**Introduction**

The nature, prevalence and determinants of mental health problems in women during pregnancy and in the year after giving birth have been thoroughly investigated in high-income countries. Systematic reviews have shown that in these settings, about 10% of pregnant women and 13% of those who have given birth experience some type of mental disorder, most commonly depression or anxiety. Social, psychological and biological etiological factors interact, but their relative importance is debated.

The perinatal mental health of women living in low- and lower-middle-income countries has only recently become the subject of research, in part because greater priority has been assigned to preventing pregnancy-related deaths. In addition, some have argued that in resource-constrained countries women are protected from experiencing perinatal mental problems through the influence of social and traditional cultural practices during pregnancy and in the postpartum period.
This systematic review was performed with the objective of summarizing the evidence surrounding the nature, prevalence and determinants of non-psychotic common perinatal mental disorders (CPMDs) among women living in low- and lower-middle-income countries.

Methods

Search strategy

A senior librarian in the World Health Organization (WHO) headquarters in Geneva, Switzerland, conducted a systematic search of the literature to identify sources dealing with the prevalence of CPMDs and the factors that make women more vulnerable to, or that protect them from, these disorders. Several databases were searched for studies published up to November 2010 (Box 1). Reference lists of the papers meeting inclusion criteria were hand searched to identify further studies.

Box 1. Literature search strategy for systematic review of the evidence on the prevalence and determinants of common perinatal mental disorders

1. “prenatal” OR “antenatal” OR “pregnancy” OR “postnatal” OR “postpartum”

2. “mental disorder” OR “adjustment disorder” OR “affective disorder” OR “dysthymic disorder” OR “psychiat*” OR “behaviour control” OR “psychological phenomena” OR “depression” OR “mental health” OR “stress disorder” OR “anxiety disorder” OR “maternal welfare” OR “maternal health”

Combined terms: 1 AND 2.

Inclusion and exclusion criteria

The search was confined to studies published in English or with sufficiently detailed English abstracts to enable comparison of the methods and main findings. Only investigations of the nature, prevalence and determinants of non-psychotic CPMDs in women in low- and lower-middle-income countries, as defined by World Bank country income categories, were included. Data about these countries were obtained from published inter-country comparisons that included at least one low- or lower-middle-income country. Although China is classified as a lower-middle-income country, economic conditions and health infrastructure in Hong Kong Special Administrative Region (Hong Kong SAR) and in Taiwan are very different from those in mainland China and in the resource-constrained settings that are the focus of this review. We therefore included in the analysis studies from mainland China but not from Hong Kong SAR or Taiwan. From studies whose findings were stratified by maternal age, we extracted data only for adults, not adolescents (people aged up to 19 years). We included all studies from which outcome data on CPMDs could be extracted, regardless of study design. Information was extracted systematically using a standardized data extraction form.
Quality assessment

The methodological quality of each study was assessed by two authors independently using the Mirza and Jenkins checklist of eight items,\textsuperscript{6,7} with an additional item pertaining to whether appropriate informed consent to participate in the study had been obtained. Differences were discussed and consensus reached. The checklist included the following quality criteria: (i) explicit study aims; (ii) adequate sample size or justification; (iii) sample representative, with justification; (iv) clear inclusion and exclusion criteria; (v) measures of mental health reliable and valid, with justification; (vi) response rate reported and losses explained; (vii) adequate description of data; and (viii) appropriate statistical analyses. One point was given for a “yes” answer and none for a “no” answer, for a possible maximum score of 9 points (Table 1, available at: http://www.who.int/bulletin/volumes/90/2/11-091850).

Analysis

Varied endpoints were reported: scores above thresholds on symptom screening measures, diagnoses by mental health practitioners or structured clinical interviews by research workers, and a combination of these. Self-reported symptom measures, including the Edinburgh Postnatal Depression Scale (EPDS), detect but do not distinguish between symptoms of anxiety and depression.\textsuperscript{50} Most studies that generated psychiatric diagnoses only assessed depression and not other disorders, such as anxiety. Therefore they yielded diverse data about the prevalence, severity and duration of non-specific and specific symptoms, including those that met the diagnostic criteria. We used Goldberg’s construct, Common Mental Disorders,\textsuperscript{51} for non-psychotic mental health conditions including depressive, anxiety, adjustment and somatic disorders which compromise day-to-day functioning and are identifiable in primary health care settings anywhere. Meta-analysis was undertaken to assess antenatal and postnatal prevalence, and heterogeneity was quantified with the $I^2$ statistic. Aggregate means, weighted by participant numbers, were calculated for comparisons between studies from different health sectors. Publication bias was assessed with the Egger test and represented graphically by a funnel plot.

Results

The steps involved in identifying studies meeting the inclusion criteria are summarized in Fig. 1.

Table 1. Methodological quality of studies of common perinatal mental disorders among women living in low- and lower-middle-income countries, as per World Bank classification (1 = yes; 0 = no)
We identified 13 studies that reported point prevalence data about common mental disorders in pregnant women (Table 2, available at: http://www.who.int/bulletin/volumes/90/2/11-091850) and 34 that assessed women at some point in the year after giving birth (Table 3, available at: http://www.who.int/bulletin/volumes/90/2/11-091850). There were 21 prospective studies with at least two assessment waves, but none reported incidence.

**Table 2. Methods of investigating common perinatal mental disorders in pregnant women in low- and lower-middle-income countries, as per World Bank country income classification**

**Table 3. Methods of investigating common perinatal mental disorders in women in resource-constrained countries who had recently given birth**

### Prevalence

#### Pregnancy

Data on the antenatal prevalence of common mental disorders were available from only 8% (9/112) of low- and lower-middle-income countries. Most of the articles containing such data (9/13, 69%) were published after 2002. Patel et al., Husain et al. and Liabsuetrakul et al. generated evidence about risks, including the risk of antenatal depression for postnatal depression, and Fatoye et al. compared symptoms in pregnant and non-pregnant women. None of these studies reported on the prevalence of common mental disorders during pregnancy.

In almost all studies (11/13, 85%), participants were recruited while attending a health facility for antenatal care. In general, recruitment strategies were not described in detail and few studies considered potential selection biases. Where antenatal care coverage is high, consecutive cohorts yield reasonably representative samples of pregnant women. However, in many low- and lower-middle-income countries high proportions of women lack access to antenatal care or make fewer than the recommended visits. Overall, 5 of the 13 studies (39%) recruited women from urban tertiary teaching hospitals, which are inaccessible to...
the majority who live in rural areas and to those who cannot pay for antenatal care. These studies thus over-represent relatively advantaged women. Most other studies (5/13, 39%) recruited women from community-based health services, which are more accessible to the general population but will not yield representative samples in settings where few women receive antenatal care. Three studies generated population-based samples in low- and lower-middle-income countries with low antenatal care coverage. In Pakistan, Rahman et al. recruited women via household visits by female community health workers and thereby included pregnant women unlikely to attend antenatal services. Gausa et al. in Bangladesh and Hanlon et al. in Ethiopia used sites covered by Demographic Surveillance Systems to identify eligible pregnant women who were then assessed during household visits by a health worker or surveillance site enumerator.

The least representative samples are therefore likely to be those from tertiary hospitals in low- and lower-middle-income countries where most women live in rural areas and few (< 65%) attend antenatal care (two studies from 8, 10 and one from Pakistan 33). The most representative ones, on the other hand, are those that recruited systematically in health services, including those located in rural areas, in low- and lower-middle-income countries where most women (90%) make at least one antenatal visit, 25, 38 or those that recruited women who would not usually attend antenatal care, systematically 27, 30, 45 (Fig. 2 and Table 4).

Fig. 2. Meta-analysis of individual study and overall prevalence of common perinatal mental disorders in women in low- and lower-middle-income countries.
Average prevalence (15.9%; 95% confidence interval, CI: 15.0–16.8%) was higher than in high-income countries. Meta-analysis revealed significant differences between prevalence estimates based on self-reported symptom measures (13.43%; 95% CI: 12.4–14.5) and prevalence estimates based on diagnostic assessment (21.75%; 95% CI: 19.8–23.7). However, all studies based on diagnostic assessments but only 55% of those in which self-report measures were used took place in provincial or community settings, where prevalence appears to be higher (Table 4).

Postpartum
Evidence about the prevalence of common mental disorders postpartum was available for 15% (17/112) of low- and lower-middle-income countries; most (30/34, 88%) of the studies were published after 2002. The papers reported 14 cohort and 20 cross-sectional studies, most of which were at least of reasonable quality. Overall the methods were more rigorous in the recent studies than in the older ones. The most common limitations were failure to specify inclusion criteria or to describe recruitment strategies. All studies addressed limited literacy by using questionnaires administered by an interviewer in the local language. All but one of these questionnaires had been appropriately validated. Among studies with clearly-described selection criteria, many excluded participants with characteristics relevant to the outcomes. For example, some studies excluded women who were illiterate or unable to speak the researchers’ language or who had a personal or family history of psychiatric problems. Such studies may have underestimated prevalence.

Almost one third (10/34, 29%) of the studies recruited participants from tertiary teaching hospitals. This occurred, for example, in Nigeria and Nepal, where less than 40% of the women receive skilled birth attendance and even fewer give birth in a hospital (Table 3). Thus, the findings from these studies cannot be generalized to the entire population of women who have recently given birth. The most representative samples are those recruited through rural health services in countries where more than 80% of women give birth with a skilled birth attendant or through household visits in settings where women commonly give birth at home. Samples obtained differently may have yielded inaccurate prevalence estimates (Fig. 2 and Table 4).

In our study countries, pooled prevalence of postpartum common mental disorders (19.8%; 95% CI: 19.2–20.6) was higher than in high-income countries. Meta-analyses revealed significant differences in mean prevalence estimates derived from self-reported symptom measures (20.80%; 95% CI: 20.0–21.6) and from diagnostic assessments (16.09%; 95% CI: 14.6–17.6). In the studies of postpartum symptoms about 50% of studies based on self-reported symptoms or on diagnostic assessment took place in provincial or district settings.

Overall meta-analyses revealed no differences in the pooled mean estimated prevalence of CPMDs derived from self-reported symptom
measures (18.59%; 95% CI: 17.9–19.2) and diagnostic assessments (18.63%; 95% CI: 17.4–19.8).

**Socioeconomic and intermediary determinants**

Most studies (31/41, 76%) investigated risk and protective factors, while the remainder only reported prevalence data. Potential risk factors for CPMDs in women in low- and middle-income countries reflected diverse conceptual frameworks and differed between studies. This precluded data pooling. We used the framework of the WHO Commission on the Social Determinants of Health (Table 5).

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<th>Table 5. Determinants of common perinatal mental disorders in women in low- and lower-middle-income countries</th>
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**Socioeconomic factors**

Nineteen studies investigated a variety of social, cultural and economic risk factors for CPMDs. Socioeconomic disadvantage was widely associated with increased risk. Relative rather than absolute disadvantage also appears to be relevant: Wan et al. found that not owning a car in Beijing was associated with a higher risk of suffering a CPMD (odds ratio, OR: 1.9; 95% CI: 1.0–3.6). Rates of CPMD were also higher among women who were young, of a religious minority, or unmarried. However, other studies found no association between CPMD and maternal age, marital status, economic difficulties or a low income, unemployment, or adverse life events.

**Quality of relationship with intimate partner**

When other factors were controlled for, higher rates of CPMD were observed among women who experienced difficulties in the intimate partner relationship. Such difficulties included having a partner who rejected paternity, who was unsupportive and uninvolved, or critical and quarrelsome, and who used alcohol to excess. Higher average symptom scores among women in polygamous rather than monogamous marriages were found in Nigeria and Nepal, but not in Ethiopia.

Only seven studies investigated an association with intimate partner violence. However, in 6 of them women who had experienced physical abuse during pregnancy or in the previous year had a higher prevalence of CPMDs than women who had not experienced these problems. In Viet Nam, pregnant women who felt “criticized over small things” (P < 0.01) and “controlled” by their partners had higher mean symptom scores than those who did not. Patel et al. found that the risk of chronic depression associated with intimate partner violence was higher if the baby was a girl (relative risk, RR: 1.9; 95% CI: 1.2–2.8) rather than a boy (RR: 1.7; 95% CI: 0.8–3.5). A few studies found no association between CPMD and “marital conflict”, an “unhappy relationship with husband” or the “husband’s alcoholism”.

**Family and social relationships**

Eleven studies investigated the risks associated with difficult interpersonal relationships other than with the spouse. They focused in particular on conflicts between a woman and her in-laws in...
settings where women move into the in-laws’ household after marriage.\(^9, 18, 25, 28, 45, 48\) The risk of CPMD was higher among women whose postpartum care was provided by their mothers-in-law or who received no help from their mothers-in-law at all, or among those who feared or argued with their in-laws or who had insufficient social support.\(^17, 24, 26, 42\) In some studies, women who lived in a nuclear, rather than a multigenerational household,\(^45\) whose mothers lived in a rural area,\(^36\) or who lacked an affectionate and trusting relationship with their own mothers\(^25\) were at increased risk.\(^45\) However, no significant relationship of this kind was found in other studies.\(^26, 27\)

There was also mixed evidence regarding the relationship between CPMD and the number of living children in a woman’s care. While three studies\(^22, 38, 45\) found higher prevalence of CPMDs among women who had three or more children other studies found no association between family size and mental health.\(^18, 31, 32\)

Reproductive and general health
Reproductive health and general health as risk factors for CPMDs were widely investigated.\(^8, 9, 13, 23, 30, 37 – 40, 49, 53\) A higher risk was associated with adverse reproductive events including unwanted or unintended pregnancy, past pregnancy losses, coincidental illness and operative birth. However, other studies found no significant association between CPMDs and unwanted pregnancy,\(^16, 28\) gravidity,\(^22, 36, 48\) parity\(^13, 16, 20, 22, 34, 37, 47, 57\) prior stillbirth,\(^18, 20, 34, 39\) coincidental medical problems\(^48\) or caesarean birth,\(^16, 20, 23, 28, 36, 40, 55, 57\)

History of mental health problems
Five studies\(^22, 28, 30, 34, 40\) identified risks associated with past mental health problems, including during pregnancy.\(^11, 28\) These included past psychiatric illness and less specific psychological symptoms, which were found to increase risk. However, other studies found no association between CPMDs and a history of mental illness\(^37\) or with depression during the current pregnancy.\(^31\) In many settings that lack comprehensive mental health care, few women with common mental disorders are diagnosed or treated. In such settings it may not be possible to know whether a woman has a psychiatric history.

Infant characteristics
In many low- and lower-middle-income countries there is a cultural preference for male children. The potential association between this attitude and the risk of developing a CPMD was examined in various ways.\(^10, 16, 17, 22, 26, 28, 32, 39, 48\) In some studies such risk was increased among women who wanted a son but gave birth to a daughter\(^37\); who did not give birth to a child of the desired sex\(^16\); whose parents-in-law preferred a male baby,\(^26\) or who already had at least two daughters.\(^45\) However, other studies found no significant relationship between CPMD and the birth of a girl or with not having a child of the desired sex.\(^10, 16, 17, 22, 26, 28, 32, 39, 48\) The studies that investigated this risk yielded inconsistent evidence from China,\(^37\) Nigeria,\(^10, 13, 39, 57\) and Pakistan\(^45\) but more consistent evidence of an increased risk from India\(^18, 40\) and Uganda\(^37\) and of no risk from Bangladesh\(^17, 28\) and Morocco.\(^16\)

A few studies investigated whether an infant’s poor health and development was a risk factor for developing a CPMD. As most of these studies were cross-sectional, the direction of the relationship cannot be ascertained. Mothers may feel distressed because their infants are sick
or failing to thrive. It is also possible, however, that mothers who have a CPMD are less able to provide sensitive care and that their babies are therefore vulnerable to health problems. Risk was increased among mothers who had experienced difficulty breastfeeding and those whose infants cried for prolonged periods. The prevalence of CPMDs was higher among mothers whose infants were ill than among those whose infants were well. Grief following with the death of an infant was also detected in these surveys and associated with a higher risk of having a common mental disorder in the postpartum period.

**Protective factors**

Even among the poor, relative social and economic advantage appears protective. The risk of CPMDs was lower among women with more education, a permanent or secure job, and an employed partner and among those belonging to the ethnic majority.

Two studies examined the relationship between the observation of traditional postpartum rituals and the risk of developing a CPMD. Rahman et al. in Pakistan found that the *chilla* ritual, which involves seclusion and the provision of heightened care to mothers and neonates in the first 40 days postpartum, was protective. Fisher et al. in Viet Nam found that culturally prescribed practices, such as lying over a charcoal fire or using cotton ear swabs to protect against the cold, were not related to the risk of CPMDs. However, practices that involved direct interpersonal care were relevant. Women who were given less than 30 days of rest were at increased risk (OR: 1.9; 95% CI: 1.1–3.2), but having someone to prepare special foods was protective (OR: 0.61; 95% CI: 0.4–1.0).

The quality of a woman’s intimate relationship with her partner can also act protectively. In Viet Nam women who scored > 33 on the Intimate Bonds Measure Care subscale, which assesses partner kindness, trust, sensitivity and affection, were at reduced risk.

Of the eight prospective studies initiated in pregnancy, five reported both the antenatal and postnatal prevalence of CPMDs and in four this was higher in pregnancy than after childbirth.

**Test for publication bias**

The funnel plots (Fig. 3) were skewed and asymmetrical. Normal statistical testing confirmed the presence of publication bias (total studies: Egger test *P* < 0.001; pregnancy: studies: egger test=*P* = 0.013; postpartum studies: Egger test *P* <

**Fig. 3.** Funnel plot of studies on the prevalence of common perinatal mental disorders in women in low- and lower-middle-income countries
Discussion

There have been recent systematic reviews of studies dealing with perinatal mental disorders in women worldwide and in specific regions, including Asia and Africa, but to our knowledge this is the first review of studies about women in low- and lower-middle-income countries.

This review reveals a serious double disparity. One has to do with the availability of local evidence on which to base practice and policy. Tens of thousands of papers from high-income countries provide high-quality epidemiological, clinical, health service and health system evidence surrounding CPMDs. This stands in sharp contrast to the lack of local evidence about CPMDs in women in more than 80% of the world’s 112 low- and lower-middle-income countries and in 90% of the least-developed countries. Furthermore, few countries have more than one study in the English-language literature.

The settings, recruitment strategies, inclusion and exclusion criteria, representative adequacy of the samples and assessment measures used in the studies varied widely. Since all of these factors could have influenced prevalence estimates, only broad comparisons between low- and lower-middle-income countries and high-income countries can be made. We acknowledge this limitation. Nevertheless, the second disparity lies in the fact that in all the low- and lower-middle-income countries that report data, pregnant women and women who have recently given birth experience non-psychotic mental health conditions at substantially higher rates than the 10% in pregnancy and 13% postnatally reported in high-income countries.

These differences in the prevalence of CPMDs may result from the biased publication of studies reporting high rather than low prevalence in low- and lower-middle-income countries. However, we are all active researchers in this field and are not aware of unpublished studies that have reached different conclusions. It is also possible that the differences in prevalence merely result from the use of different study methods. While more recent studies have shown improvements over previous ones in the use of systematic sampling and locally validated assessment instruments, overall the studies were of reasonably high methodological quality and therefore this explanation is unlikely. It is possible, in fact, that the population prevalence of CPMDs in low- and lower-middle-
income countries has been underestimated because the study sites and exclusion criteria may have resulted in the samples being disproportionately composed of women of relatively higher socioeconomic status and in better health, among whom prevalence is generally lower. Prevalence estimates are usually higher when based on self-reported symptom measures rather than on diagnostic assessment. This pattern was not consistent and overall prevalence estimates did not differ by method of assessment. Mental health problems may have been underestimated because most studies that used diagnostic interviews, considered the gold-standard, investigated depression but not other relevant psychological conditions, including perinatal anxiety disorders. Overall, we believe that the prevalence estimates are reliable. In low- and lower-middle-income countries about one in six pregnant women and one in five women who have recently given birth are experiencing a CPMD. This counters the notion that women’s mental health is protected by culturally-prescribed traditional postpartum care and suggests that it is erroneous to assume that this care is always available or welcome.

A few early studies in low- and lower-middle-income countries, most of which recruited women from tertiary hospitals, concluded that the prevalence of CPMDs was similar to that observed in high-income countries and that these conditions must therefore be biological in origin. Differences in the risk factors and protective factors found in the various studies reflect the use of different data sources (i.e. survey instruments containing either one or several study-specific questions) and standardized measures. Risks are likely to vary by cultural context and few studies assessed all the risk and protective factor domains that were identified. However, these data indicate that in these study settings, women’s mental health is governed significantly by social factors, including many beyond individual control.

Our review, which supports the conclusions reached by the Commission on the Social Determinants of Health, indicates that the prevalence of CPMDs is highest among the most socially and economically disadvantaged women, especially those living in crowded households in rural areas. Risk is also increased by gender-based factors, including the bias against female babies; role restrictions regarding housework and infant care, and excessive unpaid workloads, especially in multi-generational households in which a daughter-in-law has little autonomy. Gender-based violence, including both emotional and physical abuse, has adverse effects on women’s mental health and is especially destructive in the perinatal period, when a woman is more dependent. Such violence was consistently found to increase the risk of CPMD. As in high-income countries, the quality of a woman’s intimate partner relationship was found to be closely related to her perinatal mental health. Women whose partners welcomed the pregnancy and provided support and encouragement had better mental and emotional health.

The risk of CPMDs was lower among women with access to a better education, paid work, sexual and reproductive health services, including family planning, and supportive, non-judgmental family relationships. Overall the data indicate that CPMDs in women living in low- and lower-middle-income countries are caused by multiple factors and lack a direct causal pathway. Edwards et al. demonstrated that symptoms were more severe among women who had a greater number of risk factors and Patel et al. found that risk factors interact, including in culturally determined ways.
Mental health problems have serious consequences for women, their infants and their families. Although these problems are difficult to investigate because vital registration systems are often weak, suicide appears to contribute to maternal deaths in resource-constrained countries.\textsuperscript{60} Women with mental health problems are often stigmatized and are less likely to participate in antenatal, perinatal, postnatal and essential preventive health care.\textsuperscript{25} Infants are dependent on their mothers for breastfeeding, physical care, comfort and social interaction. Infant development is compromised if a mother is insensitive or unresponsive to the infant's behavioural cues and needs. In low- and lower-middle-income countries, maternal depression is associated with higher rates of malnutrition and stunting, diarrhoeal diseases, infectious illnesses, hospital admissions, lower birth weight and reduced completion of immunization schedules among infants.\textsuperscript{46}

While some women overcome their poor mental health over time, many have chronic mental health problems.\textsuperscript{40, 45} In an international call to action on the part of WHO that was published in \textit{The Lancet} in "No health without mental health", the point was made that addressing the major burden of mental health problems in resource-constrained countries is essential for development.\textsuperscript{61} Furthermore, Millennium Development Goals 4 and 5, which relate to the health of mothers and children, cannot be attained without due attention to maternal mental health.\textsuperscript{62} High-quality evidence about mental health problems in the perinatal period must be generated, especially at the local level, to make pregnancy safer for women in low- and lower-middle-income countries.

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None declared.

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