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**WILEY**

[Intervention Review]

# Health system and community level interventions for improving antenatal care coverage and health outcomes

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## ABSTRACT

### Background

The World Health Organization (WHO) recommends at least four antenatal care (ANC) visits for all pregnant women. Almost half of pregnant women worldwide, and especially in developing countries do not receive this amount of care. Poor attendance of ANC is associated with delivery of low birthweight babies and more neonatal deaths. ANC may include education on nutrition, potential problems with pregnancy or childbirth, child care and prevention or detection of disease during pregnancy.

This review focused on community-based interventions and health systems-related interventions.

### Objectives

To assess the effects of health system and community interventions for improving coverage of antenatal care and other perinatal health outcomes.

### Search methods

We searched the Cochrane Pregnancy and Childbirth Group's Trials Register (7 June 2015) and reference lists of retrieved studies.

### Selection criteria

We included randomised controlled trials (RCTs), quasi-randomised trials and cluster-randomised trials. Trials of any interventions to improve ANC coverage were eligible for inclusion. Trials were also eligible if they targeted specific and related outcomes, such as maternal or perinatal death, but also reported ANC coverage.

### Data collection and analysis

Two review authors independently assessed trials for inclusion and risk of bias, extracted data and checked them for accuracy.

## Main results

We included 34 trials involving approximately 400,000 women. Some trials tested community-based interventions to improve uptake of antenatal care (media campaigns, education or financial incentives for pregnant women), while other trials looked at health systems interventions (home visits for pregnant women or equipment for clinics). Most trials took place in low- and middle-income countries, and 29 of the 34 trials used a cluster-randomised design. We assessed 30 of the 34 trials as of low or unclear overall risk of bias.

### Comparison 1: One intervention versus no intervention

We found marginal improvements in **ANC coverage of at least four visits** (average odds ratio (OR) 1.11, 95% confidence interval (CI) 1.01 to 1.22; participants = 45,022; studies = 10; Heterogeneity:  $Tau^2 = 0.01$ ;  $I^2 = 52%$ ; *high quality evidence*). Sensitivity analysis with a more conservative intra-cluster correlation co-efficient (ICC) gave similar marginal results. Excluding one study at high risk of bias shifted the marginal pooled estimate towards no effect. There was no effect on **pregnancy-related deaths** (average OR 0.69, 95% CI 0.45 to 1.08; participants = 114,930; studies = 10; Heterogeneity:  $Tau^2 = 0.00$ ;  $I^2 = 0%$ ; *low quality evidence*), **perinatal mortality** (average OR 0.96, 95% CI 0.89 to 1.03; studies = 15; Heterogeneity:  $Tau^2 = 0.01$ ;  $I^2 = 45%$ ; *moderate quality evidence*) or **low birthweight** (average OR 0.94, 95% CI 0.82 to 1.06; studies = five; Heterogeneity:  $Tau^2 = 0.00$ ;  $I^2 = 5%$ ; *high quality evidence*). Single interventions led to marginal improvements in the **number of women who delivered in health facilities** (average OR 1.08, 95% CI 1.02 to 1.15; studies = 10; Heterogeneity:  $Tau^2 = 0.00$ ;  $I^2 = 0%$ ; *high quality evidence*), and in the proportion of women who had **at least one ANC visit** (average OR 1.68, 95% CI 1.02 to 2.79; studies = six; Heterogeneity:  $Tau^2 = 0.24$ ;  $I^2 = 76%$ ; *moderate quality evidence*). Results for ANC coverage (at least four and at least one visit) and for perinatal mortality had substantial statistical heterogeneity. Single interventions did not improve the **proportion of women receiving tetanus protection** (average OR 1.03, 95% CI 0.92 to 1.15; studies = 8; Heterogeneity:  $Tau^2 = 0.01$ ;  $I^2 = 57%$ ). No study reported on **intermittent prophylactic treatment for malaria**.

### Comparison 2: Two or more interventions versus no intervention

We found no improvements in **ANC coverage of four or more visits** (average OR 1.48, 95% CI 0.99 to 2.21; participants = 7840; studies = six; Heterogeneity:  $Tau^2 = 0.10$ ;  $I^2 = 48%$ ; *low quality evidence*) or **pregnancy-related deaths** (average OR 0.70, 95% CI 0.39 to 1.26; participants = 13,756; studies = three; Heterogeneity:  $Tau^2 = 0.00$ ;  $I^2 = 0%$ ; *moderate quality evidence*). However, combined interventions led to improvements in **ANC coverage of at least one visit** (average OR 1.79, 95% CI 1.47 to 2.17; studies = five; Heterogeneity:  $Tau^2 = 0.00$ ;  $I^2 = 0%$ ; *moderate quality evidence*), **perinatal mortality** (average OR 0.74, 95% CI 0.57 to 0.95; studies = five; Heterogeneity:  $Tau^2 = 0.06$ ;  $I^2 = 83%$ ; *moderate quality evidence*) and **low birthweight** (average OR 0.61, 95% CI 0.46 to 0.80; studies = two; Heterogeneity:  $Tau^2 = 0.00$ ;  $I^2 = 0%$ ; *moderate quality evidence*). Meta-analyses for both ANC coverage four or more visits and perinatal mortality had substantial statistical heterogeneity. Combined interventions improved the **proportion of women who had tetanus protection** (average OR 1.48, 95% CI 1.18 to 1.87; studies = 3; Heterogeneity:  $Tau^2 = 0.01$ ;  $I^2 = 33%$ ). No trial in this comparison reported on **intermittent prophylactic treatment for malaria**.

**Comparison 3: Two interventions compared head to head.** No trials found.

### Comparison 4: One intervention versus a combination of interventions

There was no difference in **ANC coverage (four or more visits and at least one visit)**, **pregnancy-related deaths**, **deliveries in a health facility** or **perinatal mortality**. No trials in this comparison reported on **low birthweight** or **intermittent prophylactic treatment of malaria**.

## Authors' conclusions

**Implications for practice** - Single interventions may improve ANC coverage (at least one visit and four or more visits) and deliveries in health facilities. Combined interventions may improve ANC coverage (at least one visit), reduce perinatal mortality and reduce the occurrence of low birthweight. The effects of the interventions are unrelated to whether they are community or health system interventions.

**Implications for research** - More details should be provided in reporting numbers of events, group totals and the ICCs used to adjust for cluster effects. Outcomes should be reported uniformly so that they are comparable to commonly-used population indicators. We recommend further cluster-RCTs of pregnant women and women in their reproductive years, using combinations of interventions and looking at outcomes that are important to pregnant women, such as maternal and perinatal morbidity and mortality, alongside the explanatory outcomes along the pathway of care: ANC coverage, the services provided during ANC and deliveries in health facilities.

## PLAIN LANGUAGE SUMMARY

### Health system and community level interventions for improving antenatal care coverage and health outcomes

#### What is the issue?

The World Health Organization recommends at least four antenatal visits for all pregnant women. Almost half of pregnant women worldwide miss out on this level of care, and this is more problematic in low- and middle-income countries.

#### Why is this important?

Healthcare during pregnancy is a priority because poor antenatal attendance is associated with delivery of low birthweight babies and more newborn deaths. Antenatal care also provides opportunity for nutritional and health checks, such as whether a woman has a disease like malaria or has been exposed to infectious diseases such as HIV (human immunodeficiency virus) or syphilis.

#### What evidence did we find?

We reviewed randomised controlled trials that tested ways to improve the uptake of antenatal care during pregnancy. Some trials tested community-based interventions (media campaigns, education on self and infant care or financial incentives for pregnant women to attend antenatal care), while other trials looked at health systems interventions (home visits for pregnant women or provision of equipment for clinics). We included 34 trials with approximately 400,000 women. Most trials took place in low- and middle-income countries, and most trials were conducted in a way that made us feel confident about trusting the published reports. We assessed 30 of the 34 trials as of low or unclear overall risk of bias. The quality rating (*high, moderate or low*) shows our level of confidence that the result is robust and meaningful.

##### *Trials comparing one intervention with no intervention*

Single interventions only marginally improved the numbers of women attending four antenatal visits (*high quality*). Interventions did not improve rates of maternal death (*low quality*), baby deaths (*moderate quality*) or low birthweight (*high quality*). Even so, interventions led to modest improvements in the number of women who had at least one antenatal visit (*moderate quality*) and who delivered in a health facility (*high quality*). The number of women who received intermittent preventive treatment for malaria was not reported.

##### *Trials comparing two or more interventions with no intervention*

Combined interventions did not improve the number of women with four or more visits (*low quality*), or reduce maternal deaths (*moderate quality*). Nor did it increase the number of women who delivered in a health facility (*moderate quality*). However, more women who received combined interventions had one or more antenatal visits (*moderate quality*); there were also fewer baby deaths (*moderate quality*) and fewer low birthweight babies (*moderate quality*). The number of women who received intermittent preventive treatment for malaria was not reported.

We found no evidence that trials of community interventions worked differently from trials of health systems interventions.

##### *Trials comparing one intervention with another intervention - there were no trials for this comparison.*

*Trials comparing one intervention with a combination of interventions - There was no difference in the number of women attending four or more antenatal visits (and at least one visit), maternal deaths, baby deaths, the number of deliveries in a health facility or the number of women who received intermittent preventive treatment for malaria.*

#### What does this mean?

Single interventions may improve antenatal care coverage (women attending at least one visit and women attending four or more visits) and encourage women to give birth to their babies in health facilities. Combined interventions may also improve antenatal care coverage (at least one visit), reduce baby deaths and reduce the number of babies born with low birthweight.

We recommend that further studies of pregnant women and women in their reproductive years use combinations of interventions to maximise impact and look at outcomes that are important to the women themselves, such as maternal and baby deaths or ill health and the use of healthcare services.