to the traditional postpartum care practices, financial strain related
5 to low socioeconomic status, and social and sexual relationship with the partner or caretaker
6 of the child.^{2,3} Other emotionally draining aspects are biological, obstetric, clinical,
7 psychological, social, and infant factors which may also contribute to the prevalence of
8 postpartum depression, general depression, and stress.^{2,3} Some of the risk factors for
9 postpartum depression (PPD) such as history of physical abuse, mode of delivery, and sex of
10 the baby³ differ between developing and developed countries. A systematic review by
11 Villengas et al.⁴ reported that an increased risk of PPD in developing countries is related to
12 some unique risk factors associated with poor relationship with the partner or in-laws, having
13 an unemployed and uneducated husband, husband's psychopathology, years of marriage,
14 having more than five children, having two or more children under the age of seven, and
15 gender of the infant. Although the risk factors for PPD are considered multifactorial, studies
16 have consistently identified the significant role of social support. Studies in both developed
17 and developing countries have shown that lack of social support is an independent predictor
18 of PPD.^{2,5} Asian culture that dictates Asians to follow certain traditional rituals after delivery
19 to protect the mother and child is one example of the stressors specific to the Asians, while
20 poor marital relationship, stressful life events, child care stress, negative attitude towards
21 pregnancy and learned helplessness are common and important psychological stressors
22 predisposing to PPD.²

23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51 PPD is a significant health issue that can impact the health of the mother, her marital
52 relationship, interaction with the newborn as well as infant growth.⁵ Although the prevalence
53 of PPD and general depression is between 10 and 15% in the first three months of
54 postpartum, an increasing trend in prevalence was observed after three months until 12
55
56
57
58
59
60

1
2
3 months of postpartum, and no difference in prevalence was observed through self-reports or
4 clinical interviews.⁶ Hence, depression at this critical period of life carries special meanings
5 and consequences to the mother and her relationship with her baby.⁶ It is possible to identify
6 mothers with an increased risk for PPD and general depression in the postpartum period using
7 appropriate and validated tools which are acceptable and can be more efficient than clinical
8 interviews.^{6,7}
9
10
11
12
13
14
15
16
17
18

19 Depression is the most common psychological disorder during the postpartum period. The
20 first symptom usually appears within 4 weeks of delivery,⁸ which can range from mild to
21 severe.⁸ According to WHO, symptoms of PPD, also termed as postpartum blues, begin with
22 a depressed mood, anhedonia and low energy within a few days of delivery, most commonly
23 on day 3 or day 4.⁶ The *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed.
24 (DSM-5) categorizes PPD as a major depressive episode “with peripartum onset if onset of
25 mood symptoms occurs during pregnancy or within 4 weeks following delivery”.⁹ Symptoms
26 can persist up to several months, and if left untreated, PPD may lead to subsequent emotional,
27 behavioral and cognitive problems of the child.^{6,10} Despite these concerns, PPD remains
28 under-diagnosed and under-treated in clinical practices in Malaysia.¹¹⁻¹³ This might be due to
29 social taboos associated with psychiatric diseases.¹⁴ Other factors that contribute to the low
30 detection rate include low screening rate for PPD and lack of awareness of the illnesses
31 amongst mothers and caretakers.¹¹ Studies showed that between 1990 and 2002, the
32 prevalence of PPD ranged between 10 and 15% within 12 months postpartum in Western
33 societies compared to the more varied prevalence rates of between 3.4% and 63.9% among
34 Asian countries within the similar postpartum period and timeframe.^{2,6} In Malaysia, studies
35 reported that the incidence and prevalence of PPD were 9.8% and 20.7%, respectively.^{12,13}
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 A systematic review suggested that a history of general depression, stressful life events, low
4 social support, antenatal anxiety, unplanned pregnancy, preference of infant's gender, and
5 low income were risk factors leading to PPD in Asian countries such as India and
6 Bangladesh.¹⁵ A study in Thailand reported that a history of lifetime major depression and
7 depressive symptoms during pregnancy were the most important risk factors for PPD.¹⁶ For
8 Malaysian women, depressive symptoms during late pregnancy, an emergency delivery,
9 preterm birth, application of traditional postpartum practices, marital problems, as well as
10 low income were likely to be associated with an increased risk of developing PPD.^{6,17-19} On
11 the other hand, a local study suggested that a planned pregnancy may prevent the risk of
12 PPD.¹²

13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29 With regards to general depression in the postpartum period, the general depressive
30 symptoms during the postpartum period include experiencing continuous low mood or
31 sadness, feeling hopeless and helpless, having low self-esteem, and feeling tearful that the
32 mother is unable to take care of the child.⁹ Psychosocial predictors of a general depression in
33 postpartum women which include lower occupational status, prenatal depression level, more
34 distal stressors and personal psychiatric history reflecting past and present experiences,
35 showed an indirect effect.^{20,21} Based on the Depression Anxiety Stress Scale (DASS)
36 screening questionnaire, the general depressive symptoms include not feeling positive, not
37 having the initiative to do daily activities, having nothing to look forward to, feeling down-
38 hearted and blue, not feeling enthusiastic, lacking self-worth, and having the feeling that life
39 is meaningless.²¹ Care for women who suffer from mild to moderate depressive symptoms
40 may be overlooked, resulting in late diagnosis and increased chances of aggravating PPD and
41 other psychological disorders, which in turn, increase the burden of healthcare costs and
42 impact family relationships negatively.¹

1
2
3 In Malaysia, much less is known about postpartum anxiety. Anxiety disorders are more
4 common in postpartum women than in the general population, and based on studies done in
5 the United States²², its incidence usually occurs during the first 6 months of postpartum,
6 ranging from 6.1% to 27.9%,^{23,24} with the prevalence rate of 4.4% to 8.2% at 6 to 8 weeks
7 postpartum.²² A study in Croatia reported 17% prevalence of high anxiety occurring
8 immediately after childbirth, 20% at six weeks postpartum, and the comorbidity of anxiety
9 and PPD was 75%.²⁵ Characteristics of anxiety include excessive worry that lasts,
10 accompanied by restlessness, fatigue, poor concentration, muscle tension, and sleep
11 disturbance.⁹ Other symptoms include excessive worry, feeling nervous or on the edge,
12 inability to stop or control worrying, having troubles relaxing, feeling easily irritable or
13 annoyed, and feeling awful as if something bad is going to happen. While a certain degree of
14 anxiety in response to becoming a new mother is normal and even adaptive, some mothers
15 can experience anxieties that are excessive and debilitating.^{26,27} Examples of postpartum
16 panic disorders include personality problem exhibited by being over vigilance and excess
17 checking on baby's breathing.²⁶ Excessive anxiety may have long-term effects on mothers
18 and their infants. Some of the experiences identified in relation to postpartum anxiety
19 disorders are feeling of loss, frustration and guilt, accompanied by physical symptoms of
20 tension.⁸ Postpartum anxiety is associated with disrupted mother–infant attachment,
21 postpartum depression, reduced likelihood of breastfeeding, increased risk of infant abuse,
22 delayed cognitive and social development in infants, and an increased likelihood of anxiety in
23 children.²² Some studies pointed to the importance of distinguishing anxiety from depression
24 in order to provide appropriate treatments that target the symptoms and etiology of anxiety.²⁴

25
26 Symptoms of stress during the postpartum period at the first 6 weeks post-delivery include
27 difficulty to wind down, over-reacting to situations, nervousness, agitation, difficulty to relax,
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 and becoming very sensitive to changes. The prevalence rate of stress varied between 20%
4
5 and 40%.²⁶ A study done in Taiwan identified the three most common factors that contribute
6
7 to postpartum stress i.e. maternity role attainment, lack of social support, and body changes.²⁸
8
9 The study also concluded that the level of postpartum stress varied based on the duration of
10
11 postpartum.²⁸ Women who underwent caesarean delivery had higher antenatal stress and
12
13 anxiety and depression levels compared to women who did not undergo the procedure.²⁹ In
14
15 contrast, an Islamic lifestyle has been shown to be protective against pregnancy-specific
16
17 stress.³⁰ A study in Lebanon showed that an intervention with a postpartum film that
18
19 addresses common stressors during the postpartum period and availability of a 24-hour
20
21 telephone hotline service reduce stress during the postpartum period.³¹ In Malaysia, however,
22
23 no studies have been carried out on the prevalence of stress during the postpartum period.
24
25
26
27
28
29
30

31 Many studies have looked into the psychological well-being of mothers using only a brief
32
33 unidimensional instrument such as the Edinburgh Postnatal Depression Scale (EPDS) without
34
35 looking at other aspects of the psychological well-being of postpartum mothers and their
36
37 associated risk factors.^{23,26,31} Furthermore, studies conducted in Malaysia were done in
38
39 Kelantan,¹³ Negeri Sembilan,¹¹ and Sabah¹¹ which have limited external validity in terms of
40
41 ethnicity and socioeconomic profiles in comparison to the population in Perak. For example,
42
43 the study carried out in Kelantan only focused on the Malay ethnicity while in Sabah, the
44
45 cultural and sociodemographic background differs from that of the population in peninsular
46
47 Malaysia. As such, risk factors such as confinement with in-laws, observing cultural taboos
48
49 during confinement, lack of sleep, postpartum wound pain and other somatic symptoms have
50
51 not been well studied or established in the Malaysian context.³² Additionally, these studies
52
53 were restricted to women admitted to hospitals; thus, data which were collected solely
54
55
56
57
58
59
60

1
2
3 through interviews could be misleading as a result of the Hawthorne effect and socially
4
5 pleasing answers.¹⁷
6
7
8
9

10 Accordingly, this study aims to determine the point prevalence and risk factors of postpartum
11 depression, general depressive symptoms, anxiety, and stress among mothers at 4-week
12 follow-up at public health clinics in Perak. It will look into the overall depression based on
13 the combined EPDS and DASS general depression subscale measures. It will also explore the
14 relationship of these two established measures for any possible contextual differences as few
15 studies, if any, have examined this.
16
17
18
19
20
21
22
23
24
25
26
27

28 **METHODS AND ANALYSIS**

29 **Study design**

30
31 This will be a cross-sectional study over a period of nine months beginning from September
32
33 2019 to May 2020.
34
35
36
37
38
39

40 **Setting**

41
42 The study will be conducted among postpartum mothers who have postnatal follow-up in five
43 public health clinics in Perak: four in the district of Kinta (urban) and one in the district of
44 Kerian (sub-urban). The four clinics in Kinta district will be Pasir Pinji Health Clinic,
45 Gunung Rapat Health Clinic, Buntong Health Clinic, and Greentown Health Clinic. The fifth
46 clinic is Bagan Serai Health Clinic which is located in the Kerian district. These clinics are
47 selected as these are the clinics where the researchers will be practicing at the time of the
48 study. These clinics provide antenatal care starting from the booking and continuing
49 postnatally after the mothers have delivered in hospitals. Postnatally, the health of the
50
51
52
53
54
55
56
57
58
59
60

1
2
3 mothers and babies will be examined within days and weeks during follow-up home visits by
4 nurses from these clinics. The mothers and babies will also be inspected by medical officers
5 at the health clinics at 4-week after delivery for general health checks, counselling on
6 contraception, and review of the baby including immunization.
7
8
9
10
11
12
13
14

15 **Participants**

16
17 The study will involve postnatal mothers who have follow-up at the participating public
18 health clinics during their 4-week scheduled postnatal visit. They are 18 years and above and
19 are at 4-week post delivery irrespective of mode of delivery, able to read and understand the
20 Malay or the English language, and able to give a written consent. The study will exclude
21 those who are illiterate. Also excluded are mothers with a known diagnosis of depression,
22 neurosis or psychotic disorders such as bipolar mood disorder and schizophrenia as
23 documented in the antenatal book or by self-report from family members as they may not be
24 able to respond appropriately to the questionnaire. Mothers who are non-Malaysian are also
25 excluded due to the differences in psychosocial background, in addition to being few in
26 numbers.
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42

43 **Sampling**

44
45 All eligible postnatal mothers attending the 4-week postnatal check-up will be invited to
46 participate. The eligibility will be screened a day earlier based on the copy of their antenatal
47 medical records available at the clinics. Those who fulfil the eligibility criteria will receive a
48 copy of the questionnaire and a consent form which will be attached to the clinic copy of the
49 antenatal medical records. When the mothers arrive at the registration counter of the postnatal
50 clinic, their eligibility will be further confirmed, followed by an explanation regarding the
51 study. Those who agree to participate will sign the consent form before they are given the
52
53
54
55
56
57
58
59
60

1
2
3 study questionnaire. They will self-administer the questionnaire at a designated waiting area
4 while waiting for their turn for medical consultation. After returning the completed
5 questionnaire, every participant will be given a token of appreciation i.e. a fact sheet on
6 postpartum depression, general depression, anxiety, and stress for educational purposes.
7
8
9
10
11
12

13
14 All returned questionnaires will be checked for completeness by a research assistant or the
15 doctors on duty at the postnatal clinics. Participants who are found to have postpartum
16 depression based on the EPDS questionnaire or severe psychological disorders based on the
17 DASS-21 will be referred to the doctors or family physicians at the clinic within the same
18 week of questionnaire completion for further management. Patients with mild or moderate
19 score of psychological disorders based on the questionnaire will be given appropriate
20 counselling and follow-up care in the health clinics within a month following the completion
21 of the questionnaire. Confidentiality of the participants will be guarded throughout the study
22 (Figure 1).
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37

38 **Research Tools**

39
40 The research tool used in this study is a 3-part questionnaire with an estimated time of about
41 30 minutes to complete the whole questionnaire. Part 1 covers questions on the subject's
42 sociodemographic characteristics while Part 2 contains questions which explore the risk
43 factors according to the variables used. Questions in Part 1 and Part 2 were created based on
44 the literature review. The variables used in the questionnaire and their definitions are
45 available in the Supplementary Material Table S1. Face and content validity of Part 1 and
46 Part 2 will be further tested in a pilot study involving 50 postnatal mothers (10 from each
47 health clinic) with the same eligibility (see below).
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 Part 3 consists of the validated English or Malay version of the Edinburgh Postpartum
4 Depression Scale questionnaire (EPDS) and the Depression Anxiety and Stress Scales
5 (DASS-21).³³⁻³⁸ EPDS which was developed in 1987 by Cox, Holden, and Saqovsky was
6 originally written in the English language.¹⁷ The Malay language version of the EPDS was
7 developed by Azidah et al. in 2004, and it was validated based on the sample of postpartum
8 Malaysian women in Kelantan, North East of Peninsular Malaysia.³⁴ The questionnaire
9 contains 10 questions assessing the mothers' feelings in the past seven days. Item score
10 ranges from zero to three on a 4-point Likert scale, and the scores are summed up to get an
11 overall score ranging from 0 to 30, with some reversed scored items.³⁵ The findings of the
12 study suggested an EPDS cut-off score value of 11.5 for depression with a sensitivity of
13 72.7% and specificity of 92.6%.³⁴ The Malay version of the EPDS was also shown to have
14 good internal consistency (Cronbach's alpha = 0.86) and good split-half reliability (Spearman
15 split half coefficient = 0.83). Based on a study conducted by Wan Mahmud and Mohamed,
16 the instrument also showed satisfactory discriminant and concurrent validity. The cut-off
17 point of 11 was considered optimal for screening a population of Malay-speaking women
18 during 4 to 12 weeks postpartum.³⁷

19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43 The DASS-21 scale will be used to determine the incidence of other psychological disorders
44 (general depression, anxiety, and stress) among the participants.³⁷ The DASS-21 consists of
45 seven self-report items for the three different subscales of general depression (DASS-21-D),
46 anxiety (DASS-21-A), and stress (DASS-21-S).^{38,39} Each item is scored on a 4-point Likert
47 scale ranging from 0 ("did not apply to me at all") to 3 ("applied to me very much"). The
48 scores for the total DASS-21 and for each subscale are then summed up. DASS is suitable to
49 be used in many different clinical settings to assess emotional states over the past one
50 week.^{40,41} The score ranges from 0-21 for each of the subscales with a separate scoring each.

1
2
3 For general depression, scores 5 and below indicate no depression; scores 6-10 indicate
4 moderate depression; and scores higher than 10 indicate major depressive symptoms. For the
5 anxiety subscale, scores 4 and below indicate no anxiety; scores 5-8 indicate moderate
6 anxiety symptoms; and scores higher than 8 indicate major anxiety. For the stress category,
7 scores 7 and below exclude stress; scores 8-13 indicate moderate stress; and scores higher
8 than 13 indicate major stress.³⁷ The Malay version of DASS-21 had a Cronbach's alpha
9 values of 0.75, 0.74, and 0.79 for depression, anxiety, and stress subscales, respectively.⁴⁰ A
10 systematic review of the measurement properties of DASS-21 showed a significant
11 association with other similar constructs such as the Hospital Anxiety and Depression Scale
12 (pooled $r= 0.69$ for depression, and pooled $r= 0.66$ for anxiety), the Beck Depression
13 Inventory (pooled $r= 0.73$), Beck Anxiety Inventory (pooled $r= 0.75$), and Positive and
14 Negative Affect Schedule (pooled $r= 0.56$).⁴² The overall construct validity was rated as high
15 in the hypotheses testing.
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34

35 Using both the EPDS and DASS-21 will enable the point prevalence of postpartum
36 depression and other psychological well-beings among the postpartum mothers in the same
37 setting to be determined.
38
39
40
41
42
43
44

45 **Pilot study**

46 A pilot test was conducted on the data collection process in August 2019 at each participating
47 health clinic, and 10 eligible participants completed the questionnaires. Improvements on the
48 questionnaire and process were then carried out based on the findings of the pilot test. The 50
49 samples from this pilot study will not be included in the actual study.
50
51
52
53
54
55
56
57

58 **Sample size calculation**

1
2
3 Based on the various studies done in Malaysia, the prevalence of postpartum depression and
4 psychological disorders ranges from 3.9 to 28.8%.^{3,4,42} There was no previous study done
5 with a population similar to this study. This study takes the approach of best estimation of the
6 prevalence for postpartum depression and psychological disorders to be at 10%. Using
7 logistic regression in the GPower 3.1.2 and with estimated proportion of postpartum
8 depression and psychological disorders as 10%, with the smallest odd ratio of 2.5 of the
9 potential risk factor⁴² with 0.80 power and significance at two-sided α of 0.05, the estimated
10 sample size is 321. Taking into consideration of about 30% of non-response rate and
11 incomplete or missing data in patients' medical records and questionnaires returned, the
12 sample size needed is 459.
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27

28 **Data analysis**

29
30 The investigators have the overall responsibility for compilation, maintenance, and
31 management of the study questionnaires and database. The database is stored on a password-
32 protected computer in a locked office. In making sure that data entry is of good quality, all
33 research assistants will be trained to facilitate in the administration of the questionnaires in a
34 standardized manner and to check on the completeness of the returned questionnaires. Data
35 will be entered and checked for accuracy by two separate persons from two different clinics
36 before analysis. Multiple imputation (with 10 runs) may be used to replace missing data in
37 the variables. Imputed variables will be set within a pre-defined clinically possible range.
38 Data cleaning will be done using SPSS to check that each data point is entered within
39 plausible ranges; otherwise, verification from the original data source will be conducted. Data
40 analysis will be done using SPSS version 25.0 (IBM, Chicago, IL).
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 Descriptive statistics will be used to summarize sociodemographic data. A report will be
4 prepared on the sociodemographic and clinical characteristics (age, ethnicity, education level,
5 parity and mode of delivery) of the non-participants and refusals to compare to that of the
6 participants. Numerical data will be presented as mean (standard deviation) or median
7 (interquartile range) based on the normality of their distribution. Categorical data will be
8 presented as frequency (percentage). Point prevalence of depression (postpartum depression
9 and general depressive symptoms, combined and separately), anxiety, and stress will be
10 reported based on the recommended cut-offs. A cut-off point of 11 based on the EPDS will
11 be considered as having PPD.³⁵ For general depression, DASS-21-D scores of 5 and below
12 indicate no depressive sign; scores 6-10 indicate moderate depression; and scores higher than
13 10 indicate major depressive symptoms. The EPDS ≥ 11 and DASS-21-D ≥ 6 will be
14 combined to indicate an overall depression. For the anxiety subscale, DASS-21-A scores 4
15 and below indicate no anxiety; score 5-8 indicate moderate anxiety symptoms; and scores
16 higher than 8 indicate major anxiety. For the stress category, DASS-21-S scores 7 and below
17 exclude stress; scores 8-13 indicate moderate stress; and scores 13 and above show major
18 stress.³⁶ Some categorical variables will be further merged: marital status into married/not
19 married and divorced or widowed; educational levels into primary/ secondary/ diploma or
20 technical studies/ tertiary education and have never been to school; occupation into
21 unemployed/ routine and manual occupation/ intermediate occupation/ higher level:
22 managerial, administrative and professional occupations; household income into less than
23 RM1000, RM1000 – RM5000, RM5000 – RM 10,000 and more than RM 10,000; who
24 supported the mother with postnatal care - parents, parents-in-law, husband, confinement lady
25 or confinement centre, alone, and others; mode of delivery into normal vaginal delivery/
26 instrumental delivery/ planned caesarean section, and emergency caesarean section.
27 Outcomes of the baby include alive or not, gender as male or female, baby weight, number of
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 babies whether one or more than one, term or preterm, admission during postpartum period,
4 and any medical complication. Correlation between the total scores for postpartum
5 depression, general depressive symptoms, anxiety, and stress will be done using the
6 Pearson's or the Spearman's correlations according to the distribution of the total scores,
7 normally or non-normally distributed, respectively.
8
9
10
11
12
13
14
15
16

17 To analyze the association between sociodemographic and clinical variables with PPD,
18 general depressive symptoms, anxiety, and stress, multiple or multinomial logistic
19 regressions analyses will be used after the categorization of these outcomes according to the
20 recommended cut-offs (see above). The lowest score category will be used as the referent
21 group, and the PPD, general depressive symptoms, anxiety, and stress will be represented by
22 the two higher score categories, respectively. Additional multinomial logistic regression
23 analyses might be run with the three cut-offs categories and the results compared if the
24 sample size within each of the categories allows it. These sociodemographic and clinical
25 factors with a P value < 0.20 from the simple logistics regression analyses (crude odds ratio)
26 will be included in the final multiple logistics regression analyses (adjusted odds ratio).
27
28 Multicollinearity between any independent variables will be checked according to the
29 tolerance < 0.4 ($VIF \geq 2.5$). In the present of multicollinearity, the more meaningful or
30 important variable from the clinical perspectives will be selected for use in the final
31 regression analysis. Odds ratio (OR) will be presented with 95% confidence interval (CI).
32
33 P value of < 0.05 is considered statistically significant. In all the final models, Q-Q plots will
34 be checked for normality of residuals, and the residual plots will be checked for linearity and
35 homogeneity assumptions to ensure statistical assumptions are acceptably met.
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Expected outcomes

This study aims to obtain accurate estimates of point prevalence of postpartum depression, general depression, anxiety, and stress among postpartum mothers in public health clinics in Perak. It is proposed that point prevalence is measured instead of prevalence rate or incidence as the study is designed to measure the number of new conditions (PPD, general depressive symptoms, anxiety, and stress) over the number of women at risk at four weeks postpartum due to the lack of proper assessment of the women's psychological conditions between the period after delivery and the time of participation in the study. It is not incidence rate as the study is cross-sectional in its sampling method and does not follow-up on the participants. A prevalence rate would be the effect estimate if the study proposes to study the conditions in a defined population such as all women throughout the first four weeks of postpartum. It is noted that the distinction between point prevalence, prevalence rate, and incidence proportion for depression, anxiety, and stress is slim when the condition-free status at the immediate postpartum is based on self-report without objective measures. However, based on the study design, the effect estimate is closer to a point prevalence than it is to prevalence rate or incidence proportion.⁴³

The five public health clinics chosen for this study are likely to be representative of Perak population in terms of ethnicity distribution. Most ethnicities in Malaysia can read and understand the Malay language to some extent; however, without the Chinese or Tamil version of the questionnaires, this might impair the responses received from mothers of these ethnicities, particularly those with lower educational background. The study will assess the representativeness of the participants to the population of postpartum mothers in Perak and nationwide from other socio-demographic aspects and clinical characteristics from the most recent report of the National Obstetrics Registry.⁴⁴ All the five participating clinics have

1
2
3 separate services for maternal and child health care and have an estimated live births ranging
4 from 450 to 1500 babies per year in each clinic. Thus, it is possible to reach the target sample
5 size. General depressive symptoms, anxiety, and stress are novel variables that have been
6 shown to be predictors of postpartum depression, but they are rarely explored in the
7 Malaysian setting. As these concepts are personal and sensitive, the study adopts the self-
8 administration approach facilitated by a trained research assistant whose responsibility is only
9 to clarify difficult items faced by the respondents. Furthermore, a quiet designated area will
10 be provided to help improve the quality of responses.
11
12
13
14
15
16
17
18
19
20
21
22
23

24 By identifying the demographic and clinical risk factors associated with depression, anxiety,
25 and stress in postpartum mothers, effective counselling and awareness programs can be
26 designed for high risk pregnant mothers. The findings of this study will provide information
27 to the public and create better awareness on psychological well-being during the postpartum
28 period. This may further help in reducing incidences of postpartum depression, anxiety, and
29 stress in mothers with a newborn.
30
31
32
33
34
35
36
37
38
39

40 **Patient and Public Involvement**

41
42 Based on the feedback received from patients who participated in the pilot study, several
43 changes were made to the questionnaire, and the data collection process was refined. In the
44 patient section, the categorical list for patient's occupation was taken out. Instead,
45 respondents are given the option to write down their occupation. This was done following a
46 confusion caused by the options given for occupation. The questionnaire was also formatted
47 to improve its readability and reduce the number of pages to encourage self-administration by
48 patients.
49
50
51
52
53
54
55
56
57
58
59
60

ETHICS AND DISSEMINATION

Ethical consideration

This study is registered in the National Medical Research Register (NMRR-19-868-47647), and ethics approval was obtained from the Medical Research and Ethics Committee (MREC) Ministry of Health Malaysia with reference number KKM/NIHSEC/P19-1129(11) on 07 August 2019. All collected data and responses obtained from the observation will be kept strictly confidential, and no unique identifier(s) will be present on the questionnaire package. Results and data presented will not identify individual mothers. Participation in this study will not bring any risk or harm to the current treatment of postnatal mothers.

Privacy and Confidentiality

Participant's name will be linked to the study identification number for this research only on the Consent Form. The study identification number instead of patient identifiers will be used on the data sheet. All data will be entered into a protected computer. Upon the completion of the study, data in the computer will be copied to CDs, and the data in the computer will be erased. CDs and any hardcopy of data will be safeguarded in a locked cabinet in the Sister's room in the designated public health clinics of the investigators and maintained for a minimum of seven years after the completion of the study. The CDs and data will be destroyed after the storage period. Subjects will not be allowed to view their personal data as the data will be consolidated into a database. However, subjects may write to the investigators to request access to the findings of the study if the need arises.

Publication Policy

1
2
3 No personal information will be disclosed, and participants will not be identified when the
4 findings of the research are published. If the names and details of the patients need to be
5 disclosed, a written expressed consent will be obtained prior to presentation and publication.
6
7
8
9

10 11 12 **Data sharing statement**

13
14 Collected data will be made available upon request to the corresponding author. All requests
15 are to provide a clear study protocol to the principal investigator. Deidentified and
16 anonymized participant data for all the outcomes will be shared once the results have been
17 published. No time period or limit has been set. Data use will be advised to refer to the
18 published study protocol.
19
20
21
22
23
24
25
26
27

28 29 **Dissemination plan**

30 All results from this study will be reported and shared with the local health stakeholders and
31 disseminated through conference proceedings as well as journal publications.
32
33
34
35
36
37
38
39

40 **ACKNOWLEDGEMENTS**

41 42 **Author Contributions**

43 All authors conceived the study from the beginning. TP assisted with the development of the
44 questionnaire and variables; VG and PS contributed to the study design; PNMAB assisted
45 with the sample size calculation; PK, TP and PNMAB will assist data analysis; and SAMR
46 drafted the initial manuscript, study design, and the final study protocol; LZM, SA and VP
47 provided local guidance and general administrative support for the study at the clinic level;
48 and BHC supervised and contributed to all aspects of the study. All authors critically revised
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 the study protocol and approved the final manuscript for publication. BHC is the guarantor of
4
5 the study.
6
7
8
9

10 **Funding**

11
12 This research received no specific grant from any funding agency in the public, commercial
13
14 or not-for-profit sectors. However, it is supported by the Academy of Family Physicians
15
16 Malaysia.
17
18
19
20

21 **Competing Interest**

22
23
24 None declared
25
26
27

28 **REFERENCES**

- 29
30
31 1. Zaheri F, Nasab LH, Ranaei F, et al. The relationship between quality of life after
32
33 childbirth and the childbirth method in nulliparous women referred to healthcare
34
35 centers in Sanandaj, Iran. *Electron Physician*. 2017 Dec 25;9(12):5985-5990. doi:
36
37 10.19082/5985. eCollection 2017 Dec.
38
39
40 2. M.N Norhayati, N.H. Nik Azlina, A.R. Asrenee, et al. Magnitude and risk factors for
41
42 postpartum symptoms: A literature review. *J Affect Disord*. 2015 Apr 1;175:34-52.
43
44 doi: 10.1016/j.jad.2014.12.041. Epub 2014Dec 31.
45
46
47 3. Rai S, Pathak A, Sharma I. Postpartum psychiatric disorders: Early diagnosis and
48
49 management. *Indian J Psychiatry*. 2015;57(Suppl 2):S216-S221. doi: 10.4103/0019-
50
51 5545.161481
52
53
54 4. Villegas, Laura, Katherine McKay, Cindy-Lee Dennis, and Lori E Ross. "Postpartum
55
56 Depression Among Rural Women From Developed and Developing Countries: A
57
58
59
60

1
2
3 Systematic Review" *Journal of rural health* 27, no. 3 (2011): 278-288.

4
5 doi: 10.1111/j.1748-0361.2010.00339.x

- 6
7
8 5. Siti R.M. Arifin, A. Ahmad, Rasnah A. Rahman, et al. Postpartum depression in
9
10 Malaysian women: the association with the timing of pregnancy and sense of personal
11
12 control during childbirth. *International Journal of Academic Research Part B*; 2014;
13
14 6(3), 143-149. DOI: 10.7813/2075-4124.2014/6-3/B.21.
- 15
16
17 6. Shorey S., Chee C.Y.I., Ng E. D., et al. Prevalence and incidence of postpartum
18
19 depression among healthy mothers: A systematic review and meta analysis. *J.*
20
21 *Psychiatr Res.* 2018 Sep;104:235-248.doi.10.1016/j.psychres.2018.08.001
22
23
- 24 7. Stewart DE, Robertson E, Dennis CL, et al. An evidence-based approach to post-
25
26 partum depression. *World Psychiatry.* 2004;3(2):97-8. PubMed PMID: 16633465;
27
28 PubMed Central PMCID: PMC1414677
- 29
30 8. Teissedre F, Chabrol H. A study of the Edinburgh Postnatal Depression Scale (EPDS)
31
32 on 859 mothers: detection of mothers at risk for postpartum depression. *Encephale.*
33
34 2004;30(4):376-81. PubMed PMID:15538313
- 35
36
37 9. American Psychiatric Association. Diagnostic and Statistical Manual of Mental
38
39 Disorders. 5th ed. Washington, DC: American Psychiatric Association; 2013
- 40
41
42 10. Sohr-Preston SL, Scaramella LV. Implications of timing of maternal depressive
43
44 symptoms for early cognitive and language development. *Clin Child Fam Psych Rev.*
45
46 2006;9(1):65-83.
- 47
48
49 11. Grace J, Lee KK, Ballard C, et al. The relationship between post-natal depression,
50
51 somatization and behaviour in Malaysian women. *Transcult Psychiatry*
52
53 2001;38(1):27-34.
- 54
55
56
57
58
59
60

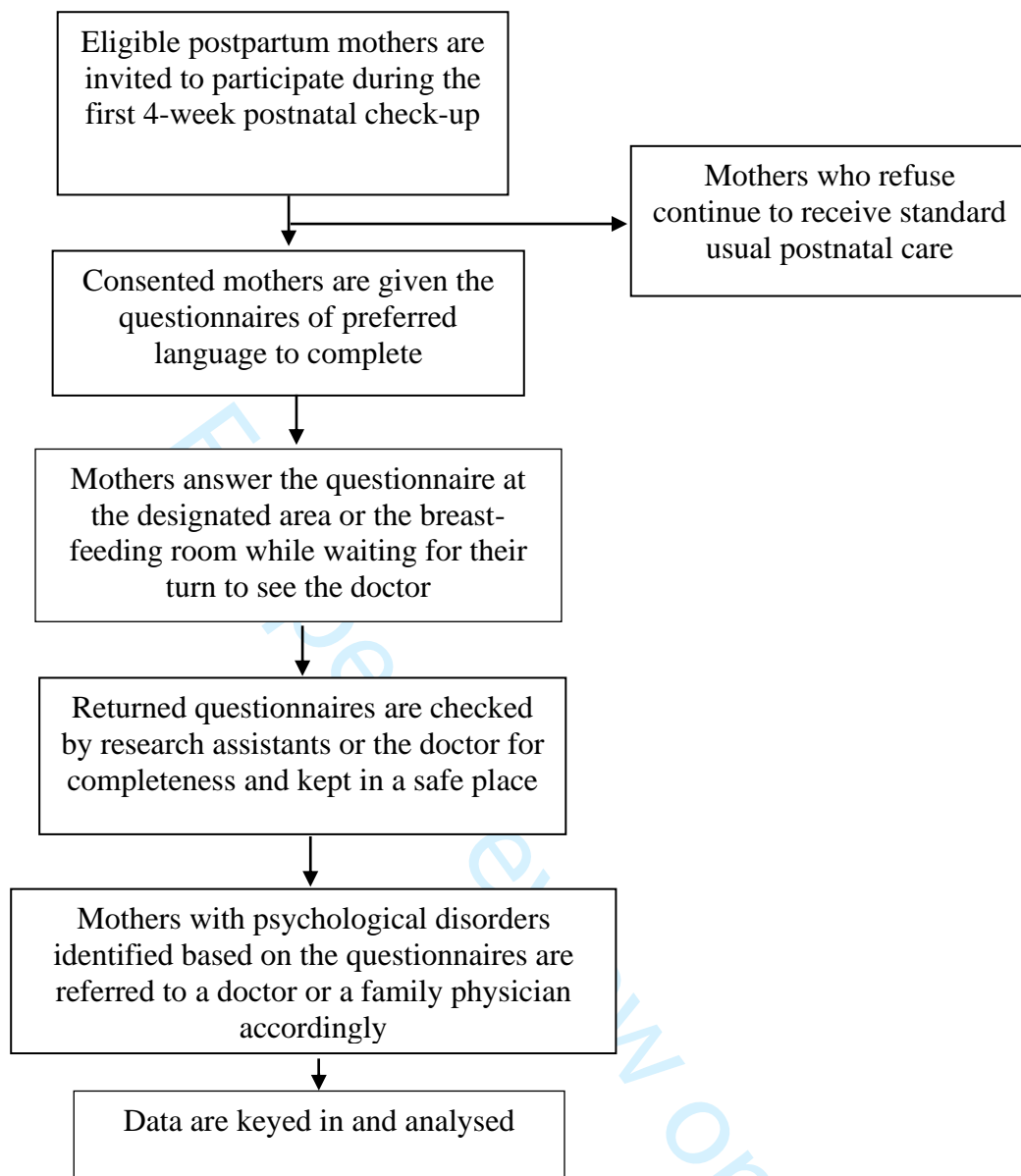
12. Azidah AK, Shaiful BI, Rusli N, et al. Postnatal Depression and Socio-Cultural Practices Among Postnatal Mothers in Kota Bahru, Kelantan, Malaysia. *Med J Malaysia* 2006; 61(1): 76-83.
13. Wan Mohd Rushidi Wan Mahmud, & Mohd. Jamil Yaacob. Postpartum depression: A survey of the incidence and risk factors among Malay women in Beris Kubor Besar, Bachok, Kelantan *Malaysian Journal of Medical Sciences* 2002;9(1): 41-48.
14. Ravi Prakash U, Ranadip Chowdury, Aslyeh S, et al. Postpartum depression in India: a systematic review and data analysis. *Bulletin of the World Health Organization* 2017; 95:706-717C. doi: <http://dx.doi.org/10.2471/BLT.171.192237>
15. Alessandra B., Susan C., Susan P., et al. Identifying the women at risk of antenatal anxiety and depression: systematic review. *Journal of Affective Disorders* 2016;191(2):62-67. <https://doi.org/10.1016/j.jad.2015.11.014>
16. Chutima Roomruangwong, Sinaporn Withayavanitchai, Michael Maes. Antenatal and postnatal risk factors of postpartum depression symptoms in Thai women: A case-control study. *Reproductive Healthcare* 2016;10: 25–31.
17. Alipour Z., Lamyian M., Hajizadeh E. Anxiety and fear of childbirth as predictors of postnatal depression in nulliparous women. *Women Birth*. 2012;25: e37–e43.
18. Cox J., Holden J., Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *The British Journal of Psychiatry*. 1987;150(6):782-6.
19. de Paula Eduardo JAF, de Rezende MG, Menezes PR, et al. Preterm birth as a risk factor for postpartum depression: A systematic review and meta-analysis. *J Affect Disord*. 2019;259:392-403. doi:10.1016/j.jad.2019.08.069
20. Wenzel A, Haigen E, Jackson L, et al. Anxiety symptoms and disorders at eight weeks postpartum. *J Anxiety Disord*. 2005;19(3):295–311.

- 1
2
3 21. Odette Bernazzani, Jean-François Saucier, H el ene David, et al. Psychosocial
4 predictors of depressive symptomatology level in postpartum women. *Journal of*
5 *Affective Disorders* 1997; 46(1): 39-49.
6
7
8
9
10 22. Wenzel A, Haugen E, Jackson L, et al. Prevalence of generalized anxiety at eight
11 weeks postpartum. *Arch Womens Ment Health*. 2003;6(1):43–49
12
13
14 23. Heron J, O Connor TG, Evans J, et al. The course of anxiety and depression through
15 pregnancy and the postpartum in a community sample. *Journal of Affective Disorder*.
16 2004; 80 (1) 65-73.
17
18
19
20 24. Milgrom J, Martin PR, Negri LM: Treating postnatal depression: a psychological
21 approach for health care practitioners. Chichester, John Wiley and Sons; 1999.
22
23
24 25. **Naki c Rado s S, Tadinac M, Herman R.** Anxiety During Pregnancy and Postpartum:
25 Course, Predictors and Comorbidity with Postpartum Depression. *Acta Clin Croat*.
26 **2018;57(1):39-51. doi: 10.20471/acc.2018.57.01.05.**
27
28
29
30 26. Anniverno R, Bramante A, Mencacci C, Durbano F. New Insights into anxiety
31 disorders. In: Durbano F, editor. *Anxiety Disorders in Pregnancy and the Postpartum*
32 *Period*. London, UK: INTECH Open Access Publisher; 2013. pp. 260–285
33
34
35
36 27. Roman M, Bostan CM, Diaconu-Gherasim LR, Constantin T. Personality Traits and
37 Postnatal Depression: The Mediated Role of Postnatal Anxiety and Moderated Role
38 of Type of Birth. *Front Psychol*. 2019;10:1625. doi:10.3389/fpsyg.2019.01625.
39
40
41
42 28. Hung, C. and Chung, H. (2001), The effects of postpartum stress and social support
43 on postpartum women’s health status. *Journal of Advanced Nursing* 2001; 36: 676-
44 684. doi:[10.1046/j.1365-2648.2001.02032.x](https://doi.org/10.1046/j.1365-2648.2001.02032.x)
45
46
47
48
49 29. Danielle Clout, Rhonda Brown. Sociodemographic, pregnancy, obstetric, and
50 postnatal predictors of postpartum stress, anxiety and depression in new mothers.
51 *Journal of Affective Disorders* 2015; 188: 60-67.
52
53
54
55 30. Pakzad M, Dolatian M, Jahangiri Y, Nasiri M, Dargah FA. The Correlation between
56 Islamic Lifestyle and Pregnancy-Specific Stress: A Cross-Sectional, Correlational
57
58
59
60

- 1
2
3 Study. *Open Access Maced J Med Sci*. 2018 Jun 16;6(6):1163-1167. doi:
4 10.3889/oamjms.2018.104.
5
6
7 31. Osman H, Saliba M, Chaaya M, et al. Interventions to reduce postpartum stress in
8 first-time mothers: a randomized-controlled trial. *BMC Womens Health*. 2014;14:125.
9 Published 2014 Oct 15. doi:10.1186/1472-6874-14-125
10
11
12
13 32. Zainab AM, Pereira XV. Depression in primary care. Part 1: Screening and diagnosis.
14 *Malaysian Family Physician*. 2007;2(3):94-101
15
16
17
18 33. Kadir AA, Nordin R, Ismail SB, et al. Validation of the Malay Version of Edinburgh
19 Postnatal Depression Scale for Postnatal Women in Kelantan, Malaysia. *Asia Pac*
20 *Fam Med*. 2004;3:9–18.
21
22
23
24
25 34. Kernot, J., Olds, T., Lewis, L.K. & Maher, C. (2015) Test-retest reliability of the
26 English version of the Edinburgh Postnatal Depression Scale. *Arch Womens*
27 *Ment Health*, 18, 255-257. DOI: 10.1007/s00737-014-0461-4.
28
29
30
31
32
33
34
35 35. Mahmud WM, Awang A, Mohamed MN. Revalidation of the Malay version of the
36 Edinburgh postnatal depression scale (EPDS) among Malay postpartum women
37 attending the Bakar Bata health Center in Alor Setar, Kedah, north west of peninsular
38 Malaysia. *The Malaysian journal of medical sciences: MJMS*. 2003;10(2):71
39
40
41
42
43
44
45 36. Lovibond SH, Lovibond PF. Manual for the Depression Anxiety Stress Scales.
46 Sydney: Psychology Foundation; 1995
47
48
49 37. Henry JD, Crawford JR. The shortform version of the Depression Anxiety Stress
50 Scales (DASS-21): Construct validity and normative data in a large non-clinical
51 sample. *Br J Clin Psychol* 2005; 44:227-239.
52
53
54
55
56
57
58
59
60

- 1
2
3 38. Ramli M, MA Fadzil, Zain Z. Translation, validation and psychometric properties of
4 Bahasa Malaysia version of the Depression Anxiety and Stress Scales (DASS).
5
6
7 *ASEAN Journal of Psychiatry* 2007;8 (2):82-89.
8
9
- 10 39. Lovibond PF. Long-term stability of depression, anxiety, and stress syndromes. *J*
11
12 *Abnorm Psychol.* 1998;107(3):520-26.
13
14
- 15 40. Crawford JR, Henry JD. The Depression Anxiety Stress Scale (DASS): Normative
16
17 data and latent structure in a large non-clinical sample. *Br J Clin Psychol.* 2003;
18
19 42:111-31.
20
21
- 22 41. Lee, J., Lee, EH. & Moon, S.H. Systematic review of the measurement properties of
23
24 the Depression Anxiety Stress Scales-21 by applying updated COSMIN methodology.
25
26 *Qual Life Res* 2019;28(9):2325-2339. doi.org/10.1007/s11136-019-0217-x
27
28
- 29 42. ASM Yusuff, L Tang, CW Binns, et al. Prevalence and risk factors for postnatal
30
31 depression in Sabah, Malaysia: a cohort study. *Women and Birth* 2014: 28(1), 25-29.
32
33
- 34 43. Centers for Disease Control and Prevention (CDC). Principles of Epidemiology in
35
36 Public Health Practice, Third Edition. An Introduction to Applied Epidemiology and
37
38 Biostatistics. Lesson 3: Measures of Risk. Centers for Disease Control and
39
40 Prevention, Office of Public Health Scientific Services, Center for Surveillance,
41
42 Epidemiology, and Laboratory Services, Division of Scientific Education and
43
44 Professional Development. May 18, 2012. Available on
45
46 <https://www.cdc.gov/csels/dsepd/ss1978/lesson3/section2.html>
47
48
- 49 44. Ravichandran Jeganathan (Eds). Preliminary Report of National Obstetrics Registry,
50
51 Jan 2013 – Dec 2015. Kuala Lumpur, Malaysia: National Obstetrics Registry 2013-
52
53 2015. Available on www.acrm.org.my
54
55
56
57
58
59
60

Figure 1: Flow of the participants during data collection



Supplementary Table S1: Definitions of the variables

No.	Variables (Operational definition)	Description	Type of variable
1	Antenatal code	<ul style="list-style-type: none"> • White • Green • Yellow • Red 	Categorical
2	Age	Maternal age in completed years	Interval
3	Ethnicity -according to paternal side	<ul style="list-style-type: none"> • Malay • Chinese • Indian • Others 	Categorical
4	Religion	<ul style="list-style-type: none"> • Islam • Buddha • Hindu • Christian • Others 	Categorical
5	Marital status	<ul style="list-style-type: none"> • Single • Married • Divorced • Widow 	Categorical
6	Education level - highest attained	<ul style="list-style-type: none"> • Primary education • Secondary education • Diploma/ Technical studies • Tertiary education • Never been to school /No schooling 	Categorical
7	Occupation	<ul style="list-style-type: none"> • Unemployed • Routine and manual occupations • Intermediate occupations • Higher level: managerial, administrative or professional 	Categorical
8	Duration of marriage	Duration of marriage in completed years	Interval
9	Husband occupation	<ul style="list-style-type: none"> • Unemployed • Routine and manual occupations • Intermediate occupations • Higher level: managerial, administrative or professional occupations 	Categorical
10	Combined household income	<ul style="list-style-type: none"> • <RM1000 • RM1000-RM5000 • RM5000-RM10,000 • >RM10,000 	Categorical

11	Smoking status -all types	<ul style="list-style-type: none"> • Yes, intensity – no of stick(s) • No • Ex-smoker 	Categorical
12	Alcohol status -all types	<ul style="list-style-type: none"> • Yes • No • Currently stopped 	Categorical
13	Husband practicing polygamy	<ul style="list-style-type: none"> • Yes • No 	Categorical
14	If polygamy, wife no	<ul style="list-style-type: none"> • 1 • 2 • 3 • 4 	Categorical
15	No of children	<ul style="list-style-type: none"> • 0 • 1 • 2 • 3 • 4 • >5 	Ordinal
16	Pre-pregnancy baby gender preference	<ul style="list-style-type: none"> • Male • Female • No preference 	Categorical
17	Antenatal care	<ul style="list-style-type: none"> • Government • Private • None 	Categorical
18	Planned pregnancy -Is the current pregnancy planned and not unexpected?	<ul style="list-style-type: none"> • Yes • No 	Categorical
19	Satisfied with marriage -self-report	<ul style="list-style-type: none"> • Yes • No 	Categorical
20	Marital problems -respondent's own perception of her marriage	<ul style="list-style-type: none"> • Yes • No 	Categorical
21	Period of marital problems	<ul style="list-style-type: none"> • Before child delivery • After child delivery 	Categorical
22	Stable relationship with husband - self-report	<ul style="list-style-type: none"> • Yes • No 	Categorical
23	Domestic violence -Self-report of physical or emotional abuse at home before marriage	<ul style="list-style-type: none"> • Yes • No 	Categorical
24	Domestic violence in this marriage and during pregnancy	<ul style="list-style-type: none"> • Yes • No 	Categorical

25	Relationship with parents -respondent's own perception of the relationship between the mother and her parents	<ul style="list-style-type: none"> • Yes • No 	Categorical
26	Relationship with parent in law - respondent's own perception of the relationship between her and her parent-in-law	<ul style="list-style-type: none"> • Yes • No 	Categorical
27	Underlying medical illness before pregnancy -Any underlying diabetes, hypertension, asthma or any other chronic illnesses	<ul style="list-style-type: none"> • Yes • No 	Categorical
28	Underlying medical illness during pregnancy -Hypertension, gestational diabetes etc.	<ul style="list-style-type: none"> • Yes • No 	Categorical
29	History of miscarriage -any history of abortion before 22 weeks in previous pregnancy	<ul style="list-style-type: none"> • Yes • No 	Categorical
30	Underlying mental illness -Diagnosed of having mental illness prior to pregnancy	<ul style="list-style-type: none"> • Yes • No 	Categorical
31	History of mental illness during pregnancy -Diagnosed of having mental illness during her current pregnancy	<ul style="list-style-type: none"> • Yes • No 	Categorical
32	History of mental illness during postpartum period -Diagnosed of having mental illness during her postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical
33	Family history of mental illness -Is there any parents of 1 st degree relative being diagnosed of having mental illness?	<ul style="list-style-type: none"> • Yes • No 	Categorical
34	Inadequate help from spouse during postpartum period - respondent's own perception of inadequate support during postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical
35	Inadequate help from other family members during postpartum period - respondent's own perception of inadequate support during postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical
36	Inadequate help from others during postpartum period	<ul style="list-style-type: none"> • Yes 	Categorical

	- respondent's own perception of inadequate support during postpartum period	<ul style="list-style-type: none"> • No 	
37	Inability to establish breast feeding -the inability to exclusively breast feed, requiring top up using formula milk	<ul style="list-style-type: none"> • Yes • No 	Categorical
38	No confidence to care for the child -the inability of the mother to care for the baby, thus being dependent on others	<ul style="list-style-type: none"> • Yes • No 	Categorical
39	Experienced stressful life events -any recent events, occurred during antenatal and postpartum period such as financial burden, passing of loved ones or events that are perceived as stressful by respondent	<ul style="list-style-type: none"> • Yes • No 	Categorical
40	Any cultural taboos observed during postnatal care that contribute to mother's stress	<ul style="list-style-type: none"> • Yes • No 	Categorical
41	With whom respondent observed postnatal care during confinement	<ul style="list-style-type: none"> • Parents • Parents in law • Husband • Confinement lady/ centre • Alone 	Categorical
42	Inadequate help to take care of new born at night - self-report	<ul style="list-style-type: none"> • Yes • No 	Categorical
43	Inadequate sleep/rest - respondent's own perception of inadequate sleep or rest during postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical
44	Dissatisfied with body weight and appearance post delivery - respondent's own perception on the satisfaction of her body weight and appearance post delivery	<ul style="list-style-type: none"> • Yes • No 	Categorical
45	Intrapartum experience - respondent's own perception of having bad experiences during labour. E.g.: unbearable pain	<ul style="list-style-type: none"> • Yes • No 	Categorical
46	Mode of delivery	<ul style="list-style-type: none"> • SVD 	Categorical

		<ul style="list-style-type: none"> • Instrumental delivery • Planned caesarean section • Emergency caesarean section 	
47	Postnatal complication -experienced wound pain, wound breakdown, readmission to ward	<ul style="list-style-type: none"> • Yes • No • 	Categorical
48	Type of complication	List complication	Categorical
49	Readmission after discharge during postpartum period	<ul style="list-style-type: none"> • Yes • No 	Categorical
50	Outcome of the baby	<ul style="list-style-type: none"> • Alive • Gender • Birth weight • Twins • Gestational weight • Admission to ward • Medical complication 	Categorical
51	Edinburgh Postpartum Depression scale scoring (Less than 11 – no postpartum depression 11 or more – postpartum depression)	<p>Total score (range 0 - 30)</p> <ul style="list-style-type: none"> • Less than 11 – no postpartum depression • 11 or more – postpartum depression 	Interval Categorical
52	Depression anxiety stress scale (DASS) scoring	<p>Total scores (range 0-21)</p> <ul style="list-style-type: none"> • Depression <ul style="list-style-type: none"> - Mild: 6-7 - Moderate: 8-10 - Severe: 11-14 - Very severe: 15 to 21 • Anxiety <ul style="list-style-type: none"> - Mild: 5-6 - Moderate: 7-8 - Severe: 9-10 - Very severe: 11 to 21 • Stress <ul style="list-style-type: none"> - Mild: 8-9 - Moderate: 10-13 - Severe: 14-17 - Very severe: 18 to 21 	Interval Ordinal Ordinal Ordinal

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of cross-sectional studies

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-9
Objectives	3	State specific objectives, including any prespecified hypotheses	9
Methods			
Study design	4	Present key elements of study design early in the paper	9
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	9-13
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	10-11
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	16-18, Supplementary Table S1
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	14-16
Bias	9	Describe any efforts to address potential sources of bias	16-17
Study size	10	Explain how the study size was arrived at	13-14
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	14-16
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	14-16
		(b) Describe any methods used to examine subgroups and interactions	14-16
		(c) Explain how missing data were addressed	14-16
		(d) If applicable, describe analytical methods taking account of sampling strategy	14-16
		(e) Describe any sensitivity analyses	14-16

Results			NA
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	NA
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	11
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	NA
		(b) Indicate number of participants with missing data for each variable of interest	NA
Outcome data	15*	Report numbers of outcome events or summary measures	NA
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA
		(b) Report category boundaries when continuous variables were categorized	NA
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	NA
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	3, 16-18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	NA
Generalisability	21	Discuss the generalisability (external validity) of the study results	NA
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	18

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.