

INTERGROWTH-21st very preterm size at birth reference charts

In 2014, the INTERGROWTH-21st Consortium published international standards for newborn baby size, based on neonates with no major complications or ultrasound evidence of fetal growth restriction (FGR), who were born to healthy mothers without FGR risk factors.¹ Despite our large

sample size, very few neonates born at 33 weeks' gestation or earlier met these prescriptive inclusion criteria. While implementing these standards, we have received many requests for very preterm, size at birth charts for clinical practice and research.

Unsurprisingly, at these low gestational ages, most pregnancies have some risk factors, and prescriptive standards are difficult to construct. Therefore, we opted to generate very preterm reference charts

to avoid previous methodological shortcomings.² We supplemented the original sample by including neonates from the same INTERGROWTH-21st population who, despite being born to mothers with some FGR risk factors (except smoking and severe obesity), did not have congenital malformations or ultrasound evidence of FGR before birth. We used the same statistical methods as for the Newborn Size Standards.¹ All other methods and ethics approvals have been described previously.^{3,4}

408 neonates (214 boys, 194 girls) were included in the reference study population, after excluding 216 newborn babies because of maternal smoking, severe maternal obesity or morbidity, congenital malformations, or ultrasound evidence of FGR, and 37 because of implausible anthropometric measurements or gestational age estimates. As expected, perinatal events (eg, higher pre-eclampsia, caesarean section, and neonatal mortality rates) for these very preterm babies differed from the Newborn Size Standards (appendix).¹

The third, 10th, 50th, 90th, and 97th smoothed centile curves for weight, length, and head circumference at birth according to gestational age and sex, superimposed on the individual data, are shown in the appendix (actual centile values and corresponding equations are provided in the appendix and at the INTERGROWTH-21st website). Values for birthweight and head circumference at 33 weeks' gestation overlapped perfectly with the original Newborn Size Standards;¹ values for length were complementary at the median level, but less so at the extreme centiles because of the differently shaped curves in early and late pregnancy (figure).

We present very preterm reference charts for newborn baby size at birth using the same underlying population, methods, instruments, standardisation protocols, and statistical analyses as for the Newborn Size Standards,¹ which

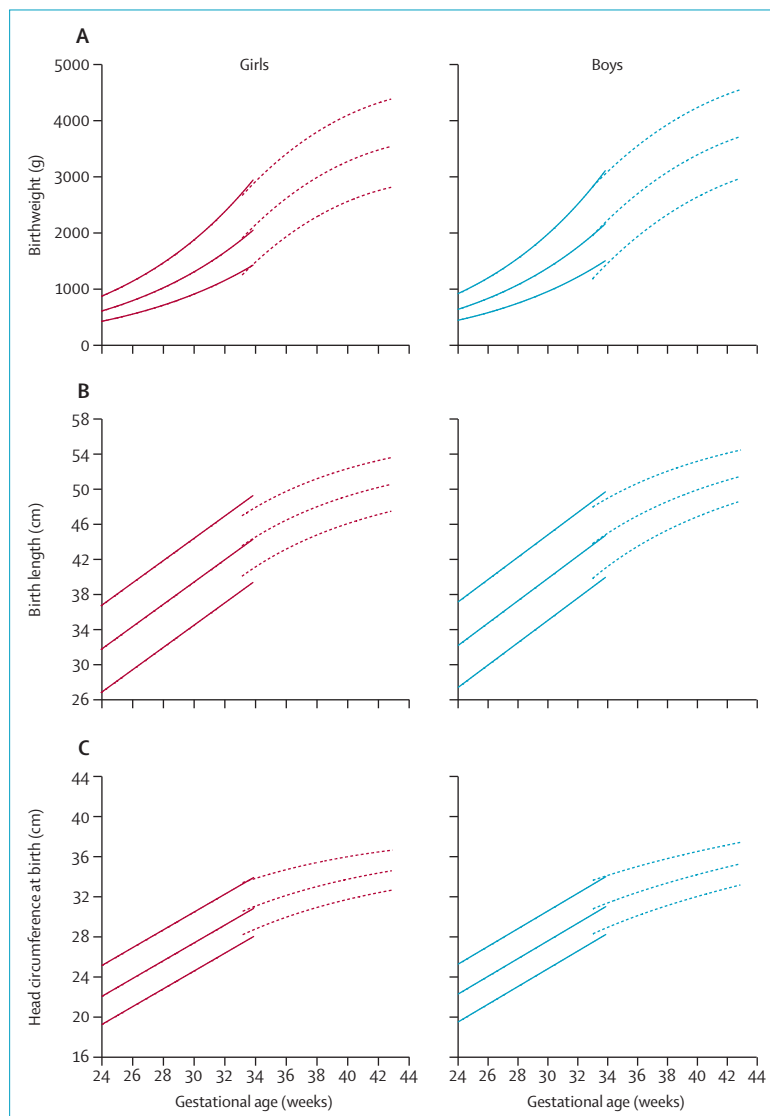


Figure: Centile curves for weight, length, and head circumference at birth

The 3rd, 50th and 97th centile curves for birthweight (A), birth length (B), and head circumference at birth (C) according to gestational age for newborns less than 33 weeks' gestation (solid lines) followed by the INTERGROWTH-21st Newborn Size Standards (dashed lines).



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See Online for appendix

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they complement well. They provide neonatologists with a single way to assess and screen newborn babies from 24 to 42 weeks' gestation. The head circumference charts are particularly important in view of the urgent need, in the midst of the Zika virus outbreak, to assess the head size of newborn babies with a set of standardised, gestational-age specific charts, to avoid over-reporting of cases of microcephaly across all affected regions.⁵

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*José Villar, Francesca Giuliani,
Tanis R Fenton, Eric O Ohuma,
Leila Cheikh Ismail,
*Stephen H Kennedy, for the
INTERGROWTH-21st Consortium*
stephen.kennedy@obs-gyn.ox.ac.uk

Nuffield Department of Obstetrics & Gynaecology, University of Oxford, John Radcliffe Hospital, Oxford OX3 9DU, UK (JV, EOO, LCI, SHK); Oxford Maternal & Perinatal Health Institute, Green Templeton College, University of Oxford, Oxford, UK (JV, EOO, LCI, SHK); Dipartimento di Scienze Pediatriche e dell'Adolescenza, Cattedra di Neonatologia, Università degli Studi di Torino, Torino, Italy (FG); Department of Community Health Sciences, Alberta Children's Hospital Research Institute, University of Calgary, Calgary, AB, Canada (TRF); and Centre for Statistics in Medicine, Botnar Research Centre, University of Oxford, Oxford, UK (EOO)

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