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Male involvement and maternal health outcomes: systematic review and meta-analysis

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ABSTRACT

Background The developing world accounts for 99% of global maternal deaths. Men in developing countries are the chief decision-makers, determining women's access to maternal health services and influencing their health outcomes. At present, it is unclear whether involving men in maternal health can improve maternal outcomes. This systematic review and meta-analysis aimed to investigate the impact of male involvement on maternal health outcomes of women in developing countries.

Methods Four electronic databases and grey literature sources were searched (up to May 2013), together with reference lists of included studies. Two reviewers independently screened and assessed the quality of studies based on prespecified criteria. Measures of effects were pooled and random effect meta-analysis was conducted, where possible.

Results Fourteen studies met the inclusion criteria. Male involvement was significantly associated with reduced odds of postpartum depression (OR=0.36, 95% CI 0.19 to 0.68 for male involvement during pregnancy; OR=0.34, 95% CI 0.19 to 0.62 for male involvement post partum), and also with improved utilisation of maternal health services (skilled birth attendance and postnatal care). Male involvement during pregnancy and at post partum appeared to have greater benefits than male involvement during delivery.

Conclusions Male involvement is associated with improved maternal health outcomes in developing countries. Contrary to reports from developed countries, there was little evidence of positive impacts of husbands' presence in delivery rooms. However, more rigorous studies are needed to improve this area's evidence base.

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INTRODUCTION

Developing countries account for 99% of global maternal deaths.[1] In Sub-Saharan Africa, for example, a woman's lifetime risk of dying from preventable or treatable complications of pregnancy and childbirth is 1 in 39, compared to 1 in 3800 in the developed regions.[2] The 1994 International Conference on Population and Development advocated for the active inclusion and shared responsibility of men in reproductive health.[3] Male involvement, an all-encompassing term which refers to "the various ways in which men relate to reproductive health problems and programmes, reproductive rights and reproductive behaviour", is considered an important intervention for improving maternal health.[4] In many developing countries, men are the key decision-makers and chief providers, often determining women's access to economic resources. This practice has implications for maternal health as it determines the nutritional status of women during pregnancy;[5] women's access to maternal health services since healthcare systems in most developing countries require out-of-pocket payments;[6–9] and women's chances of receiving emergency obstetrics care, which is vital in averting maternal mortality.[5]

Many studies have reported positive benefits of male involvement in maternal health in developed and developing countries, which include: increased maternal access to antenatal and postnatal services;[10 11] discouragement of unhealthy maternal practices such as smoking;[12 13] improved maternal mental health;[14–23] increased likelihood of contraception usage;[24 25] and allayment of stress, pain and anxiety during delivery.[26–29] However, arguments on the downsides of male involvement have also been highlighted such as increased male dominance in decision-making[30 31] and the potential for escalating labour difficulty when husbands become anxious in delivery rooms.[10]

Evidence suggests that male involvement may be beneficial to maternal health; however, the magnitude of the association is not clear. There have also been speculations on possible negative impacts if men were involved in maternal health, hence it is necessary to undertake a systematic review to reconcile these opposing views. However, it is paramount that the review focuses on developing countries since they bear the greatest burden of global maternal deaths and men's dominant roles in these regions have been shown to influence health outcomes. Previous systematic reviews have focused on developed regions,[16] on the impact of male involvement on non-maternal health areas such as child health outcomes,[32 33] or on its impact on HIV/AIDS topics in developing countries.[34–36] Thus, this systematic review aimed to assess the impact of male involvement on maternal health outcomes of women in developing countries. The review was restricted to maternal outcomes in order to have a much more focused research question. In addition, improved maternal health is one of the Millennium Development Goals in which "progress…is falling short", thus necessitating research on alternative interventions.[37]

METHODS

Criteria for selecting studies

We included all comparative observational studies or controlled trials assessing the impact of male involvement on maternal health outcomes in women of childbearing age (15–49 years) from developing countries (as defined by the World Bank).[38]

The term 'male involvement' is subjective and very multifaceted.[34] The most basic criterion used

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for identifying male involvement in this review was men being in marital unions with the women (legal, religious or traditional). However, being in a marital relationship does not necessarily translate into male involvement. Hence three broad categories were considered as indicating male involvement:

- Active participation in maternal health services and care (husband's attendance of antenatal care (ANC); husband's presence at delivery room; and husband's support/help to wife during pregnancy, delivery or at post partum);
- Financial support given for pregnancy-related and childbirth-related expenses;
- Shared decision-making powers on maternal health with wife.

We excluded studies which focused on male involvement within out-of-wedlock adolescent pregnancies; studies on the impact of male involvement on women's uptake of prevention of mother-to-child transmission and HIV Counselling and Testing services, since systematic reviews have already been conducted on these areas[34–36]; non-journal articles (commentaries, editorials, letters, reviews and policy statements) and qualitative studies.

Types of outcome measures

Primary outcomes:

I. Complications (during pregnancy and during childbirth)
II. Duration of postpartum stay at hospital
III. Maternal depression (antenatal depression and postpartum depression)

Secondary outcomes:

I. Maternal health service utilisation (ANC, skilled birth attendance (SBA), postnatal care and emergency obstetrics care)
II. Maternal mortality

Data sources

MEDLINE, EMBASE, CENTRAL, CINAHL and grey literature sources (http://www.theses.com and the Electronic Theses Online Service http://www.ethos.ac.uk) were searched from inception to May 2013. The references of included studies were also tracked for additional papers. Searches were conducted using both free texts and medical subject headings based on the exposure/intervention and outcomes (see online supplementary appendix 1).

Study selection

The authors independently screened the titles and abstracts of retrieved studies, and the full texts of potentially eligible studies. Discrepancies on decisions between the two reviewers were resolved via discussion at respective screening stages. Language restrictions were not imposed and three non-English papers were translated. Data extraction was conducted by both authors independently using a previously piloted data extraction form, with disagreements resolved via discussion. The methodological quality of studies was assessed independently by the two authors and disagreements were also resolved via consensus. The Cochrane Collaboration's Risk of Bias tool was used to assess the quality of randomised controlled trials (RCTs) and quasi-experimental studies.[39] Studies were categorised as having low, unclear or high risk of bias depending on how they met the criteria stipulated in the six domains of the Risk of Bias tool. For example, for studies to be termed high quality, they had to meet rigorous RCT standards such as demonstrating evidence of randomisation, allocation concealment and blinding. For observational studies, quality was assessed using the Newcastle-Ottawa Scale (NOS).[40] A NOS score of <4 was deemed low quality, 4–5 as moderate quality and ≥6 as high quality. The Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) Statement was adhered to in the review.[41]

Data synthesis and analysis

Crude or adjusted ORs with 95% CI were extracted from the included studies. Adjusted measures of effects were used in preference where both were reported. p Values less than 0.05 were deemed statistically significant. Using Cochrane Review Manager V.5.2 software (RevMan),[42] meta-analysis was conducted using a random effect model[43] to pool measures of effects where studies were available and "sufficiently homogenous in terms of participants, interventions and outcomes to provide a meaningful summary".[44]

Heterogeneity was quantified using I^2,[45] which measures the degree of inconsistency between the studies. A value of 0% indicated no observed heterogeneity between the studies, with larger values indicating increased levels of heterogeneity. We anticipated that there would be moderate to substantial levels of heterogeneity in the meta-analyses due to clinical and methodological differences between the studies. Where we observed extreme levels of heterogeneity (I^2 values between 85% and 100%), we identified which studies appeared to be contributing to the inconsistency.

A number of subgroup analyses were specified a priori in the review protocol to explore reasons for heterogeneity between studies, where sufficient numbers of studies were included in the meta-analyses. A subgroup analysis, based on timing of male involvement (at pregnancy, delivery, post partum) was performed to determine whether there were any descriptive differences on maternal health outcomes. Publication bias was assessed using funnel-plot where sufficient numbers of studies were available.

RESULTS

Overview of search hits and included studies

The electronic databases yielded a total of 11 702 hits. After removing duplicates and screening papers based on their titles and abstracts, 60 papers were screened at the full text stage. Fourteen papers were finally included in the review (figure 1). The reference lists of the included papers were checked, but no additional papers were identified. Similarly, the grey literature searches did not yield additional papers for inclusion. The reasons for excluding papers at the full text stage are listed in online supplementary appendix 2. Four full-text papers could not be obtained even after contacting authors; the impact of this on findings cannot be ascertained.

Of the 14 studies included (table 1), 7 were conducted in South Asia,[46–52] 3 in East Asia and Pacific,[53–55] 2 in Europe and Central Asia,[56 57] 1 in Sub-Saharan Africa[58] and 1 in the Middle-East and North Africa.[59] Seven studies used a cross-sectional design,[46 52 54 56–59] three a cohort design,[47 48 55] two a quasi-experimental design,[50 53] one an RCT design[49] and one a case–control design.[51] With respect to maternal health outcomes, 4 of the 14 studies focused on complications (all on complications during childbirth; 2 studies considered a broad list of complications, including some that occurred during pregnancy; however, a significant majority of the complications occurred during childbirth, hence were classified as 'complications during childbirth'),[50 52 53 58] 8 on maternal depression (3 focused on antenatal depression and 5 on postpartum depression)[47 48 51 54–57 59] and 2 on maternal health service utilisation

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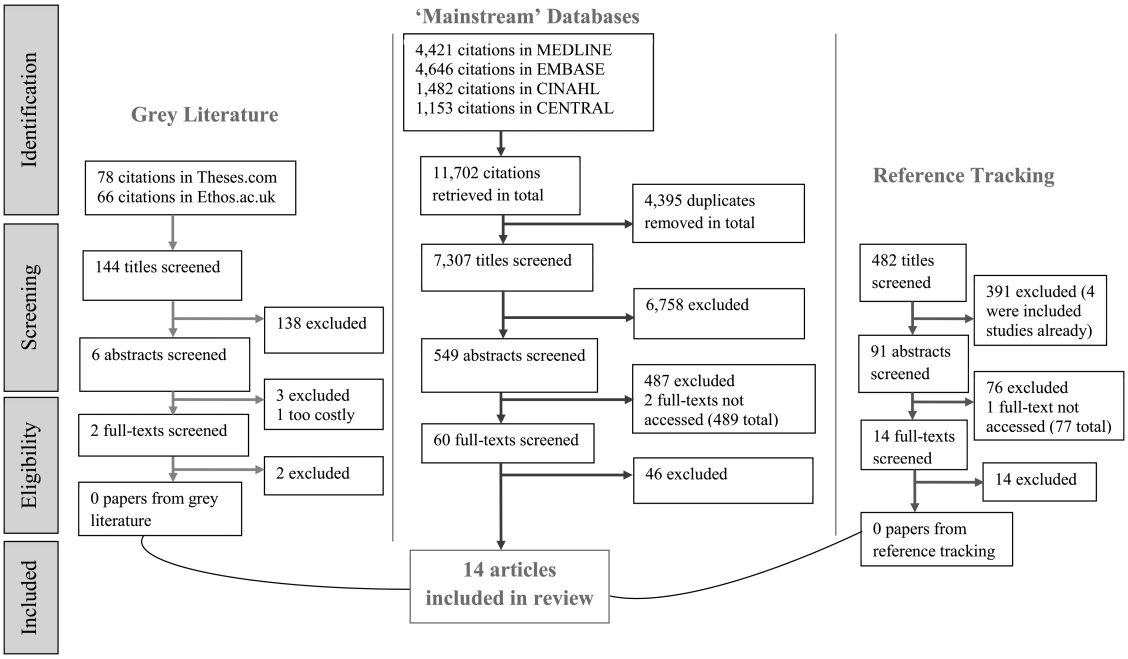

Figure 1 Flowchart of search results from data sources.

(1 on ANC, 2 on SBA and 1 on postnatal care; 1 study reported the impact of male involvement on more than one maternal health service, hence the numbers do not add up to 2).[46 49] In considering male involvement, 13 studies focused on the first category "active participation in maternal health services and care";[46–57 59] 0 studies on "financial support given for pregnancy-related and childbirth-related expenses" and 1 study focused on the third category "shared decision-making on maternal health with wife".[58] Of the 13 studies that considered the first category of male involvement, 9 focused on the impact of a husband's support/help to his wife in the maternal phase,[47 48 51 52 54–57 59] 2 considered the impact of a husband's attendance of ANC,[46 49] and the last 2 studies focused on the effects of a husband's presence in the delivery room.[50 53]

Using the quality assessment tools described in the methods section, six studies were considered high quality,[47–49 55–57] three moderate[46 54 58] and five were low quality.[50–53 59] Nine studies adjusted for a measure of socioeconomic status, using education and/or income.[46–49 54–58]

Findings from studies by outcome

Primary outcome I—complications: Four studies reported the impact of male involvement on complications during childbirth.[50 52 53 58] Of these four, only three studies provided relevant information that could be included in the meta-analysis.[50 53 58] Two meta-analyses were conducted for this outcome.

Male involvement was not significantly associated with the risk of childbirth complications (OR=0.58, 95% CI 0.28 to 1.21; two studies; figure 2). High levels of heterogeneity were detected between the studies (I^2=87%), which appeared to be related to differences in composition of the diverse sample populations (women in the Andersson *et al*[58] study were more deprived with respect to education and institutional delivery compared with women in the other studies; thus the women in the former group may have perceived these complications as 'normal' and under-reported them).

Having husbands present in the delivery room was not significantly related to the risk of non-spontaneous deliveries (OR 0.85, 95% CI 0.45 to 1.58; two studies; I^2=0%; figure 3).

The remaining study[52] could not be included in the meta-analyses because it reported results from linear regression, as opposed to using the measures of effects considered in the meta-analyses we conducted (binary outcome). It found a significant decrease in the number of childbirth complications with increasing male involvement (p=0.0181).

Primary outcome II—duration of postpartum stay at hospital: None of the included studies reported this outcome.

Primary outcome III—maternal depression: Three studies assessed the impact of male involvement on antenatal depression.[47 57 59] Findings from two studies found out that male involvement significantly decreased the likelihood of antenatal depression by approximately 90% (OR=0.12, 95% CI 0.02 to 0.60;[47 59] OR=0.10, 95% CI not reported; p=0.001).[59] In the remaining study,[57] women with antenatal depression had significantly lower emotional and practical support from their husbands than women without antenatal depression (p<0.05; OR and corresponding CIs not available).

Five of the included studies assessed the impact of male involvement on postpartum depression.[48 51 54–56] During pregnancy, male involvement significantly decreased the likelihood of postpartum depression by 64% (OR=0.36, 95% CI 0.19 to 0.68; I^2=49%; two studies; figure 4). Also, during the postpartum period, male involvement significantly decreased the likelihood of postpartum depression by 66%, (OR 0.34, 95% CI 0.19 to 0.62; I^2=57%; five studies; figure 4).

Secondary outcome I—maternal health service utilisation: Two of the included studies reported the impact of male involvement on use of maternal health services.[46 49] One study found husbands' attendance of antenatal appointments was not significantly associated with women's ANC attendance (OR=0.97, 95% CI 0.88 to 1.07).[49] One of the included studies found that husbands' attendance at ANC was significantly associated with having a skilled attendant at birth

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Table 1 Summary descriptions of included studies

General paper information					Exposure and outcome information				Quality assessment
Paper and reference number	Study design	Country and World Bank subregion	Participants and final sample size	Study period	Exposure: type of male involvement	Timing of male involvement	Relevant maternal health outcome(s)	Method(s) used to measure/collect outcome(s)	Quality assessment results/score
Andersson *et al*[58]	Cross-sectional	Nigeria—Sub-Saharan Africa	15 629 (7870 in Bauchi; 7759 in C/River) women who had been pregnant in the past 3 years	May–Nov 2009	Shared decision-making powers with wife	Pregnancy	Complications (during childbirth)	Self-reports (structured questionnaires via face-to-face interviews and focus group discussions)	Moderate quality (NOS 5/7)
Aydin *et al*[56]	Cross-sectional	Turkey—Europe and Central Asia	728 women within first postnatal year	Jan–Feb 2003	Active participation in maternal healthcare/services—husband's support/help to wife	Post partum	Maternal depression (postpartum depression)	EPDS; ≥13 EPDS scores indicated depression	High quality (NOS 7/7)
Chattopadhyay[46]	Cross-sectional	India—South Asia	Men and women aged 15–49 (9155, 2335 and 6216 in 3 different areas)	2005–2006	Active participation in maternal health services/care—husband's ANC attendance with wife	Pregnancy	Maternal health service utilisation (SBA)	National Family Health Survey III, the equivalent of DHS survey in India	Moderate quality (NOS 5/7)
Gausia *et al*[47]	Cohort	Bangladesh—South Asia	361 women aged 15–49 in rural Matlab subdistrict	July–Dec 2005	Active participation in maternal healthcare/services—husband's support/help to wife	Pregnancy	Maternal depression (antenatal depression)	EPDS; cut-off score of ≥10 indicated depression	High quality (NOS 9/9)
Gausia *et al*[48]	Cohort	Bangladesh—South Asia	361 women aged 15–49 in rural Matlab subdistrict (346 finally reassessed postdelivery)	July–Dec 2005	Active participation in maternal healthcare/services—husband's support/help to wife	Post partum	Maternal depression (postpartum depression)	EPDS; cut-off score of ≥10 indicated depression	High quality (NOS 9/9)
Ip[53]	Quasi-experimental	China (Hong Kong)—East Asia and Pacific	63 women in maternity unit of a public hospital	A 6-month period (not specified)	Active participation in maternal health services/care—husband's presence in delivery room	Delivery	Complications (during childbirth)	Extracted from medical records	Low quality
Lteif *et al*[59]	Cross-sectional	Lebanon—Middle East and North Africa	79 women consulting a gynaecological outpatient department	July–Aug 2002	Active participation in maternal health services/care—husband's support/help to wife	Pregnancy	Maternal depression (antenatal depression)	Beck Depression Inventory (<10 no depression, 10–18 moderate, >18 severe) & questionnaire	Low quality (NOS 2/7)
Mullany *et al*[49]	RCT	Nepal—South Asia	442 women attending ANC during second trimester (but only 386 evaluated for some outcomes)	Aug 2003–Jan 2004	Active participation in maternal health services/care—husband's attendance of ANC with wife	Pregnancy	Maternal health service utilisation (ANC, SBA and postnatal care)	RCT data records	High quality
Sapkota *et al*[50]	Quasi-experimental	Nepal—South Asia	309 women in a central level referral hospital	Feb–Apr 2011	Active participation in maternal health services/care—Husband's presence in delivery room	Delivery	Complications (during childbirth)	Extracted from medical records	Low quality

Continued

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Table 1 Continued

General paper information					Exposure and outcome information				Quality assessment
Paper and reference number	Study design	Country and World Bank subregion	Participants and final sample size	Study period	Exposure: type of male involvement	Timing of male involvement	Relevant maternal health outcome(s)	Method(s) used to measure/collect outcome(s)	Quality assessment results/score
Senturk *et al*[57]	Cross-sectional	Turkey—Europe and Central Asia	751 women attending ANC in third trimester from urban and rural settings, Ankara (but 730 analysed finally)	Dec 2007–Aug 2008	Active participation in maternal healthcare/services—husband's offer of emotional and practical support to wife	Pregnancy	Maternal depression (antenatal depression)	EPDS; ≥13 EPDS scores indicated depression	High quality (NOS 7/7)
Sreelekshmi *et al*[51]	Case–control	India—South Asia	50 cases and 150 controls in a hospital	Aug–Nov 2009	Active participation in maternal healthcare/services—husband's support/help to wife	Post partum	Maternal depression (postpartum depression)	EPDS; ≥10 EPDS score or a positive answer to question 10 indicated depression	Low quality (NOS 3/9)
Wan *et al*[54]	Cross-sectional	China—East Asia and Pacific	342 women coming for their 6–8 week postpartum follow-up in an obstetric outpatient clinic	May–July 2006	Active participation in maternal healthcare or services—husband's support/help to wife	Pregnancy and at post partum	Maternal depression (postpartum depression)	EPDS; ≥13 EPDS scores indicated depression	Moderate quality (NOS 5/7)
Wasti *et al*[52]	Cross-sectional	Nepal—South Asia	144 women aged 15–49 who had given birth in the past 5 years	Feb–March 2010	Active participation in maternal healthcare/services—husband's support/help to wife	Pregnancy	Complications (during childbirth)	Semistructured questionnaire, which was used to construct a maternal health problem index	Low quality (NOS 3/7)
Xie *et al*[55]	Cohort	China—East Asia and Pacific	634 women recruited from hospitals at prenatal phase (534 finally evaluated by end of post partum)	Feb–Sept 2007	Active participation in maternal healthcare/services—husband's support/help to wife	Pregnancy and at post partum	Maternal depression (postpartum depression)	EPDS; ≥13 EPDS scores indicated depression	High quality (NOS 6/9)

ANC, antenatal care; EPDS, Edinburgh Postnatal Depression Scale; NOS, Newcastle-Ottawa Scale; RCT, randomised controlled trial; SBA, skilled birth attendance.

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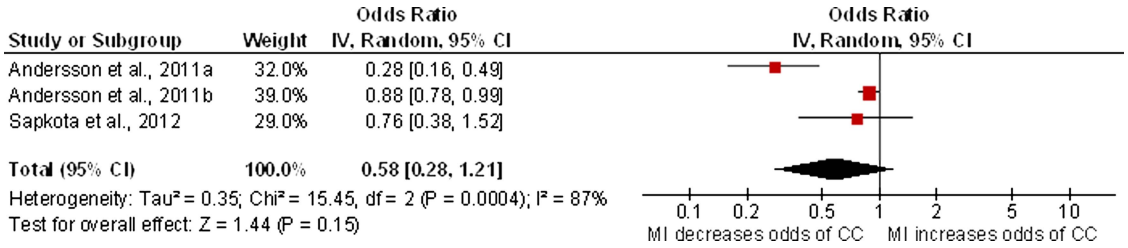

Figure 2 Forest-plot for the impact of MI on complications during childbirth. The Andersson *et al*[58] study was split into two groups because the paper reported separate statistics for the two Nigerian sample states (MI, male involvement; CC, childbirth complications).

(OR=1.35, 95% CI not reported; p=0.01)[46] while the other study found a 'borderline' non-significant association (OR=1.09, 95% CI 0.99 to 1.2).[49] In addition, women whose husbands attended ANC were significantly more likely to receive postnatal care than women who either received health education alone (OR=1.25, 95% CI 1.01 to 1.54) or no education (OR=1.29, 95% CI 1.04 to 1.60). None of the studies reported on the emergency obstetrics care outcome.

Secondary outcome II—maternal mortality: None of the included studies reported this outcome.

Relationship between the type of male involvement and its corresponding effect on maternal health outcomes

Most studies in this review defined male involvement as the active participation of men in maternal health services/care. Within this category, studies on husbands' offer of support/care tended to report positive effects on decreased likelihood of maternal depression[57 59] (figure 4) and childbirth complications;[52] whereas studies focusing on the husband's attendance at ANC appeared to have more impact on women's utilisation of maternal health services, relating to SBA and postnatal care.[46 49] The remaining studies, which defined male involvement as shared decision-making on maternal health with wife, did not appear to have any significant effect on maternal health outcomes. None of the included studies defined male involvement as providing financial support given for pregnancy-related and childbirth-related expenses.

Comparison of effects of male involvement by timing of involvement

Studies which assessed the effect of male involvement during pregnancy and at post partum were more likely to report statistically significant beneficial maternal health effects than those which assessed the impact of male involvement during delivery. In particular, results from studies on husband's attendance at ANC visits or his offer of support/care during pregnancy or at post partum showed similar statistically significant beneficial effects on maternal depression [57 59](figure 4) and maternal health service utilisation;[46 49] however, studies assessing the impact of a husband's presence in the delivery room found no significant effect on non-spontaneous delivery.[50 53]

Assessment of publication bias

A funnel plot of the meta-analysis assessing the association between male involvement and postpartum depression found no evidence of publication bias (online supplementary appendix 3).

DISCUSSION

Main findings

This is the first systematic review and meta-analysis to consider the impact of male involvement on maternal health outcomes in developing countries. This review has demonstrated statistically significant beneficial impacts of male involvement on maternal health through reduced odds of maternal depression and improved utilisation of maternal health services (relating to SBA and postnatal care). Male involvement was also associated with decreased likelihood of childbirth complications, although results showed contradictory significance (the meta-analysis result did not show significant findings while the study excluded from the meta-analysis did). There was little evidence of beneficial maternal health outcomes from husbands' presence in the delivery room. Furthermore, the synthesis of evidence suggests that male involvement during pregnancy and at post partum appear to offer statistically significant maternal health benefits than male involvement during delivery.

Interpretation

The observed protective effect conferred by husbands' support/care on odds of maternal depression is consistent with evidence from developed countries.[15–23 60 61] A husband's practical support in terms of assisting with child-care and household chores, and his emotional support expressed via boosting his wife's self-esteem in her ability to care for the baby could help explain this protective effect against maternal depression.[61] In developing countries where practices adverse to maternal mental health—such as gender inequality and domestic violence—are common, the impact of a husband's support/care can go a long way in boosting maternal mental health. These results

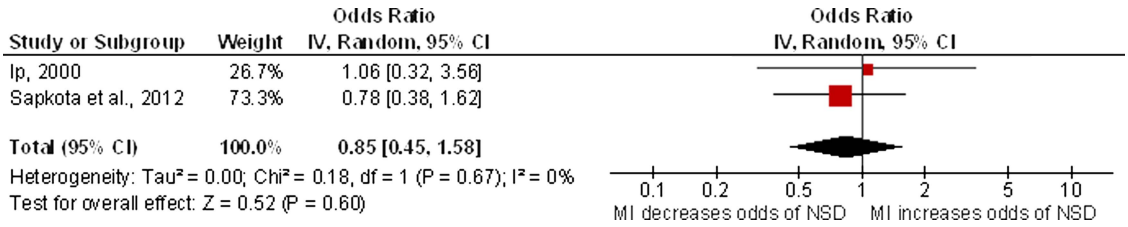

Figure 3 Forest-plot for the impact of a husband's presence in the delivery room during NSD (MI, male involvement; NSD, non-spontaneous delivery).

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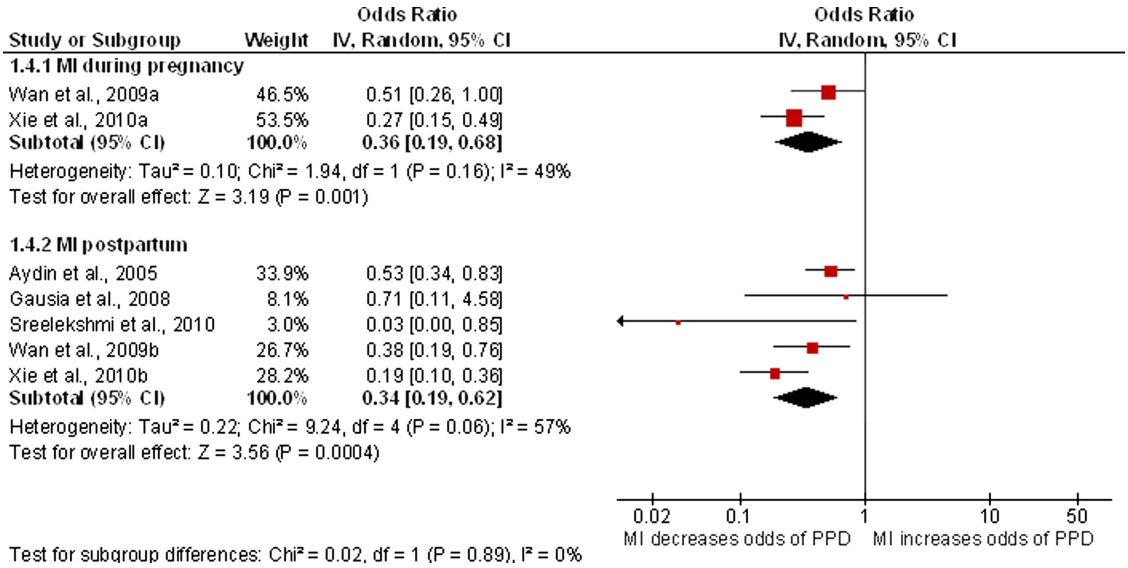

Figure 4 Forest-plot for the impact of male involvement (MI) on postpartum depression (PPD). The Wan *et al*[54] and Xie *et al*[55] studies were split into two because they provided statistics on PPD for two phases—MI during pregnancy and MI postpartum.

should be interpreted with some caution however. Approximately half of the maternal depression studies utilised a cross-sectional design, thus reverse causation may be a possible alternative explanation. For example, is lack of husband support a risk factor for postpartum depression, or are women with postpartum depression more likely to isolate themselves from their husbands hence decreasing their chances of obtaining support from them?[55]

This review has also demonstrated statistically significant beneficial impacts of male involvement on maternal health through improved utilisation of maternal health services (relating to SBA and postnatal care). Previous studies elsewhere have linked husbands' attendance of ANC with increased maternal health service utilisation.[10 62] A possible explanation for this association is that men's knowledge about the importance of maternal health services increases with active participation, which in turn makes them more likely to encourage and support their wives to use them.[63–65] In a developing country setting, this acquired knowledge could also translate into the husbands' grant of permission and provision of resources for accessing maternal services such as transportation to hospital for delivery, payment of user fees and so on.

Furthermore, male involvement was associated with decreased likelihood of childbirth complications, although results showed contradictory significance. It has been reported in literature that men's offer of practical support can reduce women's workload during pregnancy and ensure they rest sufficiently, therefore one could hypothesise that this offer of practical support could translate through pregnancy to childbirth, where the risk of complications may be minimised. In addition, male involvement fosters adequate complication readiness and birth preparation in the form of recognising danger signs and making arrangement for SBA among other things.[66] This in turn prevents delays in accessing care, decreases risk of developing complications and also averts maternal mortality.[65] In the Indonesian Suami SIAGA ('alert husband') campaign, men exposed to the programme were 1.7 times more likely than unexposed men to take alert actions against birth complications ($p<0.001$),[67] thereby reducing women's likelihood of experiencing them.

There was little evidence of the impact of a husband's presence in the delivery room on beneficial maternal health outcomes. This finding deviates from evidence/reports from developed countries where findings suggest significant maternal effects when husbands are present in the delivery room.[26–29] This deviation could be due to a lack of power to detect a clinically significant effect since only two studies[50 53] constituted the meta-analysis, or due to the poor quality of the two quasi-experimental studies included in the meta-analysis, where inadequate or no randomisation was performed.

Finally, the findings from this review suggest male involvement during pregnancy and the postpartum period appear to offer statistically significant maternal health benefits than male involvement during delivery. The explanation for this association is not clear in literature. It is plausible that the dearth of studies or lack of power in the studies on male involvement during delivery could be likely reasons. Duration of exposure could also be a possible explanation. The pregnancy and postpartum phases are longer time periods compared with the delivery phase, thus the male involvement exposure would have occurred long enough for perceived maternal benefits to be observed unlike the delivery phase. In addition, the pregnancy and postpartum phases are less characterised with highly intense maternal anxiety and pain compared to the delivery phase, therefore more benefits could potentially be easily seen in the former two.

Strengths and limitations

Overall, the studies included in this review provided valuable insights on the research topic. Almost half of the studies were assessed as high quality, with some studies using robust RCT and cohort designs. In general, majority of studies adjusted for confounding and also had good response rates, with several exceeding 90%. The literature search for evidence was comprehensive and filters were not used for study design or countries in order to increase sensitivity of the search. In addition, restrictions were not placed in terms of time and language and non-English papers were translated. Authors were also contacted for inaccessible papers and missing details in studies. Widely known tools were also used to assess some outcomes; for example, the

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Edinburgh Postnatal Depression Scale (EPDS) was used to screen for postpartum depression. The EPDS appears to be culturally relevant as included studies used translated (and sometimes validated) versions of this tool, with sensitivity and specificity percentages in the 70s and 80s.

However, this review has certain limitations. The review found a general dearth of evidence on male involvement in the developing world. A significant weakness was the paucity of studies in specific regions of the globe such as Latin America and the Caribbeans and Sub-Saharan Africa. Ten of the 14 included studies were conducted in Asia, raising questions on the generalisability of findings to other developing regions. The majority of the research also focused on maternal depression, which is a less pressing issue for developing countries due to high rates of maternal mortality and low rates of mental health service utilisation. Thus the evidence base needs to be improved in terms of regional representation, study robustness, and consideration of more pressing outcomes such as maternal mortality.

In addition, some studies appeared to be insufficiently powered, which may have contributed to the non-significant findings observed for few of the outcomes. The data on the definition and timing of male involvement were generally obtained via self-reports, potentially introducing reporting bias. Although the meta-analysis for male involvement on complications during childbirth was non-significant, one additional study[52] which could not be included in the meta-analysis due to how the data were reported, did find a significant improvement in outcome; therefore, we are not currently able to conclude the effect of male involvement on this outcome.

Furthermore, due to the nature of the countries considered in this review and their unique economic constraints, some studies may not have been published. It is plausible that such studies may have been published in regional databases that are largely absent in the international scene. On one hand, however, certain regional databases with ample representation at the international level (such as LILACS) were not searched, thus some papers could potentially have been missed. On the other hand, one paper that explored the effectiveness of numerous databases in identifying studies for systematic reviews on a WHO case study topic found that MEDLINE alone identified 75% of electronic citations and 62% of all included citations, the highest yield.[68] Thus the probability of missing relevant papers in this review appears to be very negligible.

CONCLUSIONS

There is some evidence that male involvement improves maternal health in developing countries. It is therefore paramount to consider men as part of 'the solution' rather than 'the problem'.[8] The results underscore the need to shift from women-only maternal health services to 'male-friendly', couple-services, and also to dissolve healthcare/government policies that inadvertently isolate/discourage men from active engagement in maternal health programmes. Effective awareness campaigns promoting male involvement should be organised so that men can be aware of their roles and specific ways to get involved in maternal health.

This review could not conclusively reconcile the contradictory perspectives with respect to the impact of husbands' presence in the delivery room on maternal health. Further studies should be conducted to reconcile the differences so that male involvement efforts are not counterproductive. Finally, the evidence base on male involvement in maternal health in developing countries needs to be improved in terms of quality as well as quantity.

Key messages

- Male involvement significantly reduced the odds of postpartum depression in women and improved overall utilisation of maternal health services.
- Male involvement during pregnancy and postpartum may offer greater maternal benefits than male involvement during delivery.
- There is a general dearth of evidence on male involvement in assessing its effect on specific maternal health outcomes in the developing world; further high quality studies need to be performed.

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