

## Cohort study

# At 15–20 weeks of pregnancy, various modifiable factors are associated with increased likelihood of a subsequent uncomplicated pregnancy

10.1136/eb-2013-101707

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Commentary on: Chappell LC, Seed PT, Myers J, *et al.* Exploration and confirmation of factors associated with uncomplicated pregnancy in nulliparous women: prospective cohort study. *BMJ* 2013;347:f6398.

## Implications for practice and research

- This study introduces the prediction of normal pregnancy outcomes, as opposed to the prediction of adverse pregnancy outcomes.
- In view of the modifiable factors that are associated with increased chances of uncomplicated pregnancy, there is a need for intervention studies on the subject.

## Context

Traditional approaches in research and obstetric care focus on identifying risk indicators for adverse pregnancy outcomes rather than the prediction of uncomplicated pregnancy. A focus on identifying indicators of uncomplicated pregnancy may help women and their healthcare providers to select appropriate antenatal care, for example change in lifestyle factors or intensified monitoring, thus reducing the risk of pregnancy complications.

Chappell and colleagues focus on the identification of such indicators, placing special attention on modifiable risk indicators which could be altered by women themselves before or during early pregnancy to promote a favourable outcome.

## Methods

Chappell and colleagues recruited 5628 nulliparous women with a singleton pregnancy from New Zealand, Australia, the UK and Ireland. Women with a perceived high risk of complications were excluded. Trained research midwives collected information at around 15–20 weeks of gestation using questionnaires.

Primary outcome was defined as a normotensive pregnancy, delivered at >37 weeks, resulting in a live born baby who was not small for gestational age and did not have any other significant pregnancy complications, such as hypertensive disorders, spontaneous preterm birth or small for gestational age.

Predictors were identified from 86 variables (divided into 10 groups of matching variables) using variable reduction, based on univariable and multivariable associations in exploration (n=2129) and local replication (n=1067) datasets from Australia and New Zealand, and an external dataset (n=2432) of women from the UK and Ireland.

## Findings

In total, 3452 (61%) women had an uncomplicated pregnancy. Modifiable predictors that lowered likelihood of an uncomplicated pregnancy were: increased body mass index, increased blood pressure and drug misuse during the first trimester, while high fruit intake 1 month before pregnancy and paid employment at 15 weeks' gestation both increased the likelihood of uncomplicated pregnancy.

Non-modifiable predictors that reduced the likelihood of uncomplicated pregnancy were: family history of pregnancy hypertensive disorders, vaginal bleeding during pregnancy, increased uterine artery resistance, lower socioeconomic status and hypertension before pregnancy while using oral contraceptives.

## Commentary

This is the first study to focus on prediction of uncomplicated pregnancy rather than pregnancy complications. This approach is definitely interesting, but also raises concerns. Although this approach has recently been recommended, the approach is essentially no different from the use of a composite outcome consisting of several pregnancy complications.

As such, problems associated with a composite outcome also apply to Chappell and colleagues' study. Specifically, the associations identified between predictors and outcome are an average estimate of predictors and individual components of the composite outcome, meaning incident outcomes which are more likely to occur make a greater contribution to the effect estimate than less likely outcomes. Consequently, interpretation of effect estimates is difficult and the effects of rare, severe pregnancy complications are overlooked.

In addition, 'complicated pregnancy' is actually a collection of different pregnancy complications which are associated differently with the identified indicators and so may behave differently (eg, decreasing cervical length is associated with an increasing risk of preterm delivery, but not with hypertensive disorders<sup>1</sup>). Consequently, prediction patterns of various pregnancy complications differ. Using one model to predict all uncomplicated pregnancy ignores this fact, potentially lowering the reliability of the model.

This composite outcome approach is not problematic when recommending lifestyle changes (apart from when considering associated costs for lifestyle changes and application of lifestyle changes that may not be beneficial for all women, if effective at all). However, the model may prove problematic when used for risk stratification, where its application may potentially result in reassuring a woman based on her low overall risk of uncomplicated pregnancy, when the woman could be at increased risk of a rare but severe pregnancy complication.

The solution is that the prediction of normalcy and the prediction of several high-risk complications should be applied.

Competing interests None.



## Reference

1. Iams JD, Goldenberg RL, Meis PJ, *et al.* The length of the cervix and the risk of spontaneous premature delivery. National Institute of Child Health and Human Development Maternal Fetal Medicine Unit Network. *N Engl J Med* 1996;334:567–72.