

# Common perinatal mental disorders in northern Viet Nam: community prevalence and health care use

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**Objective** To establish the prevalence of common perinatal mental disorders their determinants, and their association with preventive health care use among women in one rural and one urban province in northern Viet Nam.

**Methods** We conducted a cross-sectional survey of cohorts of pregnant women and mothers of infants recruited systematically in 10 randomly-selected communes. The women participated in psychiatrist-administered structured clinical interviews and separate structured interviews to assess sociodemographic factors, reproductive health, the intimate partner relationship, family violence and the use of preventive and psychiatric health care. Associations between these variables and perinatal mental disorders were explored through univariate analyses and multivariable logistic regression.

**Findings** Among women eligible for the study (392), 364 (93%) were recruited. Of these, 29.9% (95% confidence interval, CI: 25.20–34.70) were diagnosed with a common perinatal mental disorder (CPMD). The frequency of such disorders during pregnancy and in the postpartum period was the same. Their prevalence was higher among women in rural provinces (odds ratio, OR: 2.17; 95% CI: 1.19–3.93); exposed to intimate partner violence (OR: 2.11; 95% CI: 1.12–3.96); fearful of other family members (OR: 3.36; 95% CI: 1.05–10.71) or exposed to coincidental life adversity (OR: 4.40; 95% CI: 2.44–7.93). Fewer women with a CPMD used iron supplements than women without a CPMD, but the results were not statistically significant ( $P=0.05$ ). None of the women studied had ever received mental health care.

**Conclusion** Perinatal depression and anxiety are prevalent in women in northern Viet Nam. These conditions are predominantly determined by social factors, including rural residence, poverty and exposure to family violence. At present the needs of women with common perinatal mental disorders are unrecognized and not attended to and their participation in essential antenatal preventive care appears to be compromised.

Une traduction en français de ce résumé figure à la fin de l'article. Al final del artículo se facilita una traducción al español. الترجمة العربية لهذه الخلاصة في نهاية النص الكامل لهذه المقالة.

## Introduction

Common perinatal mental disorders in women are associated with reduced social participation and caregiving capacity and constitute a significant public health problem. In high-income countries, about 10% of pregnant women and 13% of mothers of infants have significant mental health problems, depression and anxiety being the most common.<sup>1,2</sup> Rates are much higher in resource-constrained countries. Among women attending antenatal services, screening criteria for depression were met by 16% in Tamil Nadu,<sup>3</sup> 25% in rural Pakistan<sup>4</sup> and 23% in Goa.<sup>5</sup> Such criteria were met by 34.7% of mothers of infants in a poor South African township<sup>6</sup> and by 40% in Rawalpindi, Pakistan.<sup>7</sup> Even in these contexts, most evidence is derived from women attending hospitals, which are only accessible to relatively advantaged urban dwellers.<sup>3,5,8,9</sup> Little research has been conducted among the poorest rural-dwelling women who give birth in local health centres or without skilled attendants at home.<sup>4</sup>

Evidence is emerging that mental disorders contribute to maternal mortality and morbidity in Viet Nam. Of 796 pregnancy-related deaths in seven provinces in 2000–2001, up to 16.9% were attributed to suicide. The prevalence of suicide was highest in the poorest rural provinces, where health services were limited. Psychiatric illness and exposure to family violence were not assessed, but the authors concluded that “community behaviours towards women” must be considered as a potential contributing

factor.<sup>10</sup> In 2000, 506 mothers of 6-week-old infants attending Ho Chi Minh City immunization clinics were surveyed using a translated, culturally-verified and back-translated form of the Edinburgh Postnatal Depression Scale (EPDS).<sup>8,11</sup> In the absence of local validation, a clinical cut off score of 12 points was used. The average EPDS score was 9.49 ( $\pm 6.32$ ) points, and 32.8% of the women scored  $> 12$ ; 19.4% acknowledged thoughts of not wanting to live anymore (translated Item 10), 64% of them at least quite frequently. In the Young Lives longitudinal study of childhood poverty, 20% of mothers of 6-month-old infants met the “caseness” criteria of the Self-Reporting Questionnaire for psychiatric screening of the World Health Organization (WHO).<sup>12,13</sup> In the only investigation of antenatal mood conducted to date, EPDS scores  $> 12$  were found less frequently among socioeconomically-advantaged women attending clinics at a tertiary-level Hanoi hospital, which suggests a social gradient in prevalence.<sup>14</sup> None of these studies used diagnostic interviews to confirm screening data, and this may have yielded overestimates.

Viet Nam has well-developed public and primary health care systems: most women (88%) have a skilled attendant at birth, and infant immunization coverage is  $> 90\%$ .<sup>15</sup> Iron deficiency anaemia associated with hookworm infection and low meat consumption are prevalent in pregnant women (54%) and those who have recently given birth (62%), especially in rural provinces.<sup>16</sup> With the introduction of a national iodized salt

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programme, the prevalence of antenatal iodine deficiency and hypothyroidism in women decreased, but it has recently increased again, especially in the delta regions. National antenatal dietary supplementation programmes have been implemented to reduce the prevalence of these conditions, but for reasons as yet unknown, the uptake of free or subsidized supplements is incomplete. Mental health is not considered in initiatives to make pregnancy safer in Viet Nam, and its role as a determinant of participation in preventive health care is overlooked.

The primary objective of this study was to establish the prevalence and determinants of common perinatal mental disorders in women living in rural and urban provinces in northern Viet Nam. A secondary objective was to investigate whether such disorders, socioeconomic status or exposure to violence were associated with the use of psychiatric and preventive health care

## Methods

### Setting

The study was conducted in one urban and one rural province in northern Viet Nam. Hanoi, the national capital, is a city as well as a major urban province with a population of 2 million. Most residents are able to generate incomes and only 4% live below the international poverty line of 1 United States dollar (US\$) per day. Women register for antenatal care through commune health centres, and most give birth in hospital. Hanam is a typical Red River delta rural province, with a population of 0.8 million who live in communes of about 7500 people and rely on subsistence agriculture, principally rice farming. Women can earn additional income through embroidery and basket weaving and some are employed in local industries. The average annual per capita income is US\$ 300, and 23% of the people live below the international poverty line.<sup>17</sup> Most births in Hanam take place in commune health centres. In these two provinces more than 99% of the women register their pregnancies at the commune health station and attend at least one antenatal health check.<sup>18</sup>

### Study design, sampling and recruitment

We conducted a cross-sectional survey of pregnant women and mothers of young infants in two northern Vietnamese prov-

inces. A two-stage sampling protocol was used to select commune health centres. Each district in the two provinces was assigned a number, and four in Hanoi (Hai Ba Trung, Dong Da, Thanh Xuan and Hoang Mai) and six in Hanam (Boi Cau, Chau Son, Duy Minh, Hop Ly, Liem Son and Van Xa) were selected randomly. Commune health centres have similar characteristics within districts and, using the same technique, we selected one commune health centre in each district. All women registered with the commune health centre in the previous month as being either at least 7 months pregnant or between the fourth and eighth week postpartum were eligible to participate in the study. Because most women experience unstable mood in the early weeks postpartum, we excluded women in the first three weeks. In Hanoi, a package including an invitation and an information and consent form was distributed by commune health workers at clinic or home visits associated with the Expanded Programme on Immunization, which includes pregnant women and mothers of neonates. In Hanam health workers visited the households of eligible women to describe the study, explain the dates when the research team would be visiting the commune, and distribute information packs. Interested potential participants then made appointments for interviews. Women who could write signed consent forms and those who could not write either gave oral consent or marked the form with a thumb print. We estimated, based on data from our previous research, that 20% of participants would be diagnosed with a CPMD. The required sample size to establish community prevalence with a 95% confidence interval (CI) of 16–24% was 340.

### Interviews

In Viet Nam, people are unfamiliar with self-reporting questionnaires. For this reason, the data for the study were collected by clinical and study-specific interviews.<sup>8</sup> All were conducted either at commune health centres or, infrequently, at home. Diagnostic clinical interviews were conducted by a senior Vietnamese psychiatrist (BtL), and study-specific interviews by Vietnamese health research workers at the Research and Training Centre for Community Development. In keeping with local research requirements, participants were given small gifts valued at US\$ 3 to compensate for the time spent

away from income-generating activities. Data were collected in Hanam in November 2006 and in Hanoi in February and March 2007.

All participants completed the modules for depression, generalized anxiety, panic disorder and alcohol abuse in the Structured Clinical Interview for DSM-IV (SCID).<sup>19</sup> This interview, based on the American Psychiatric Association's *Diagnostic and statistical manual of mental disorders*, fourth edition (DSM-IV), is the international gold standard for the diagnosis of common perinatal mental disorders.<sup>20</sup>

We developed a study-specific structured interview instrument based on our prior research and existing evidence.<sup>8,13</sup> Most items were in fixed-choice format. The instrument was translated from English into Vietnamese, reviewed by a group of Vietnamese clinicians and researchers for meaning, comprehensibility and cultural appropriateness, and back-translated into English for verification.<sup>21</sup> It comprised the following sections:

### Sociodemographic factors

Assessed sociodemographic characteristics included age and marital, educational and occupational status. Information about 17 household characteristics, services and durable assets was collected to calculate a household wealth index following the World Bank method.<sup>22</sup> Current coincidental life adversity was assessed by an open-ended question.

### Reproductive health

We investigated various aspects of reproductive health potentially related to perinatal mental health. They included gravidity and parity; a history of spontaneous or induced abortions and fetal or neonatal deaths; attitude towards the index pregnancy, and antenatal illness.

### Quality of emotional support

The quality of a woman's intimate relationships with her partner, her own mother and, in this context, her mother-in-law is a primary determinant of perinatal mental health. Empathic, confiding relationships are protective and experiences of criticism, coercion or limited support increase the risk of mental health problems. The quality of the relationship with the intimate partner was assessed by using the 24-item Intimate Bond Measure,<sup>23</sup> which yields two subscale scores: care, which assesses sensitivity, empathy

and trust, and control, which assesses criticism, coercion and dominance and is culturally relevant in Viet Nam.<sup>14</sup> Scores on each subscale ranged from 0 to 36, with higher scores being positive on the care, but negative on the control subscale. The quality of the woman's relationship with her mother and mother-in-law was assessed by means of single fixed-choice items assessing trust and affection in these relationships.

### Experiences of violence

Experiences of past or current family violence were ascertained through single items. Childhood sexual abuse was assessed as any unwanted sexual encounter with an adult, and physical abuse as being beaten or otherwise physically mistreated by a parent or other person in authority before the age of 16 years. In the absence of prior research about perinatal gender-based violence in Viet Nam, two dimensions of intimate partner abuse were assessed: current fear of the husband (an indicator of emotional abuse) or any experience of being hit, slapped, kicked, dragged, choked or punched (physical abuse) during the previous year.<sup>24</sup> Participants were also asked to identify any other family members of whom they felt afraid.

### Health care use

Participation in health care was assessed by means of fixed-choice and open-ended items. These enquired whether the participant had ever been diagnosed with a mental disorder and, if so, what type of treatment had been received; and whether iron supplements and/or iodised salt had been used or not during the index pregnancy.

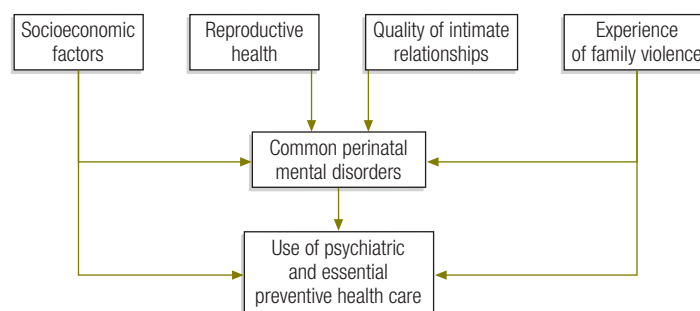
### Ethical approval

The study was approved by the University of Melbourne's Human Research Ethics Committee and the Viet Nam Medical Association's Scientific Committee. A coded identifier was used for interview records and data merging.

### Data analysis

The primary outcome was the prevalence of common perinatal mental disorders,<sup>25</sup> specifically mild, moderate or severe major depressive episode, dysthymic disorder (DSM-IV code 300.4), panic disorder with or without agoraphobia (DSM-IV codes 300.01 and 300.21) and generalized anxiety disorder (DSM-IV code 300.02). The outcome was coded as

Fig. 1. Conceptual framework for analyses of risk factors for common perinatal mental disorders in women in northern Viet Nam and their association with health care use



a binary variable, and since preliminary analyses revealed that factors associated with common perinatal mental disorders were the same in the pregnant and postpartum groups, these were combined for all subsequent analyses. Intimate partner violence was created as a composite variable for any physical abuse experienced in the previous 12 months and/or acknowledged fear of the intimate partner. It was treated as a binary variable: any experience of intimate partner violence or none. Because educational and occupational status and household wealth were significantly lower in the cohort of women in Hanam than in the one in Hanoi the province was used as a proxy for socioeconomic status. Data analysis was guided by a conceptual framework (Fig. 1) in which mental disorders were postulated to be multifactorially determined by socioeconomic status, reproductive health, the quality of intimate relationships and experiences of violence. The secondary outcome assessed interactions between socioeconomic status, common perinatal mental disorders, experiences of violence and health care use. Associations were tested in univariate comparisons and included in multivariable analyses if significant. Multivariable logistic regression was used to estimate odds ratios and 95% CIs. Data were analysed in STATA 9 for Windows (StataCorp LP, College Station, United States of America) using *Svy* commands.

## Results

Of all pregnant women and mothers of young infants who were identified as eligible for the study, 97% (65/67) and 93% (65/70) participated in Hanoi, and 91% (134/148) and 93% (100/107) participated in Hanam, respectively. The overall recruitment fraction was 93% (364/392).

### Sociodemographic characteristics

Although the proportion of urban-dwelling women in the study (37%) was higher than the national average (27%), the sample was otherwise representative of the general parturient population. Having a child when unmarried is socially proscribed in Viet Nam, and almost all participants (360/364, or 99%) were married. Like 11% of the population of Viet Nam, about 10.7% of participating women had not completed primary school.<sup>26</sup> No differences in sociodemographic characteristics were noted between pregnant women and women who had recently given birth, but there were marked disparities in rural and urban circumstances (Table 1). More women from Hanam generated income through agricultural labour or manual work than women from Hanoi, and their average level of household wealth was lower; fewer had completed secondary or post-secondary education, and they were younger, on average, when they first gave birth. In contrast to women in Hanoi, a quarter of whom were exclusively engaged in unremunerated household work and infant care, almost all women in Hanam were generating income.

### Prevalence of disorders

Overall, 29.9% of the cohort (33.45% in Hanam and 23.8% in Hanoi) was diagnosed with a common perinatal mental disorder. Depressive disorders, which occurred at rates higher than the 10% during pregnancy to 13% postpartum reported in high-income settings, were the most commonly diagnosed common mental disorders.<sup>1,2</sup> Alcohol consumption by women is rare and no alcohol abuse was found. There was no difference in the prevalence of common perinatal mental disorders during pregnancy or in the postpartum period (Table 2).



Table 1. Sociodemographic characteristics, reproductive health, intimate relationships and exposure to violence in 364 pregnant women and mothers of young infants, northern Viet Nam, 2007

Sociodemographic variable	Pregnant women (n=199)			Mothers of young infants (n=165)		
	Hanam (n=134)	Hanoi (n=65)	P-value	Hanam (n=100)	Hanoi (n=65)	P-value
<b>Age in years, mean (±SD)</b>	25.6 (±5.0)	29.0 (±4.8)	0.001	26.0 (±5.6)	28.8 (±4.9)	0.001
<b>Completed education, no. (%)</b>						
Up to complete primary (years 1–5)	49 (36.6)	2 (3.1)	0.001	33 (33.0)	2 (3.1)	0.001
Complete secondary (years 6–9)	63 (47.0)	10 (15.4)		55 (55.0)	18 (27.6)	
Complete high school (years 10–12)	14 (10.5)	24 (36.9)		5 (5.0)	12 (18.5)	
Post-secondary	8 (6.0)	29 (44.6)		7 (7.0)	33 (50.8)	
<b>Occupation, no. (%)</b>						
Agricultural, factory or handcraft worker	121 (90.2)	36 (55.4)	0.001	90 (90)	30 (46.1)	0.001
Government officer	6 (4.5)	13 (20.0)		5 (5)	20 (30.8)	
Housewife, unemployed	7 (5.2)	16 (24.6)		5 (5)	15 (23.1)	
<b>Income, no. (%)</b>						
Insecure income	31 (23.1)	14 (21.5)	0.80	22 (22)	11 (16.9)	0.40
<b>Household wealth index, no. (%)</b>						
Lowest quartile	51 (38.1)	0 (0)	0.001	40 (40)	0 (0)	0.001
Lower middle quartile	57 (42.5)	0 (0)		34 (34)	0 (0)	
Upper middle quartile	26 (19.4)	21 (32.3)		23 (23)	21 (32.3)	
Highest quartile	0 (0)	44 (67.7)		3 (3)	44 (67.7)	
<b>Reproductive health, no. (%)</b>						
Nulli/primiparous	55 (41.0)	26 (40.0)	0.88	44 (44)	34 (52.3)	0.29
Past spontaneous abortion	12 (9)	12 (18.5)	0.04	14 (14)	8 (12.3)	0.5
Past induced abortion	10 (7.5)	17 (26.1)	0.001	11 (11)	15 (23.1)	0.03
Past stillbirth or neonatal death	3 (2.2)	1 (1.5)	0.7	3 (3)	0	0.15
<b>Current or most recent pregnancy, no. (%)</b>						
Welcome	93 (69.4)	54 (83.1)	0.03	76 (76)	56 (86.2)	0.22
Inconvenient, but welcome	11 (8.2)	6 (9.2)		10 (10)	5 (7.7)	
Unwelcome	30 (22.4)	5 (7.7)		14 (14)	4 (6.2)	
Pregnancy illness	38 (28.4)	31 (47.7)	0.007	34 (34)	29 (44.6)	0.17
Using/ed iron supplements	100 (74.6)	62 (95.4)	0.001	79 (79)	63 (96.9)	0.001
Using/ed iodised salt	125 (93)	55 (84.6)	0.05	92 (92)	59 (90.1)	0.4
<b>Quality of intimate relationships</b>						
IBM care subscale, mean score (±SD)	32 (±4.5)	30 (±5.1)	0.002	32.5 (±4.1)	31 (±5.8)	0.05
IBM control subscale, mean score (±SD)	11.8 (±7.2)	9.4 (±6.6)	0.02	11.7 (±6.2)	10.4 (±6.3)	0.2
Trusting and affectionate relationship with own mother, no. (%)	103 (76.9)	40 (61.5)	0.024	83 (83.0)	39 (60)	0.001
Trusting and affectionate relationship with mother-in-law, no. (%)	83 (61.9)	26 (40)	0.004	62 (62.0)	22 (33.9)	0.0001
<b>Experiences of violence, no. (%)</b>						
Fear of husband past year	31 (23.1)	8 (12.2)	0.07	17 (17)	7 (10.1)	0.18
Physical abuse by husband past year	7 (5.2)	1 (1.5)	0.21	2 (2)	2 (3.1)	0.66
Fear of other family member past year	7 (5.2)	1 (1.5)	0.21	7 (7)	3 (4.6)	0.36
Childhood physical abuse	5 (3.7)	2 (3.1)	0.8	4 (4)	2 (3.1)	0.75
<b>Coincidental life adversity, no. (%)</b>	26 (19.4)	14 (21.5)	0.72	21 (21)	11 (16.9)	0.50

IBM, Intimate bond measure; SD, standard deviation.

### Determinants of disorders

In Viet Nam, sexual matters are seldom discussed openly. Disclosure of childhood sexual abuse can bring shame and dishonour on families and no participant acknowledged its occurrence. No differences in gravidity, parity, antenatal illness or previous pregnancy losses were noted between women with and without common perinatal mental disorders.

All remaining factors were entered into the multivariable logistic regression model, and six of them made independent contributions to the model, which classified 75.8% of the cases correctly (Table 3). Living in a poor rural commune rather than in the relatively prosperous national capital was associated with twice the rate of common perinatal mental disorders. Family violence in

the form of either intimidation or acts of physical abuse, most commonly perpetrated by the intimate partner but sometimes also by in-laws, with whom many women in Viet Nam live after marriage, was also associated with at least twice the rate of common perinatal mental disorders. The coincidental life adversities that were most strongly associated with such disorders were poverty

Table 2. Current common mental disorders, alcohol use and psychiatric history in 364 pregnant women and mothers of young infants, northern Viet Nam, 2007

Variable	Pregnant women			Mothers of young infants		
	Hanam (n=134)	Hanoi (n=65)	Total (n=199)	Hanam (n=100)	Hanoi (n=65)	Total (n=165)
<b>Common perinatal mental disorder</b>						
All types, % (95% CI)	32.9 (25.0–41.1)	21.5 (13.4–35.5)	29.1 (22.8–35.5)	34.0 (24.4–43.1)	26.1 (16.6–40.6)	30.9 (23.8–38.0)
Depressive episode, no. (%)	20 (14.9)	9 (13.9)	29 (14.6)	15 (15)	9 (13.8)	24 (14.5)
Dysthymia, no. (%)	4 (3.0)	1 (1.5)	5 (2.5)	1 (1)	0 (0)	1 (0.6)
Panic disorder, no. (%)	1 (0.8)	2 (3.1)	3 (1.5)	3 (3)	4 (6.2)	7 (4.2)
Generalized anxiety disorder, no. (%)	11 (8.2)	2 (3.1)	13 (6.5)	11 (11)	3 (4.6)	14 (8.5)
Co-morbid anxiety disorder and depression, no. (%)	8 (6.0)	0 (0)	8 (4.0)	4 (4)	1 (1.5)	5 (3.0)
<b>Alcohol intake</b>						
Drunk any alcohol in past month, no. (%)	3 (2.2)	7 (10.8)	10 (5.0)	1 (1)	0 (0)	1 (0.6)
Days alcohol drunk in past month, mean no. ( $\pm$ SD)	4.5 ( $\pm$ 4.9)	3.4 ( $\pm$ 2.5)	3.7 ( $\pm$ 2.8)	8 (NA)	–	8
<b>Mental health history</b>						
Diagnosed with or treated for any psychiatric illness, no. (%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Admitted to psychiatric hospital, no. (%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

CI, confidence interval; NA, not applicable, since only one informant reported drinking alcohol; SD, standard deviation.

and violence (e.g. constant worry about the family's economic situation, insufficient food and unaffordable health care expenses; concerns about resuming income-generating work and leaving a baby with other caregivers; husbands having extramarital affairs; and hostile behaviour from in-laws). However, even in conditions of poverty, women whose intimate relationships were empathic and supportive had better mental health. Women who felt their husbands were sensitive, kind and responsive (higher Intimate Bond Measure care score) or that their mothers were affectionate and trustworthy had lower rates of perinatal mental disorders.

### Use of health care

None of the participating women had ever been diagnosed with a mental disorder or received mental health care in the past. The number of women taking iron supplements was much smaller in the rural province than in Hanoi, despite the fact that women from rural areas are at greater risk of anaemia. Fewer women with perinatal mental disorders were taking iron supplements compared with women without such disorders, although the difference was not statistically significant (Table 4). Overall, 91% of the women (331/364) used iodized salt in the index pregnancy.

### Discussion

Most previous investigations of common perinatal mental disorders among women in resource-constrained settings have been conducted with patients recruited from hospitals.<sup>3,5,8,9</sup> In our study, we recruited community-based samples systematically from both Hanoi, the relatively socioeconomically advantaged capital of Viet Nam, and from a poor rural province. To assess common perinatal mental disorders, we used the international gold standard of a diagnostic interview administered by a psychiatrist, rather than self-reported symptoms.

These data confirm previous survey findings that common perinatal mental disorders are more prevalent in women in Viet Nam than in high-income countries. While their overall prevalence resembled the prevalence found in community-based investigations in Nigeria (32.2%)<sup>27</sup> and Pakistan (28% to 36%),<sup>4,28</sup> we found a clear social gradient in which prevalence was much higher in a poor rural setting than in an urban one. Common perinatal mental disorders in women are governed by multiple factors.<sup>29,30</sup> Individual psychological and biological factors cannot explain the wide inter- and intra-country variations in prevalence and confirm the predominance of social determinants,<sup>30</sup> in particular poverty<sup>4,5,8,14,31</sup> and exposure to gender-based violence.<sup>5</sup>

According to Brown and Harris' social theory,<sup>32</sup> depression is a consequence of experiencing entrapment and humiliation. Maternity benefits in Viet Nam are only payable to women employed by the government or commercial companies, not to the majority of women who are less educated and unsalaried and who subsist by farming, small scale trading and making handcrafts. Microcredit schemes are only available to 25% of rural communities. In this context, little personal agency over poverty can be effected and it may be diminished further during the perinatal period, when energy is reduced and infant care is confining. Laws making domestic violence a crime were enacted in Viet Nam in December 2007, but there are as yet no social payments to single women with children and no women's shelters. Family violence involves derogation and harm to the person and is intrinsically humiliating, in particular during reproductive life, when avenues of escape are reduced. These data also suggest that even in the context of severe socioeconomic adversity, nurturing and confiding intimate relationships exercise a protective influence on maternal mental health.

These social determinants challenge existing conceptualisations that position both common perinatal mental disorders and their treatment within the individual. Labelling as pathological the human suf-

Table 3. Socioeconomic factors, reproductive health, quality of intimate relationships and experiences of abuse and current common perinatal mental disorders (CPMDs) in 364 women, northern Viet Nam, 2007

Variable	CPMD		OR	95% CI
	No.	%		
<b>Province</b>				
Hanoi ( <i>n</i> =130)	31	23.9	1	
Hanam ( <i>n</i> =234)	78	33.3	2.17	1.19–3.93
<b>Secure income</b>				
Yes ( <i>n</i> =286)	90	31.5	1	
No ( <i>n</i> =78)	19	24.4	0.59	0.30–1.14
<b>Index pregnancy</b>				
Welcome ( <i>n</i> =279)	85	30.5	1	
Unwelcome ( <i>n</i> =85)	24	28.2	0.60	0.32–1.09
<b>Affectionate and trusting relationship with own mother</b>				
Yes ( <i>n</i> =265)	69	26.0	1	
No ( <i>n</i> =99)	40	40.4	2.10	1.16–3.82
<b>Affectionate and trusting relationship with mother-in-law</b>				
Yes ( <i>n</i> =193)	50	25.9	1	
No ( <i>n</i> =171)	59	34.7	1.18	0.67–2.09
<b>Intimate partner violence in previous year</b>				
No ( <i>n</i> =295)	75	25.4	1	
Yes ( <i>n</i> =69)	34	49.2	2.11	1.12–3.96
<b>Fear of other family members</b>				
No ( <i>n</i> =346)	97	28.0	1	
Yes ( <i>n</i> =18)	12	66.7	3.36	1.05–10.71
<b>Childhood physical abuse</b>				
No ( <i>n</i> =351)	105	29.9	1	
Yes ( <i>n</i> =13)	4	30.7	1.49	0.38–5.81
<b>Coincidental life adversity</b>				
No ( <i>n</i> =292)	68	23.3	1	
Yes ( <i>n</i> =72)	41	56.9	4.40	2.44–7.93
<b>IBM care<sup>a</sup></b>				
Mean score ≤ 32 ( <i>n</i> =188)	70	37.2	1	
Mean score ≥ 33 ( <i>n</i> =176)	39	22.2	0.52	0.31–0.89
<b>IBM control<sup>b</sup></b>				
Mean score ≤ 11 ( <i>n</i> =244)	63	25.8	1	
Mean score ≥ 12 ( <i>n</i> =120)	46	38.3	1.81	1.06–3.11

CI, confidence interval; IBM, Intimate bond measure; OR, odds ratio; SD, standard deviation.

<sup>a</sup> A higher score is positive.

<sup>b</sup> A higher score is negative.

fering that poverty and violence generate implies that there is a healthy response to these predicaments in which distress is not experienced. Another limitation of individual illness conceptualisations is that male partners and other family members are viewed as victims of a woman's mental health problems rather than as potential contributors to dysfunction within a household. Almost universally, in situations of family violence women are derided as "mad" or "crazy"<sup>24</sup>. Conceivably, authoritative professional explanations that attribute a woman's

mental illness to biological causes could increase the risk of abuse, whereas viewing a mother's mental health as an indicator of community and household functioning may improve her predicament.

The consequences of common perinatal mental disorders for mothers and infants in Viet Nam are as yet unknown. In equivalent settings, maternal depression is associated with reduced compliance with immunization schedules and low birthweight, stunting and malnutrition at age 6 months and diarrhoeal diseases in infants.<sup>33,34</sup>

Symptoms of anaemia and of hypothyroidism in women, such as fatigue, depressed mood and reduced volition, can mimic depression.<sup>35</sup> Anaemia is associated with perinatal morbid conditions that resemble those linked to depression: reduced maternal cognitive functioning and diminished sensitivity and responsiveness to the baby, as well as low birth weight, stunting and developmental delays in the infant.<sup>36,37</sup> Iodine deficiency and hypothyroidism in pregnant women are associated with higher rates of stillbirth and with neonatal encephalopathy and mild to severe neurodevelopmental consequences for the infant.<sup>36,38</sup> National antenatal nutritional supplementation programmes have been implemented in Viet Nam to reduce maternal nutritional deficiency states. Poor uptake of interventions contributes to micronutrient deficiencies and intra-uterine growth restriction, but is not well understood.<sup>39</sup> Our data, which approach significance, suggest that maternal adherence to essential preventive health care during pregnancy may be compromised by poor mental health. The direction of the relationships cannot be ascertained from our cross-sectional data. It is possible that women not using iron supplements have anaemia accompanied by symptoms mimicking depression,<sup>40</sup> or perhaps women with common perinatal mental disorders are less motivated to take nutritional supplements. Poor women living in joint families have little financial autonomy. Although not significant and requiring further investigation, the proportion of women who were using iodized salt was smaller among those who were experiencing family abuse, perhaps reflecting low entitlement to money even for the purchase of essential nutritional supplements.

In Viet Nam, as in other resource-constrained countries, maternal perinatal mental disorders are still under-recognized, perhaps because malnutrition and communicable diseases command more attention or because traditional care, which includes mandated rest and relief from household tasks for at least 30 days after giving birth, is presumed to be universally available and to protect mental health.<sup>8</sup> Our data suggest that while some women receive enhanced care and are relieved from performing their usual tasks during pregnancy and the postpartum period, others are gravely disrespected or abused. Very poor women get little rest; they commonly sustain income-generating activities

into advanced pregnancy and resume them soon after giving birth. Viet Nam's existing mental health services, predominantly custodial hospitals, treat people with severe and chronic psychiatric illness.<sup>41</sup> The needs of women with common perinatal mental disorders go largely unrecognized and virtually no services are provided to address them.<sup>41,42</sup>

Evidence that mental disorders are common in the perinatal period among women in resource-constrained settings is growing but has yet to be addressed through strategies to make pregnancy safer. Even in the poorest settings, antenatal care is provided and pregnancy provides an entry point for integrated interventions, which could capitalize on the protective effects of trusting and affectionate intimate relationships on women's mental health. At present, interventions to address maternal mental disorders focus on improving symptoms, not on reducing risk factors beyond individual control, such as poverty and family violence. Our findings suggest that in addition to integrating mental health care within primary perinatal health-care activities, it is essential to design programmes to reduce poverty and prevent violence across sectors.<sup>43</sup> ■

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Table 4. Socioeconomic status, common perinatal mental disorders (CPMDs) and experiences of violence and their relationship with the use of essential nutritional supplements, northern Viet Nam, 2007

Variable	Used supplements		OR	95% CI
	No.	%		
<b>Antenatal iron supplements<sup>a</sup></b>				
Province				
Hanoi	125	96.2	1	
Hanam	179	76.5	7.30	2.80–18.70
Mental health status				
No CPMD	221	86.7	1	
CPMD	83	76.2	1.80	1.00–3.20
Violence by husbands				
No = 0	250	84.8	1	
Yes = 1	54	78.2	1.10	0.54–2.20
Fear of other family members				
No = 0	294	83.8	1	
Yes = 1	10	76.9	1.40	0.35–5.90
<b>Antenatal iodized salt<sup>a</sup></b>				
Province				
Hanoi	114	87.7	1	
Hanam	217	92.7	0.50	0.30–1.10
Mental health status				
No CPMD	233	91.4	1	
CPMD	98	89.9	1.20	0.50–2.70
Violence by husbands				
No	269	91.2	1	
Yes	62	89.8	1.10	0.40–2.80
Fear of other family members				
No	321	91.4	1	
Yes	10	76.9	3.20	0.80–13.00

CI, confidence interval; OR, odds ratio.

<sup>a</sup> Dichotomized in the model as used = 0, not used = 1.

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### ملخص

الاضطرابات النفسية الشائعة في الفترة المحيطة بالولادة في شمال فيتنام - نام: انتشارها في المجتمع والاستفادة من الرعاية الصحية  
الغرض تحديد انتشار الاضطرابات النفسية الشائعة في الفترة المحيطة بالولادة، ومحددات هذه الاضطرابات، والارتباط بينها وبين الاستفادة من الرعاية الصحية بين النساء في إحدى المناطق الريفية وإحدى المناطق الحضرية في شمال فيتنام.  
الطريقة أجرى الباحثون مسحاً عرضياً لأتراب من نساء حوامل وأمهات لأطفال أدرجن بطريقة منهجية في عشر مجموعات منتقاة عشوائياً. وشاركت النساء في مقابلات سريرية منهجية أجراها أطباء نفسيون، وفي مقابلات منهجية منفصلة لتقييم العوامل الاجتماعية الديموغرافية، والصحة الإنجابية، والعلاقة مع العشير، والعنف الأسري، والاستفادة من الرعاية الصحية الوقائية والنفسية. واستكشفت الارتباطات بين هذه المتغيرات والاضطرابات النفسية في الفترة المحيطة بالولادة من خلال تحليل المتغير الأحادي والتحوّف اللوجستي عديدة المتغيرات.

الموجودات من بين 392 امرأة تصلح للمشاركة في هذه الدراسة، اختبرت 364 امرأة (93%). ومن بين هؤلاء النساء، سُخِّصَتْ إصابة 29.9% منهن (فاصلة الثقة 95%: 25.20 - 34.70) باضطرابات نفسية شائعة في الفترة المحيطة بالولادة. وكان تكرر هذه الاضطرابات أثناء الحمل متساوياً مع الفترة التالية للولادة. وكانت هذه الاضطرابات أكثر انتشاراً بين النساء في المناطق الريفية (نسبة الأرجحية: 2.17؛ وفاصلة الثقة 95%: 1.19 - 3.93)؛ وبين النساء اللاتي تعرضن للعنف من العشير (نسبة الأرجحية 2.11؛ فاصلة الثقة 95%: 1.12 - 3.96)؛ وبين النساء اللاتي يشعرن بالخوف من أفراد الأسرة الآخرين (نسبة الأرجحية: 3.36؛ فاصلة الثقة 95%: 1.05-10.71)، أو اللاتي تعرضن لمحن حياتية فجائية (نسبة الأرجحية 4.40؛ فاصلة الثقة 95%: 2.44-7.93). استعمل عدد أقل من النساء المصابات باضطرابات نفسية شائعة في الفترة المحيطة بالولادة مقوّمات الحديد مقارنة بغير المصابات بالاضطرابات



الاجتماعية، متضمنة السكن في الريف، والفقر، والتعرض للعنف الأسري. وحتى الآن لا تحظى احتياجات النساء المصابات باضطرابات نفسية شائعة في الفترة المحيطة بالولادة بالتقدير والعناية كما أن مشاركتهن ضعيفة في الرعاية الوقائية الأساسية في الفترة السابقة للولادة.

النفسية، ولكن هذه النتائج لم يعتد بها إحصائياً ( $P = 0.05$ ). ولم تتلق أي امرأة من النساء اللاتي أجريت عليهن الدراسة أي رعاية صحية نفسية. الاستنتاج الاكتئاب والقلق في الفترة المحيطة بالولادة منتشر بين النساء في شمال فيتنام. ويعتمد تحديد هذه الحالات بالدرجة الأولى على العوامل

## Résumé

### Troubles mentaux périnataux communs dans le Nord du Viet Nam: prévalence communautaire et utilisation des soins de santé

**Objectif** Établir la prévalence de troubles mentaux périnataux communs, leurs déterminants et leur association à l'utilisation de soins de santé préventifs parmi les femmes d'une zone rurale et celles d'une province urbaine dans le Nord du Viet Nam.

**Méthodes** Nous avons mené une étude transversale sur des groupes de femmes enceintes et des mères de nouveau-nés recrutées de façon systématique dans 10 communes choisies au hasard. Ces femmes ont participé à des entretiens cliniques structurés, dirigés par des psychiatres ainsi qu'à des entretiens structurés distincts afin d'évaluer les facteurs sociodémographiques, leur santé reproductive, la relation intime avec leur partenaire, la violence familiale ainsi que le recours aux soins de santé préventifs et psychiatriques. Les associations entre ces variables et les troubles mentaux périnataux ont été examinées au travers d'analyses univariées et d'une régression logistique à plusieurs variables.

**Résultats** Parmi les femmes éligibles à cette étude (392), 364 d'entre elles (93%) ont été recrutées. Parmi celles-ci, 29,9% (intervalle de confiance de 95%, IC: 25,20–34,70) ont été diagnostiquées comme présentant un trouble mental périnatal commun (TMPC). La fréquence de

ces troubles au cours de la grossesse et de la période du post-partum était identique. Leur prévalence était plus élevée chez les femmes vivant dans les provinces rurales (rapport des cotes, RC: 2,17; IC 95%: 1,19–3,93); chez les femmes exposées à une violence intime par leur partenaire (RC: 2,11; IC 95%: 1,12–3,96); chez celles ayant peur d'autres membres de leur famille (RC: 3,36; IC 95%: 1,05–10,71) ou chez celles étant exposées à des difficultés fortuites (RC: 4,40; IC 95%: 2,44–7,93). Un nombre inférieur de femmes atteintes de TMPC prenait des suppléments de fer par rapport aux femmes sans TMPC, mais les résultats n'étaient pas statistiquement significatifs ( $P=0,05$ ). Aucune des femmes participant à l'étude n'avait reçu de soins de santé mentale par le passé.

**Conclusion** La dépression et l'anxiété périnatales sont largement répandues chez les femmes du Nord du Viet Nam. Ces troubles sont déterminés en grande partie par les facteurs sociaux, notamment la vie en milieu rural, la pauvreté et l'exposition à la violence familiale. À l'heure actuelle, les besoins des femmes atteintes de troubles mentaux périnataux communs ne sont ni reconnus ni comblés, et leur participation aux soins de grossesse préventifs essentiels semble être compromise.

## Resumen

### Trastornos mentales perinatales frecuentes en el Norte de Viet Nam: prevalencia en la comunidad y uso de la atención sanitaria

**Objetivo** Determinar la prevalencia de los trastornos mentales perinatales frecuentes, sus factores determinantes y su relación con el uso de la atención sanitaria preventiva en mujeres en una provincia rural y en una provincia urbana en el Norte de Viet Nam.

**Métodos** Llevamos a cabo un estudio transversal en grupos de mujeres embarazadas y madres de lactantes reclutadas sistemáticamente en 10 comunidades seleccionadas aleatoriamente. Las mujeres participaron en entrevistas clínicas estructuradas realizadas por psiquiatras y en entrevistas estructuradas independientes para evaluar los factores socio-demográficos, la salud reproductiva, la relación íntima con sus parejas, la violencia doméstica y el uso de la atención sanitaria preventiva y psiquiátrica. Se exploraron las relaciones entre estas variables y los trastornos mentales perinatales mediante análisis monofactoriales y regresión logística multivariable.

**Resultados** Entre las mujeres aptas para participar en el estudio (392), se reclutó a 364 (93%). De ellas, al 29,9% (intervalo de confianza [IC] 95%: 25,20–34,70) se le diagnosticó un trastorno mental perinatal frecuente (TMPC). La frecuencia de estos trastornos durante el embarazo

y el puerperio era la misma. Su prevalencia era mayor en las mujeres de las provincias rurales (oportunidad relativa, OR: 2,17; IC 95%: 1,19–3,93); expuestas a violencia por parte de su pareja (OR: 2,11; IC 95%: 1,12–3,96); temerosas de otros miembros de la familia (OR: 3,36; IC 95%: 1,05–10,71) o expuestas a adversidades fortuitas de la vida (OR: 4,40; IC 95%: 2,44–7,93). El número de mujeres con un TMPC que tomaban suplementos de hierro era menor que el de mujeres sin un TMPC, si bien los resultados no fueron estadísticamente significativos ( $p = 0,05$ ). Ninguna de las mujeres estudiadas había recibido en su vida atención psiquiátrica.

**Conclusión** La depresión y la ansiedad perinatales son frecuentes en las mujeres del Norte de Viet Nam. Entre los principales factores determinantes de estas enfermedades están los factores sociales, incluyendo la residencia en un área rural, la pobreza y la exposición a violencia doméstica. En la actualidad, las necesidades de las mujeres con trastornos mentales perinatales frecuentes no están reconocidas ni satisfechas y parece peligrar su inclusión en la atención sanitaria prenatal preventiva fundamental.

## References

- O'Hara MW, Swain AM. Rates and risks of postpartum depression: a meta-analysis. *Int Rev Psychiatry* 1996;8:37–54. doi:10.3109/09540269609037816
- Hendrick V, Altshuler L, Cohen L, Stowe Z. Evaluation of mental health and depression during pregnancy: position paper. *Psychopharmacol Bull* 1998;34:297–9. PMID:9803758
- Chandran M, Tharyan P, Muliylil J, Abraham S. Post-partum depression in a cohort of women from a rural area of Tamil Nadu, India. Incidence and risk factors. *Br J Psychiatry* 2002;181:499–504. doi:10.1192/bjp.181.6.499 PMID:12456520



4. Rahman A, Iqbal Z, Harrington R. Life events, social support and depression in childbirth: perspectives from a rural community in the developing world. *Psychol Med* 2003;33:1161–7. doi:10.1017/S0033291703008286 PMID:14580070
5. Patel V, Rodrigues M, DeSouza N. Gender, poverty, and postnatal depression: a study of mothers in Goa, India. *Am J Psychiatry* 2002;159:43–7. doi:10.1176/appi.ajp.159.1.43 PMID:11772688
6. Cooper PJ, Tomlinson M, Swartz L, Woolgar M, Murray L, Molteno C. Post-partum depression and the mother-infant relationship in a South African peri-urban settlement. *Br J Psychiatry* 1999;175:554–8. doi:10.1192/bjp.175.6.554 PMID:10789353
7. Rahman A, Lovel H, Bunn J, Iqbal Z, Harrington R. Mothers' mental health and infant growth: a case-control study from Rawalpindi, Pakistan. *Child Care Health Dev* 2004;30:21–7. doi:10.1111/j.1365-2214.2004.00382.x PMID:14678308
8. Fisher JR, Morrow MM, Ngoc NT, Anh LT. Prevalence, nature, severity and correlates of postpartum depressive symptoms in Vietnam. *BJOG* 2004;111:1353–60. doi:10.1111/j.1471-0528.2004.00394.x PMID:15663118
9. Owoeye AO, Aina OF, Morakinyo O. Risk factors of postpartum depression and EPDS scores in a group of Nigerian women. *Trop Doct* 2006;36:100–3. doi:10.1258/004947506776593341 PMID:16611444
10. *Maternal mortality in Vietnam, 2000: an in-depth analysis of causes and determinants* (Report No.: ISBN 92 9061 191 X). Manila: World Health Organization, Regional Office for the Western Pacific; 2005.
11. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *Br J Psychiatry* 1987;150:782–6. doi:10.1192/bjp.150.6.782 PMID:3651732
12. Beusenberg M, Orley JA. *User's guide to the self-reporting questionnaire (SRQ)*. Geneva: World Health Organization, Division of Mental Health; 1994.
13. Tuan T, Lan PT, Harpham T, Huong NT, Thach TD, Tod B, et al. *Young Lives preliminary country report: Vietnam*. Hanoi: Research and Training Centre for Community Development; 2003.
14. Fisher JR, Tran H, Tran T. Relative socioeconomic advantage and mood during advanced pregnancy in women in Vietnam. *Int J Ment Health Syst* 2007;1:3. doi:10.1186/1752-4458-1-3 PMID:18271975
15. World Health Organization. *World health statistics 2008*. Geneva: WHO; 2008.
16. Trinh LT, Dibley MJ, Byles J. Antenatal care procedures and information reported by women in three rural areas of Vietnam. *Southeast Asian J Trop Med Public Health* 2007;38:927–35. PMID:18041314
17. The World Bank. *Taking stock: an update on Vietnam's economic development and reforms*. Hanoi: WB; 2006.
18. General Statistics Office. *Vietnam Multiple Indicator Cluster Survey 2006, final report*. Hanoi: GSO; 2006.
19. First M, Gibbon M, Spitzer R, Williams J. *User's guide for the structured interview for DSM-IV axis 1 disorders - research version*. New York: Biometrics Research; 1996.
20. Gorman LL, O'Hara MW, Figueiredo B, Hayes S, Jacquemain F, Kammerer MH et al.; TCS-PND Group. Adaptation of the structured clinical interview for DSM-IV disorders for assessing depression in women during pregnancy and post-partum across countries and cultures. *Br J Psychiatry Suppl* 2004;46:s17–23. doi:10.1192/bjp.184.46.s17 PMID:14754814
21. Laungani P. Postnatal depression across cultures: conceptual and methodological considerations. *Int J Health Promot Educ* 2000;38:86–94.
22. Tran T. Community based evidence about the health care system in rural Vietnam [Dissertation]. Newcastle: University of Newcastle; 2004.
23. Wilhelm K, Parker G. The development of a measure of intimate bonds. *Psychol Med* 1988;18:225–34. doi:10.1017/S0033291700002051 PMID:3363041
24. Hegarty K, Sheehan M, Schonfeld C. A multidimensional definition of partner abuse: development and preliminary validation of the Composite Abuse Scale. *J Fam Violence* 1999;14:399–415. doi:10.1023/A:1022834215681
25. Goldberg D, Huxley P. *Common mental disorders: a biosocial model*. London: Tavistock/Routledge; 1992.
26. United Nations Development Programme. Vietnam. In: *Human development indicators: country factsheets*. New York: UNDP; 2006.
27. Adewuya AO, Afolabi OT. The course of anxiety and depressive symptoms in Nigerian postpartum women. *Arch Women Ment Health* 2005;8:257–9. doi:10.1007/s00737-005-0089-5 PMID:15959624
28. Husain N, Bevc I, Husain M, Chaudhry IB, Atif N, Rahman A. Prevalence and social correlates of postnatal depression in a low income country. *Arch Women Ment Health* 2006;9:197–202. doi:10.1007/s00737-006-0129-9 PMID:16633740
29. World Health Organization. *The world health report 2001 – mental health: new understanding, new hope*. Geneva: WHO; 2001.
30. Chen Y-Y, Subramanian SV, Acevedo-Garcia D, Kawachi I. Women's status and depressive symptoms: a multilevel analysis. *Soc Sci Med* 2005;60:49–60. doi:10.1016/j.socscimed.2004.04.030 PMID:15482866
31. Abiodun OA. Postnatal depression in primary care populations in Nigeria. *Gen Hosp Psychiatry* 2006;28:133–6. doi:10.1016/j.genhosppsych.2005.11.002 PMID:16516063
32. Brown GW, Harris T. *The social origins of depression: a study of psychiatric disorder in women*. London: Tavistock Publications; 1978.
33. Patel V, Rahman A, Jacob KS, Hughes M. Effect of maternal mental health on infant growth in low income countries: new evidence from South Asia. *BMJ* 2004;328:820–3. doi:10.1136/bmj.328.7443.820 PMID:15070641
34. Rahman A, Iqbal Z, Bunn J, Lovel H, Harrington R. Impact of maternal depression on infant nutritional status and illness: a cohort study. *Arch Gen Psychiatry* 2004;61:946–52. doi:10.1001/archpsyc.61.9.946 PMID:15351773
35. Gunnarsson T, Sjöberg S, Eriksson M, Nordin C. Depressive symptoms in hypothyroid disorder with some observations on biochemical correlates. *Neuropsychobiology* 2001;43:70–4. doi:10.1159/000054869 PMID:11174048
36. Ellis M, Manandhar N, Manandhar DS, Costello AM. Risk factors for neonatal encephalopathy in Kathmandu, Nepal, a developing country: unmatched case-control study. *BMJ* 2000;320:1229–36. doi:10.1136/bmj.320.7244.1229 PMID:10797030
37. Perez EM, Hendricks MK, Beard JL, Murray-Kolb LE, Berg A, Tomlinson M et al. Mother-infant interactions and infant development are altered by maternal iron deficiency anemia. *J Nutr* 2005;135:850–5. PMID:15795446
38. Hetzel B, Delange F, Dunn J, Ling J, Mannar V, Pandav C. *Towards the global elimination of brain damage due to iodine deficiency*. New Delhi: Oxford University Press; 2004.
39. Bhutta ZA, Ahmed T, Black RE, Cousens S, Dewey K, Giugliani E et al.; Maternal and Child Undernutrition Study Group. What works? Interventions for maternal and child undernutrition and survival. *Lancet* 2008;371:417–40. doi:10.1016/S0140-6736(07)61693-6 PMID:18206226
40. Aikawa R, Ngyen CK, Sasaki S, Binns CW. Risk factors for iron-deficiency anaemia among pregnant women living in rural Vietnam. *Public Health Nutr* 2006;9:443–8. doi:10.1079/PHN2005851 PMID:16870016
41. Tran T, Buoi LT, Nguyen TT. *Community mental health care project in Vietnam: evaluation report for the World Health Organization*. Hanoi: 2008.
42. *Mental health atlas*. Geneva: World Health Organization, Department of Mental Health and Substance Abuse; 2005.
43. Fisher J, Cabral de Mello M, Tran T, Izutsu T. *Maternal mental health and child survival, health and development in resource-constrained settings: essential for achieving the Millennium Development Goals*. Geneva: World Health Organization; 2009.