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# A CUSTOMISED BIRTHWEIGHT CENTILE CALCULATOR DEVELOPED FOR A NEW ZEALAND POPULATION

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## BACKGROUND

- SGA is usually defined as <10th% using sex adjusted population charts.
- A number of these SGA babies are "constitutionally small" and not growth restricted.
- Customised centiles adjust for maternal variables:height, booking weight, ethnicity and parity as well as infant sex and gestation.
- Customised birthweight <10th% better identifies SGA babies with perinatal morbidity and mortality.
- Customised centiles have not previously been developed for a New Zealand population.

## AIMS

1. To develop customised centiles applicable to a New Zealand population
2. To determine if customised birthweight varies between European and Maori and European and the main Pacific Island ethnic groups resident in NewZealand (Samoan and Tongan).

## METHODS

### Study population (n=4707)

- Women from the National Women's Hospital database from 1993-2000 with the following data: ethnicity, parity, height, booking weight and scan at <24 weeks.
- Exclusions - multiple pregnancies, preterm births, stillborn babies and babies with congenital abnormalities.

### Statistical methods

- Multiple regression analysis using the model of Gardosi (1995) generated coefficients for New Zealand women.
- Coefficients entered into "Gestation Network centile calculator "www.gestation.net/birthweight_centiles/birthweight_centiles.htm".
- More diabetic women met inclusion criteria so population proportion used in model.

## RESULTS

**Table 1:**
**Ethnicity and mean birthweight in the study group and those eligible but excluded because of missing data.**

| Ethnicity | Included in study (n=4707) | Birthweight | Not included (missing data) (n=54,357) | Birthweight |
|---|---|---|---|---|
| European | 1688 (36%) | 3457 (494) | 29,663 (55%) | 3520 (486) |
| Maori | 419 (9%) | 3448 (472) | 5078(9%) | 3414 (509) |
| Samoan | 506 (11%) | 3668 (510) | 4772 (9%) | 3642 (504) |
| Tongan | 326 (7 %) | 3739 (503) | 3148 (6%) | 3782 (519) |
| Chinese | 751 (16%) | 3410 (455) | 3827 (7%) | 3351 (428) |
| Indian | 214 (5%) | 3173 (479) | 1981 (4%) | 3132 (452) |
| Other | 803 (17%) | 3433 (499) | 5888 (11%) | 3446 (484) |

Data are mean (SD) and number (%) as appropriate.

Birthweights are weights in grams.

**Table 2.**
**Demographic characteristics of the study population (n=4707 women)**

| Ethnicity | Age (yrs) | Nulliparous | Booking Weight ( kg) | Height (cm) | Body Mass Index kg/m ² |
|---|---|---|---|---|---|
| European | 31.2 (5.9) | 41% | 69.2 (14.6) | 164.9 (6.7) | 25.5 (5.2) |
| Maori | 26.9 (6.3) | 30% | 78.4 (19) | 164.7 (6.2) | 28.9 (6.6) |
| Samoan | 28.9 (5.8) | 26% | 86.6 (18.8) | 164.2 (5.6) | 32.1 (6.9) |
| Tongan | 29.8 (5.8) | 22% | 88.4 (17.9) | 165.5 (5.5) | 32.3 (6.1) |
| Chinese | 32.3 (4.7) | 41% | 55.9 (9.0) | 159.3 (5.3) | 22.0 (3.3) |
| Indian | 28.3 (5.4) | 30% | 61.2 (13.3) | 158.4 (6.0) | 24.3 (4.6) |
| Other | 29.7 (6.1) | 38% | 69.9 (19.6) | 160.8 (6.6) | 26.8 (6.6) |

Data are mean (SD) or % as appropriate.

**REFERENCE**

Gardosi J, Mongelli M, Wilcox M, Chang A. An adjustable fetal weight standard. Ultrasound Obstet Gynecol 1995; 6:168-74.

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A baby of Maori and Indian ethnicity was on average 67g and 150g lighter respectively than a baby born to a European woman of the same height and weight.

A Samoan, Tongan and Chinese baby was 84g, 124g and 101g heavier than a baby born to a European woman of the same height and weight.

**Table 3:**
**Regression coefficients (grams) for variables from the Gardosi[1] model based on the National Women's Hospital data.**

The coefficients listed are based on an expected birthweight of 3530g for a nulliparous European women of height 165cm and booking weight 70kg delivering at 40 weeks gestation.

| | Coefficient (g) | SE | P value |
|---|---|---|---|
| **Gestation** (from 280 days) | | | |
| Linear term | 19.5 | 1.3 | <0.0001 |
| Quadratic term | -0.28 | 0.09 | 0.003 |
| Cubic term | 0.0006 | 0.005 | 0.9 |
| **Sex** | | | |
| Female | -57.7 | 6.1 | <0.0001 |
| Male | 57.7 | 6.1 | <0.0001 |
| **Maternal Height** (from 165cm) | | | |
| Height | 9.6 | 1.1 | <0.0001 |
| **Booking Weight** (from 70kg) | | | |
| Linear term | 7.1 | 0.6 | <0.0001 |
| Quadratic term | -0.103 | 0.022 | <0.0001 |
| Cubic term | 0.0007 | 0.0003 | 0.02 |
| **Ethnic Group** | | | |
| European | 0 | | |
| Maori | -67 | 23 | 0.004 |
| Samoan | 84 | 23 | 0.0002 |
| Tongan | 124 | 27 | <0.0001 |
| Chinese | 101 | 20 | <0.0001 |
| Indian | -150 | 31 | <0.0001 |
| Other | 13 | 19 | 0.5 |
| **Parity** | | | |
| Parity 1 | 102 | 15 | <0.0001 |
| Parity 2 | 102 | 19 | <0.0001 |
| Parity 3 | 123 | 25 | <0.0001 |
| Parity 4+ | 175 | 28 | <0.0001 |

## CONCLUSIONS

- There are significant differences in mean birthweights between New Zealand's main ethnic groups
- The expected birthweight of a European baby from a mother of average build, 3530g, was very similar to that in Nottingham, UK, 3478g.
- These coefficients can be applied clinically by downloading the software program from www.gestation.net/birthweight_centiles/birthweight_centiles.htm.
- **As customised centiles appear to improve prediction of perinatal morbidity, data on height and booking weight should be collected in all pregnancies.**