Background
Current studies have confirmed that fetal congenital heart diseases (CHDs) are caused by various factors. However, the quantitative risk of CHD is not clear given the combined effects of multiple factors.

Methods
Pregnant women who underwent fetal echocardiography (N=16,086, including 3,312 CHD fetuses) were analyzed using a BN. Twenty-five maternal and fetal factors were obtained. RRs were calculated based on the probabilistic reasoning of the BN. We built two types of BN (with or without gestational weeks (GWs) due to additive effects on the accuracy of the model's predictions.

Results:
The single-factor analysis showed that the RRs for the numbers of births, spontaneous abortions, and parental smoking were 1.50, 1.38, and 1.11, respectively. The risk was higher when multiple factors were combined. The risk was higher among subjects with five synergistic factors, including the number of births, upper respiratory tract infection during early pregnancy, anemia, and mental stress as well as a history of spontaneous abortions or parental smoking, than in those with less than 5 factors (RR=2.62 or 2.28). This result was consistent across the participants grouped by GWs.

Conclusion
We identified six factors that were directly associated with fetal CHD. A higher number of these factor led to a higher risk of CHD. These findings suggest that it is important to strengthen healthcare and prenatal counseling for women with these factors.