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# The Economic Cost of Untreated Perinatal Depression

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**Economic Cost of Untreated Perinatal Depression  
among 2020 Birth Cohort in Malaysia**

Chua Sook Ning, PhD, MPH

## THE ECONOMIC COST OF UNTREATED PERINATAL DEPRESSION

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## Executive Summary

This report examines the economic impact of maternal depression during the perinatal period (pregnancy and the first year after childbirth) in Malaysia. Perinatal depression affects 1 in 8 expectant and new mothers in the country, leading to significant physical, social, and psychological consequences for both mothers and their children. Addressing maternal mental health is an urgent public concern.

This report estimates the additional economic burden of perinatal depression from conception to five years postpartum. It's important to note that the cost estimates are conservative and the final estimate is likely an underestimate of the true social and economic costs of perinatal depression.

Key findings in this report are:

- The excess cost (the difference between the costs of mothers with perinatal depression and those without) of untreated perinatal depression for the 2020 birth cohort, projected from conception to 5 years postpartum is RM 1.64 billion.
- The average cost per mother-child dyad is RM 27,406.
- Two-thirds of the total costs are related to adverse impact on mother.

Despite perinatal depression being both preventable and treatable, qualitative reports indicate that both mothers and healthcare providers in Malaysia view perinatal mental health care as insufficient and stigmatized. This report outlines a stepped-care approach that focuses on screening and preventive interventions that can reduce the risk of perinatal depression significantly.

The earliest intervention conceivable for safeguarding the next generation's mental health lies in fostering and sustaining the psychological equilibrium of their parents during the perinatal phase. We have a tremendous opportunity to make a significant positive contribution to the mental health of the coming generations by offering them a stable start to life and creating strong and healthy bonds between mother and child.

## Introduction

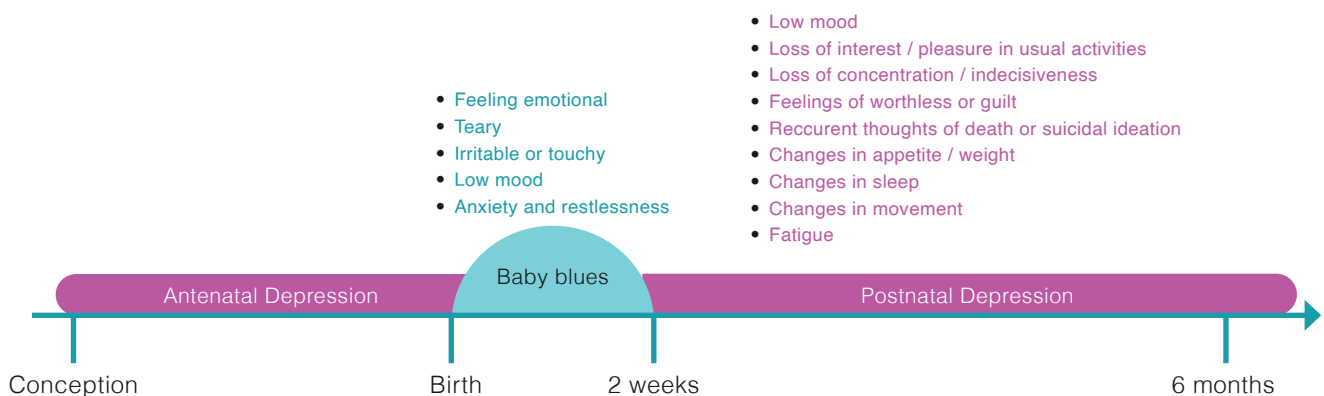
Perinatal depression is one of the most common complications of pregnancy. The term “perinatal” refers to the period of pregnancy and one year after the birth of a child, and the depressive symptoms can range from mild to severe. While up to 70% of women will experience changes in mood in the first week of having a baby, commonly known as the “baby blues,” most women typically feel better within two weeks. However, some will continue to experience symptoms of depression such as low mood, hopelessness, loss of pleasure, feelings of excessive guilt, and irritability (Table 1).

**Table 1. Diagnostic Statistical Manual (DSM) - 5 symptoms of depression**

Feeling sad or having a depressed mood
Loss of interest or pleasure in activities once enjoyed
Changes in appetite — weight loss or gain unrelated to dieting
Trouble sleeping or sleeping too much
Loss of energy or increased fatigue
Increase in purposeless physical activity (e.g., inability to sit still, pacing, handwringing) or slowed movements or speech (these actions must be severe enough to be observable by others)
Feeling worthless or guilty
Thoughts of death or suicide

Research shows that the risk of developing depression increases during pregnancy (antenatal) and the first year after delivery (postnatal) for parents (Figure 1).<sup>1</sup> Perinatal depression has been found in studies to be associated with various negative outcomes for both mothers and infants, including an increased risk of preeclampsia, preterm birth, and emotional and behavioral problems during childhood and adolescence as compared to those without perinatal depression.<sup>2,3</sup> This is a public health issue that has significant intergenerational consequences for families and society.

**Figure 1. Perinatal mental health timeline**



## Prevalence of perinatal depression in Malaysia

In 2016, the National Health and Morbidity Survey (NHMS) reported that 12.7% of mothers aged 15 to 49 years who have a child aged 6-16 weeks had postnatal depression.<sup>4</sup> The states with the highest prevalence were WP Kuala Lumpur (21.9%) and Selangor (21.2%); the state with the lowest prevalence were Kelantan (2.3%). The prevalence of postnatal depression among mothers is approximately 5 times higher than the prevalence of depression among the general population of women aged 15 to 75+ years (2.6%)<sup>5</sup>. On average, 47% of women with postnatal depression also experienced antenatal depression.<sup>6</sup>

A recent meta-analysis of community studies (n=12)<sup>1</sup> in Malaysia reported that the pooled prevalence of perinatal depression was 12.7% (95% CI, 8.7%-17.6%).<sup>7</sup> The stratified prevalence of antenatal depression was 16.9% (95% CI, 12.8%- 21.5%) while the pooled prevalence of postnatal depression was 9.6% (95% CI, 5.3% – 15.0%).

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<sup>1</sup>Prevalence of perinatal depression in Malaysia was calculated using only high-quality Malaysian studies (n=12) cited in Mitchell et al., 2023. The studies used were a combination of antenatal and postnatal depression studies.



## Risk factors

Several systematic reviews have consistently found that the lack of partner or of social support, a history of abuse or of domestic violence, socioeconomic disadvantage, history of mental illness are key risk factors of perinatal depression.<sup>2, 8-11</sup> A list of common risk factors of poor perinatal mental health are listed in Table 2.

**Table 2. Common risk factors of poor perinatal mental health (adapted from World Health Organization)<sup>12</sup>**

### Antenatal:

- Adolescent pregnancy
- Being unmarried or separated
- Unwanted pregnancy
- Marital relationship: unsupportive; polygamous
- Previous stillbirth or repeated miscarriage
- Nulliparity/Primiparity (never given birth before/first child)
- Poverty and lack of financial resources
- Lack of practical support
- Pregnancy as a result of rape
- Spouse/domestic violence
- Difficult relationship with in-laws

### Postnatal:

- Difficulties with husband's behaviour (physical violence; verbal abuse; alcohol use; being illiterate and unemployed; providing little assistance; rejecting the pregnancy)
- Inability to confide in partner
- Poverty (low income; lack of personal income generating activity; inadequate housing)
- Overcrowding and lack of privacy
- Unintended pregnancy
- Adolescent pregnancy
- Unmarried
- Antenatal depression or severe anxiety
- Illnesses during pregnancy, antenatal hospital admission, operative birth
- Large number of children
- Infant unsettled, sick, not thriving
- Problematic relationship with in-law family (mother-in-law and sister-in-law)
- Birth of a girl child in cultures over-valuing boy child
- Lack of sustained, dedicated, practical care after birth for the culturally prescribed period
- Past psychiatric history
- Other stressful life events

These common risk factors of perinatal depression can be broadly categorized into 4 groups: relational, social, personal, and pregnancy/infant related risk factors. The findings of selected studies conducted in Malaysia are reported below.

**Relational risk factors.** There is a twofold increase in the odds of developing perinatal depression among pregnant women who receive poor social support from partner and family members as compared to those who receive moderate to strong social support, controlling for demographic factors.<sup>13-15</sup> In contrast, the odds of developing perinatal depression were halved among women whose husbands helped with infant care<sup>16</sup> and who received high social support<sup>17</sup> compared to women who did not receive partner help and social support. The odds of developing perinatal depression was increased four-fold higher for women who experienced emotional violence and two-fold for women who experienced intimate partner violence compared to women who have not, controlling for demographic factors.<sup>15,17</sup>

**Social risk factors.** Women from low income households are two times more likely to develop perinatal depression than those who are not from a low-income household.<sup>15,17,18</sup>

**Personal risk factors.** A history of mental illness is associated with a three<sup>16</sup> to fivefold<sup>17</sup> increase in odds of developing perinatal depression.

**Reproductive and infant-related risk factors.** There are mixed findings on the association of an unplanned pregnancy and perinatal depression. One study found that an unplanned pregnancy is associated with a threefold increase of the odds of developing perinatal depression<sup>15,19</sup> while another did not find a significant association.<sup>17</sup>

There is also some evidence suggesting that having a male gender preference for women who give birth to a female infant is associated with increased odds of developing perinatal depression.<sup>2,17</sup>

## Perinatal mental health awareness and support in Malaysia

The pressing demand for enhanced education and intervention concerning perinatal depression underscores a disconcerting lack of both screening and effective treatment within Malaysia. Although a significant proportion of nurses working in Maternal and Child Health clinics acknowledged the necessity of screening and their role in it, the prevailing reality is that thorough screening practices are not implemented widely. As a result, the majority of women with perinatal depression remain unaware of their condition.

**Awareness and help seeking.** A study that surveyed social support networks (family, relatives, and friends) of new mothers in the Klang Valley reported that only 44% of supporters were aware that postnatal depression was common and 53% of them believed that only women with a history of psychological problems or who did not wish to become pregnant can develop postnatal depression.<sup>20</sup>

It is concerning that the most recent NHMS in 2022 reported that 9 in 10 mothers with postnatal depression in Malaysia were unaware of their condition.<sup>21</sup> This is consistent with a qualitative survey of new mothers who believed that their emotional distress was merely a temporary personal issue rather than depression.<sup>22</sup> Another study found that mothers were reluctant to seek help due to the stigma associated with depression.<sup>23</sup>

**Mental health support.** Overwhelmingly in qualitative studies, mothers reported that healthcare providers did not attend to their emotional well-being but focused on other domains such as family planning or child development.<sup>22</sup> It should be noted that most studies focused on healthcare services for only postpartum depression, and did not examine mental health support during pregnancy.

The experience of mothers is consistent with studies conducted among healthcare professionals. A survey study conducted among nurses who worked in Maternal and Child Health clinics found that only 28% had ever screened for postpartum depression despite most agreed that screening is necessary (87%) and that screening is their responsibility (72%).<sup>24</sup> A recent qualitative study with healthcare practitioners in Maternal and Child Health clinics found similar results: the majority said they do not screen new mothers for postpartum depression.<sup>25</sup> In addition, the participants cited the lack of standard care guidelines and time constraints as the main reasons for not screening.

Other studies reported that there is a low level of knowledge of postpartum depression among healthcare practitioners in Maternal and Child Health clinics.<sup>26–28</sup> For instance, about 25% of healthcare practitioners could correctly identify patients with postpartum depression in vignettes.<sup>26</sup> Many also believed that postpartum depression was synonymous with baby blues, only lasted for several weeks, and is an uncommon illness.<sup>27,28</sup>

## Consequences of perinatal depression

Perinatal depression has widespread and long-term serious consequences for mother and child.

### Maternal outcomes

- i. **Obstetric outcomes.** Mothers with perinatal depression are more likely to have perinatal complications (e.g., preeclampsia, caesarean delivery), and adverse birth outcomes (e.g., preterm birth, low birth weight).<sup>29</sup> These complications are in turn leading causes of infant morbidity and mortality.<sup>30</sup>
- ii. **Socioeconomic outcomes.** Depression is linked to lower socioeconomic outcomes through loss of income, loss of productivity (presenteeism and absenteeism)<sup>31</sup> and unemployment.<sup>32</sup>

### Child outcomes

- i. **Infant health outcomes.** Perinatal depression is associated with an increased risk of adverse infant health outcomes such as common infant illnesses and non-exclusive breastfeeding.<sup>33</sup>
- ii. **Relational outcomes.** Perinatal depression is associated with infant attachment problems<sup>34</sup> or poorer mother-infant bonding.<sup>35</sup> In turn, poor mother-infant bonding is associated with child's emotional and behavioural problems.<sup>36</sup>
- iii. **Emotional and behavioural problems.** Perinatal depression increases the risk of emotional and behavioural problems such as anxiety and depression starting in early childhood, and continuing into young adulthood.<sup>37</sup>
- iv. **Neurodevelopmental disorders.** Some studies also found evidence that perinatal depression increases the risk of attention deficit hyperactivity disorder (ADHD)<sup>38</sup> and autism spectrum disorder.<sup>39</sup>

## Economic cost of untreated perinatal depression

In this study, I quantified the economic costs of untreated perinatal depression in Malaysia, focusing primarily on the mother-child cost during conception through age 5 years.<sup>2</sup> The model focused on outcomes which are most consistently found in the literature<sup>2,3,11,30,33</sup> especially in low and middle income countries (LMIC).

The model inputs included impact estimates (the incremental effects associated with exposure to untreated perinatal depression vs. no exposure); prevalence estimates of perinatal depression in Malaysia; and the associated costs and baseline prevalence of each outcome.

For the purpose of this study, I calculated the prevalence estimates of perinatal depression using the NHMS 2016 data and the community studies used in Mitchell et al., 2023 in Stata 17.0 using a random-effects meta-analysis with Freeman-Tukey double arcsine (see Appendix 1 for studies included). The total sample size was 25,715. The pooled prevalence for perinatal depression was 12.7% (95% CI: 9.4– 16.4). When stratified by time of onset, the prevalence for antenatal depression was 16.9% (95% CI 12.8-21.5) and the prevalence for postpartum depression was 9.9% (95% CI: 6.12-14.4).

Baseline prevalence of outcomes were extracted from NHMS and other national datasets when available, or using prevalence estimates from meta-analyses on LMIC (Table 2).

Cost data was taken from peer-reviewed literature and government reports. Only direct costs were included in the model.

The following assumptions were made:

- i. Maternal obstetric health outcomes and other health outcomes occurred only once during the model timeframe.
- ii. Productivity costs occurred annually until remission.
- iii. It is assumed that two thirds of women achieved remission by the end of the first year postpartum without treatment, and that the proportion remains constant.<sup>42</sup>
- iv. Impact of exposure to untreated perinatal depression remained constant for child outcomes.
- v. When extrapolating beyond year 0 to year 5 postpartum, costs were discounted at an annual rate of 3% and adjusted for medical inflation of 10%.<sup>43</sup> Costs are reported in MYR2020.

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<sup>2</sup>The mathematical model is based on a recent paper by Luca et al. which calculated the economic burden of untreated perinatal mood and anxiety disorders among 2017 births in the United States.<sup>41</sup>

**Table 3. Parameters and costs used to estimate the economic cost of untreated perinatal depression (PMD) among 2020 births in Malaysia.**

Baseline demographics	
No. of births	471504 <sup>1</sup>
No. of pregnancies	473909 <sup>45</sup>
No. of births from PMD	59976
Prevalence of PMD, %	12.7 (9.4, 16.4) <sup>4, 13, 16, 17, 19, 35, 46–51</sup>
<b>Other inputs</b>	
Medical care inflation, %	10 <sup>43</sup>
Discount rate, %	3.0 <sup>52</sup>
Women who do not achieve remission without treatment by end of first y postnatal, %	33.3 (20.0–60.0) <sup>42</sup>

## Maternal outcomes

### Maternal productivity

Labor force participation among women with children aged younger than 6 y, %	58.8 <sup>53</sup>
Per-capita expected cost of job absenteeism, RM	228 (170 – 284) <sup>3</sup>
Per-capita expected cost of job presenteeism, RM	684 (512 – 854) <sup>54</sup>
Baseline rate of unemployment, %	4.7 <sup>53</sup>
Likelihood of unemployment among women with PMD, %	7.9 <sup>55</sup>
Annual cost per unemployed woman, RM	34668 <sup>56</sup>

### Suicide

Baseline incidence among women, %	2.4 <sup>57</sup>
Likelihood among women with depression, %	18.0 <sup>58</sup>
Annual cost per case, RM <sup>4</sup>	34668

### Maternal obstetric health

#### Preeclampsia

Baseline incidence of preeclampsia, %	2.0 <sup>59</sup>
Likelihood of preeclampsia among women with PMADs, %	3.0 <sup>60</sup>
Annual cost per case of preeclampsia, RM <sup>5</sup>	4250 <sup>61</sup>

#### Caesarean delivery

Baseline incidence of caesarean delivery, %	23.2 <sup>62</sup>
Likelihood of caesarean delivery among women with PMD, %	31.9 <sup>64</sup>
Incremental cost per case of caesarean delivery, RM	2500 <sup>65</sup>

<sup>3</sup>The estimation was varied by 25% in sensitivity analyses.

<sup>4</sup>Includes economic cost of productivity loss only due to lack of information on direct and indirect health cost.

<sup>5</sup>Includes cost of delivery only due to lack of information on cost of antenatal and prenatal care.

### Child outcomes

#### Preterm birth

Baseline incidence, %	6.6 <sup>63</sup>
Probability among infants born to women with PMD, %	16.0 <sup>11</sup>
Incremental cost per infant with preterm birth, RM	21984 <sup>66</sup>

#### Suboptimal breastfeeding

Baseline prevalence, %	52.9 <sup>4</sup>
Likelihood among women with PMD, %	68.7 <sup>67</sup>
Incremental cost per infant, RM	65.0 <sup>68</sup>

#### Child behavioral and developmental disorders

Baseline incidence among children aged 0-4 y %	12.1 <sup>69</sup>
Probability among infants born to women with PMD, %	19.9 <sup>70</sup>
Incremental annual cost per child, RM	8819 <sup>71</sup>

#### Childhood asthma

Baseline incidence, %	5.9 <sup>72</sup>
Probability among infants born to women with PMD, %	6.7 <sup>73</sup>
Incremental annual cost per child, RM	4251 <sup>74</sup>

#### Childhood unintentional injuries

Baseline incidence among children aged 0-4 y %	3.8 <sup>4</sup>
Probability among children born to women with PMD, %	5.9 <sup>75</sup>
Incremental annual cost per child, RM	3624 <sup>76</sup>



## Results

There were 471,504 live births in 2020, suggesting that 59,976 mothers who gave birth in 2020 had perinatal depression (using the estimated prevalence of perinatal depression of 12.7%). The model estimated that the excess cost of untreated perinatal depression for the 2020 cohort, projected from conception to 5 years postpartum was RM 1.64 billion (Table 4). The average cost per mother-child dyad is RM 27,406. The mother incurred about 70% of the total costs and the child incurred 30%.

### Costs of maternal outcomes

The total cost attributed to presenteeism, absenteeism and unemployment from conception to 5 years postpartum was estimated to be about RM 261.83 million. Presenteeism was estimated to cost RM 64.32 million, absenteeism RM 21.35 million, and unemployment accounted for the bulk of the productivity cost (RM 176.17 million).

The financial toll of suicide amounted to RM 870.66 million, primarily reflecting loss of income, given that direct health care expenses associated with suicide is lacking. Consequently, the actual cost of suicide is anticipated to be considerably greater.

While the costs associated with the loss of productivity and suicide are the opportunity cost of the output foregone,<sup>77</sup> the following outcomes entail additional health expenditures due to untreated perinatal depression.

The cost of maternal obstetric complications was estimated to be RM 21.52 million. Untreated perinatal depression was associated with an additional 561 women developing preeclampsia and 7,652 more women having a caesarean delivery in 2020.

### Costs of child outcomes

About 6,680 preterm births in 2020 were associated with untreated perinatal depression, leading to an increased cost of RM 146.86 million. Suboptimal breastfeeding associated with untreated perinatal depression costs RM 0.61 million.

The cost of behavioural and developmental disorders was estimated to be RM 292.02 million. It is estimated that untreated perinatal depression is associated with an increase of 4,652 children with behavioural and developmental disorders in the 2020 birth cohort.

The total incremental cost of childhood asthma and unintentional injuries was RM 14.98 million and RM 32.63 million, respectively.

**Table 4. Model results of untreated perinatal depression for 2020 birth cohort, by year (in Millions of Ringgit Malaysia)**

Outcomes	Total	0	1	2	3	4	5
<b>Maternal costs</b>							
Productivity losses	261.83M	98.19M	32.73M	32.73M	32.73M	32.73M	32.73M
Suicide	870.66M	108.83M	108.83M	108.83M	108.83M	108.83M	108.83M
Preeclampsia	2.39M	2.39M					
Cesarean delivery	19.13M	19.13M					
<b>Child costs</b>							
Preterm	146.86M	146.86M					
Suboptimal breastfeeding	0.61M	0.61M					
Behavioral and developmental disorders	292.02M	41.03M	43.82M	46.80M	49.98M	53.38M	57.00M
Asthma	14.98M	2.25M	2.40M	2.56M	2.56M	2.74M	2.92M
Child unintentional injuries	32.63M	4.59M	4.90M	5.23M	5.58M	5.96M	6.37M
<b>Total cost</b>	<b>1,641.11M</b>	<b>423.88M</b>	<b>192.68M</b>	<b>196.15M</b>	<b>199.69M</b>	<b>203.64M</b>	<b>207.86M</b>
Cost per mother-child dyad with perinatal depression over 0-5 years postpartum	27,406.00						
Cost per mother-child dyad with perinatal depression over 0-5 years postpartum, average per year	4,568.00						

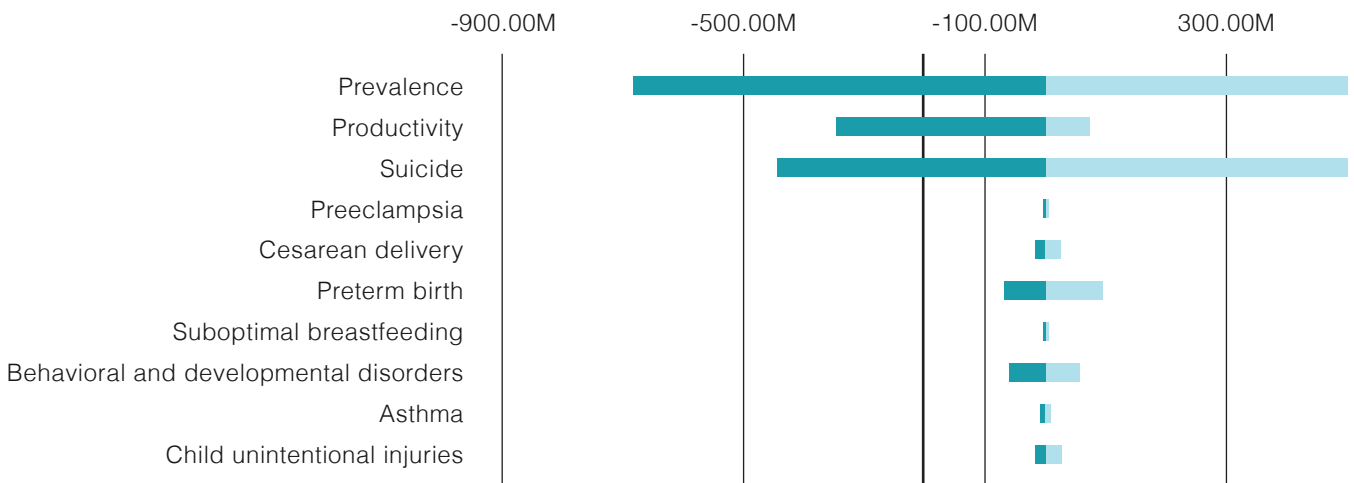
### Sensitivity analyses

Deterministic 1-way sensitivity analyses was conducted to estimate the uncertainties in individual parameters. The analyses varied prevalence of perinatal depression and impact estimates (Table 3).

The tornado diagram (Figure 2) shows the difference in costs (RM million) from the main model as each parameter was varied from the lowest to highest value. Prevalence of perinatal depression, and the impact estimates on maternal productivity and suicide were the most influential parameters, due to the large confidence intervals in the literature, as well as the high costs associated to these outcomes.

When all model estimates were varied using the low and high end of the estimate ranges simultaneously, the costs of untreated perinatal depression for the 2020 birth cohort ranged from RM 752 million to RM 3.44 billion.

**Figure 2. Tornado diagram from 1-way sensitivity analysis.**



## Discussion and recommendations

Perinatal depression is a preventable and treatable health condition which has serious intergenerational health, social, and economic consequences when left untreated. In this paper, we estimated the excess cost of perinatal depression from conception through age 5 years to be RM 1.64 billion, or RM 27,406 per mother-child dyad. The true cost of mental health problems during the perinatal period is likely to be significantly higher as conservative cost estimates were used.

Malaysia has made significant progress in maternal and child care in the past several decades. Perinatal care and services are provided either for free or at minimal cost to all Malaysians at government health facilities. Public health initiatives have successfully halved under 5 mortality and infant mortality from 1990 to 2015.<sup>78</sup> Maternal mortality has also been reduced significantly. Nevertheless, maternal and child mental health care and policies continue to lag behind. Addressing perinatal mental health is the earliest intervention for a mentally and physically healthy society.

The World Health Organization recommends taking a stepped-care approach to perinatal mental health, which is an evidence-based model of healthcare delivery where service intensity is matched to individual needs (Figure 3).<sup>79</sup> This allows for less resource intensive evidence-based interventions to be provided to the majority of the population.

**Figure 3. A stepped-care approach to perinatal mental health**



### Step 1. The promotion of good mental health care.

The promotion of good mental health care starts with providing non-stigmatizing care by knowledgeable healthcare providers.

Unfortunately, stigma of mental illness is present even among healthcare providers. A study conducted among Malaysian hospital staff found that there was greater social avoidance and more negative stereotypes of patients with mental illness compared to patients with diabetes.<sup>80</sup> Stigma not only decreases the likelihood of help-seeking but also increases patients' sense of helplessness and hopelessness about their illness through internalized self-stigma.<sup>81</sup>

Based on best practices and research findings, we recommend a program that offers a combination of social contact and psychoeducation for primary care givers to improve mental health literacy and to lower the stigma of mental illness.<sup>82,83</sup> The two main goals of such a program is to reduce the prejudice and discrimination of mental illness, and to promote affirming behaviours and social inclusion of those with mental illness. In addition, anti-stigma programs must be offered regularly as single anti-stigma events do not have a sustained positive effect.<sup>82</sup>

The National Consortium on Stigma and Empowerment recommend five key principles of an effective stigma program (Figure 4). Specifically to tackle stigma among primary care providers, the workshop needs to provide opportunities to listen to and connect with fellow health care professionals with lived experience and who are in recovery. The fellow health care professional with lived experience will share about their experience of mental health problems and their contact with healthcare services as patients.<sup>84</sup>

#### Figure 4: Principles of a mental illness stigma campaign

1. Contact with people with mental illness is fundamental to public stigma changed.
2. Contact needs to be targeted
3. Local contact programs are more effective
4. Program presenter must be credible
5. Interaction with people with mental health challenges must be continuous

#### Step 2 Prevention for vulnerable women

Research has shown that perinatal depression is preventable and treatable. The US Preventive Services Task Force (USPSTF) recommends screening pregnant and postpartum women for depression and providing preventive psychological interventions for pregnant and postpartum women who are at increased risk of perinatal depression.<sup>85,86</sup> Perinatal depression screening in combination with preventive psychological interventions have been shown to significantly reduce the risk of perinatal depression up to 50%.<sup>33,86</sup> In addition, modeling studies suggest that a screening and intervention program is more cost effective than no mental health perinatal care.<sup>87-89</sup>

**Screening programs.** Based on current clinical recommendations in Malaysia and among OECD countries, we recommend that all pregnant and postpartum women be screened for perinatal depression using the Patient Health Questionnaire (PHQ) 2 to ensure that all pregnant and postpartum women are given a chance to discuss their mental health.<sup>90,91</sup> The PHQ-2 responses also allow healthcare providers to more easily initiate a mental health discussion by providing some discussion points. The follow-up discussion may also include psychoeducation about mental health and well-being during pregnancy and postpartum. For those who screened positive for the PHQ-2, further assessment can be made using the Edinburgh Postnatal Depression Scale (EPDS).<sup>92</sup> (See Appendix 2 for PHQ-2 and EPDS)

In addition, all clinical guidelines reviewed also recommend that healthcare providers who care for women in the pregnant and postpartum stage must inquire about mental health and well-being and be able to have an empathetic, meaningful and helpful discussion on mental health with their patients. The success of any mental health program depends largely on (1) providers not labelling, stigmatizing or shaming patients for their emotional distress or mental health problems<sup>93,94</sup> and (2) having available resources for effective treatment and follow-up after a discussion or screening.<sup>93</sup> A qualitative study of patient's perception of universal screening for perinatal depression found that screening was ineffective when providers did not explain the purpose of the screening instrument, did not discuss the results of the screen with patients, and did not provide any follow-up related to the screening scores.<sup>95</sup> Thus, we recommend mental health training for healthcare providers involved in perinatal care to increase mental health literacy and to equip them with the skills to handle mental health conversations empathetically and nonjudgmentally.

**Preventive programs.** Evidence based preventive programs are usually based on interpersonal psychotherapy or cognitive behavioural therapy and can be delivered in group or individual format by healthcare professionals such as psychologists, nurses, and midwives. The US Preventive Services Taskforce review of perinatal depression interventions found that preventive interventions are usually delivered in a group format which range between 6 to 12 weeks of weekly 1- to 2- hour sessions, with a median of 8 weeks.<sup>96</sup> Mothers who attend these programs will learn about mental health during pregnancy and the postpartum period, stress management, and how to develop a good social support network. The majority of the sessions will be initiated during the second and third trimester of pregnancy, with the remaining sessions delivered postpartum.<sup>86</sup> They also reported that perinatal depression preventive interventions can reduce the risk of perinatal depression by 39% (pooled RR=0.61 [95% CI, 0.47 to 0.78]). The benefit of preventive interventions is even greater among women who are at increased risk for perinatal depression, with a 45% reduction in the likelihood of depression (pooled RR=0.55 [95% CI, 0.44 to 0.68]).

### Box 1: The estimated cost and projected savings of a preventive intervention

The estimated cost of delivering preventive workshops to all mothers who were at-risk of developing perinatal depression in the 2020 birth cohort, using the recommended fees provided in the Counsellors (Fees) Regulations 2017<sup>97</sup> is RM 55.8 million. This estimate does not include development cost.

The following assumptions were made:

1. The prevalence of perinatal depression was used to estimate the number of at-risk mothers.
2. A preventive workshop consists of 8 two-hour sessions delivered in group format.
3. It is assumed the workshops will be held in existing community or government facilities as a cost-saving measure.
4. Each group consists of 8 participant, which is the midpoint of a group counselling session according to the Counsellors (Fees) Regulations.
5. The total training and supervision time for each facilitator is 20 hours a year.<sup>98</sup>
6. It is assumed that each group session has 2 facilitators.<sup>99</sup>
7. It is assumed that each facilitator delivers 2 group sessions a week, or 6 workshops a year.
8. When a range of fees were given in the Counsellors (Fees) Regulations 2017, the midpoint was used to estimate the cost of delivering a preventive workshop.
9. It is assumed that the preventive intervention leads to a 45% reduction in the prevalence of perinatal depression (sensitivity range is 32% - 56%; pooled RR=0.55 [95% CI, 0.44 to 0.68]).<sup>86</sup>

Number of at-risk mothers	60,282
Workshop cost per participant	RM 880
Training cost per facilitator per year	RM 367
Total cost of preventive intervention per year <sup>6</sup>	RM 55.8 million

A range of potential savings due to a reduction in the prevalence of untreated perinatal depression after delivery of preventive intervention was then calculated.

	Cost of perinatal depression	Savings
<b>Without prevention</b>	RM 1,641 million	
<b>With prevention</b>		
32% reduction	RM 1,116 million	RM 526 million
45% reduction	RM 903 million	RM 739 million
56% reduction	RM 722 million	RM 919 million

The reduction in the prevalence of untreated perinatal depression has a projected cost savings of approximately RM 526 million to RM 919 million over five years postpartum. This far exceeds the estimated cost of providing preventive workshops to all at-risk mothers in the 2020 birth cohort. The actual lifetime savings is likely to be higher as this report estimates the excess cost of perinatal depression from conception up to 5 years postpartum. This estimate also does not include the non-financial benefits of improved mental health such as better quality of life, better relationships, and better physical health.

Given the high number of workshops to be delivered, it is necessary to expand the mental health workforce to include peers. Using a peer workforce will lead to the creation of new jobs and economic growth while promoting mental health recovery and decreasing risk of relapse of peers.<sup>100</sup>

### Step 3 and 4 Treatment programs

The Medical Development Division (Malaysia Ministry of Health) recommends psychotherapy for mild to moderate perinatal depression and pharmacotherapy with psychotherapy as an adjunct for severe perinatal depression.<sup>101</sup> This is in line with the National Institute for Health and Care Excellence recommendation that psychological treatments such as Interpersonal Psychotherapy (IPT) and Cognitive Behavioral Therapy (CBT) are first-line treatment for perinatal depression<sup>102</sup>.

Indeed, a meta-analysis of the effects of psychotherapy show sthat there is a moderately large effect size of psychotherapy for perinatal depression ( $g=0.67$ , numbers needed to treat = 4 ), with positive effects lasting 6 to 12 months after follow-up.<sup>103</sup>



## Conclusion

Perinatal depression is a critical yet neglected public health challenge within Malaysia. Approximately one in eight expectant and new mothers in the country struggle with perinatal depression, underscoring its prevalence as a prominent complication of childbirth. The ramifications extend beyond the individual, encompassing adverse physical, social, and psychological consequences for both maternal well-being and offspring development. Through meticulous analysis, our study conservatively estimates the economic burden of perinatal depression, amounting to RM 1.64 billion from conception through age 5 years, equating to RM 27,604 per mother-child dyad. Notably, the significant promise lies in the preventability and treatability of this condition.

To address this multifaceted issue, we advocate for a comprehensive health strategy that prioritizes the holistic enhancement of physical and psychological wellness for all mothers, commencing as early as possible. The release in 2022 of the Malaysia Country Report and Infographic by the Ministry of Health and UNICEF highlighted the dearth of resources and funding allocated to the mental health of children and adolescents in the East Asia and Pacific Region. This confluence presents a remarkable occasion to effect positive change in the mental well-being of forthcoming generations by instilling a sound foundation in their formative years. Undoubtedly, the earliest intervention conceivable for safeguarding a child's mental health lies in fostering and sustaining the psychological equilibrium of their parents during the perinatal phase. We have a tremendous opportunity to make a significant positive contribution to the mental health of the coming generations by offering them a stable start to life and creating strong and healthy bonds between mother and child .

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## Appendix A

Studies used to estimate the prevalence of perinatal depression

Health condition	Study	Sample size	Prevalence (%)
<b>Antenatal depression</b>	Elias et al. 2020	265	17.0
	Nasreen et al., 2018	904	12.2
	Rashid et al., 2017	3000	20.0
	Mohd Yusuff et al., 2016	2072	13.8
	Fadzil et al., 2013	175	10.3
	Azidah et al., 2006	337	30.2
<b>Postpartum depression</b>	Ahmad et al., 2018	5727	4.4
	National Health and Morbidity Survey, 2016	10140	12.7
	Mohd Yusuff et al., 2015	1362	14.3
	Zainal et al., 2012	411	6.8
	Azidah et al., 2006	337	20.7
	Nasreen et al., 2022	566	6.5
	Grace et al., 2001	265	3.9
	Kit et al., 1994	154	3.9



## Appendix B.1

### Patient Health Questionnaire-2<sup>99</sup>

Over the last 2 weeks, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3

Note. The PHQ-2 is a brief self-report screening tool for depression and should not be used to establish diagnosis or monitor symptom severity.

## Appendix B.2

Edinburgh Postpartum Depression Scale with scoring guide<sup>100</sup>

Since you are either pregnant or have recently had a baby, we want to know how you feel.

Please place a CHECK MARK (✓) on the checkbox by the answer that comes closest to how you have felt IN THE PAST 7 DAYS—not just how you feel today. This is a screening test; not a medical diagnosis. If something doesn't seem right, call your health care provider regardless of your score.

Below is an example already completed.

I have felt happy:

- Yes, all of the time
- Yes, most of the time
- No, not very often
- No, not at all

This would mean: "I have felt happy most of the time" in the past week.  
Please complete the other questions in the same way.

1. I have been able to laugh and see the funny side of things:
  - As much as I always could
  - Not quite so much now
  - Definitely not so much now
  - Not at all
2. I have looked forward with enjoyment to things:
  - As much as I ever did
  - Rather less than I used to
  - Definitely less than I used to
  - Hardly at all
3. I have blamed myself unnecessarily when things went wrong:
  - Yes, most of the time
  - Yes, some of the time
  - Not very often
  - No, never
4. I have been anxious or worried for no good reason:
  - No, not at all
  - Hardly ever
  - Yes, sometimes
  - Yes, very often
5. I have felt scared or panicky for no good reason:
  - Yes, quite a lot
  - Yes, sometimes
  - No, not much
  - No, not at all
6. Things have been getting to me:
  - Yes, most of the time I haven't been able to cope at all
  - Yes, sometimes I haven't been coping as well as usual
  - No, most of the time I have coped quite well
  - No, I have been coping as well as ever
7. I have been so unhappy that I have had difficulty sleeping:
  - Yes, most of the time
  - Yes, sometimes
  - No, not very often
  - No, not at all
8. I have felt sad or miserable:
  - Yes, most of the time
  - Yes, quite often
  - Not very often
  - No, not at all
9. I have been so unhappy that I have been crying:
  - Yes, most of the time
  - Yes, quite often
  - Only occasionally
  - No, never
10. The thought of harming myself has occurred to me:
  - Yes, quite often
  - Sometimes
  - Hardly ever
  - Never





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