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Abstracts

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## Most fetal weight standards miss increased stillbirth risk in obese mothers' pregnancies

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**Objective:** We investigated the performance of four international fetal weight standards and their ability to identify stillbirth risk associated with smallness for gestational age (SGA) in expectant mothers with increased body mass index (BMI).

**Design:** Retrospective cohort study

**Method:** We analysed routinely collected data from 2.27 million pregnancies. Three population based fetal weight standards – Hadlock, Intergrowth 21st (IG21) and World Health Organisation (WHO) – were compared with the customised Gestation Related Optimal Weight (GROW) fetal weight standard which is adjusted for maternal height, weight, parity and ethnic origin. SGA birthweight and stillbirth risk were determined for the two largest ethnic groups in our population (British-European and South Asian), and four BMI categories. Differences in trend across BMI categories between stillbirth and SGA rates were assessed by the slopes test.

**Results:** Stillbirth rates (per 1000) in the British European cohort increased from 3.6 (BMI 18.5 < 25) to 3.8 (25 < 30), 4.2 (30 < 35) and 4.7 (>35). This was mirrored by a rise in SGA rates according to GROW across these BMI categories, from 12.5 to 13.2, 15.8 and 17.9%, respectively, with similarity in trend to that of stillbirths confirmed by non-significant slopes test. In contrast, each of the population based fetal weight standards showed a declining trend in SGA rates across the same BMI categories: Hadlock 14.1 to 10.7, 10.0 and 8.7%; IG21 5.6 to 4.2, 3.9 and 3.5%; and WHO 18.5 to 14.2, 13.1 and 11.4% (slopes test: $p < 0.01$). The results were similar in the South Asian cohort, but with stillbirth rates higher overall, and the increase in stillbirth rates from normal to obese BMI steeper (4.97 to 7.56). This was again associated by an increase in GROW SGA rates (12.5 to 17.6%), and declining SGA with each uncustomised fetal weight standard: Hadlock 29.8 to 17.4%; IG21 13.9 to 8.0%; WHO 36.7 to 21.8%.

**Conclusion:** Maternal obesity during pregnancy is associated with increased stillbirth risk and a higher rate of SGA, when the fetal weight standard is adjusted for maternal characteristics. The increased stillbirth rate in high BMI pregnancies could be due to increased instances of fetal growth restriction as well as difficulties in antenatal recognition. In contrast, population based fetal weight standards like Hadlock, Intergrowth and WHO appear to hide the association between obesity and SGA associated stillbirth risk, and their use in antenatal surveillance will fail to identify cases at risk.