

The INTERGROWTH-21st Project

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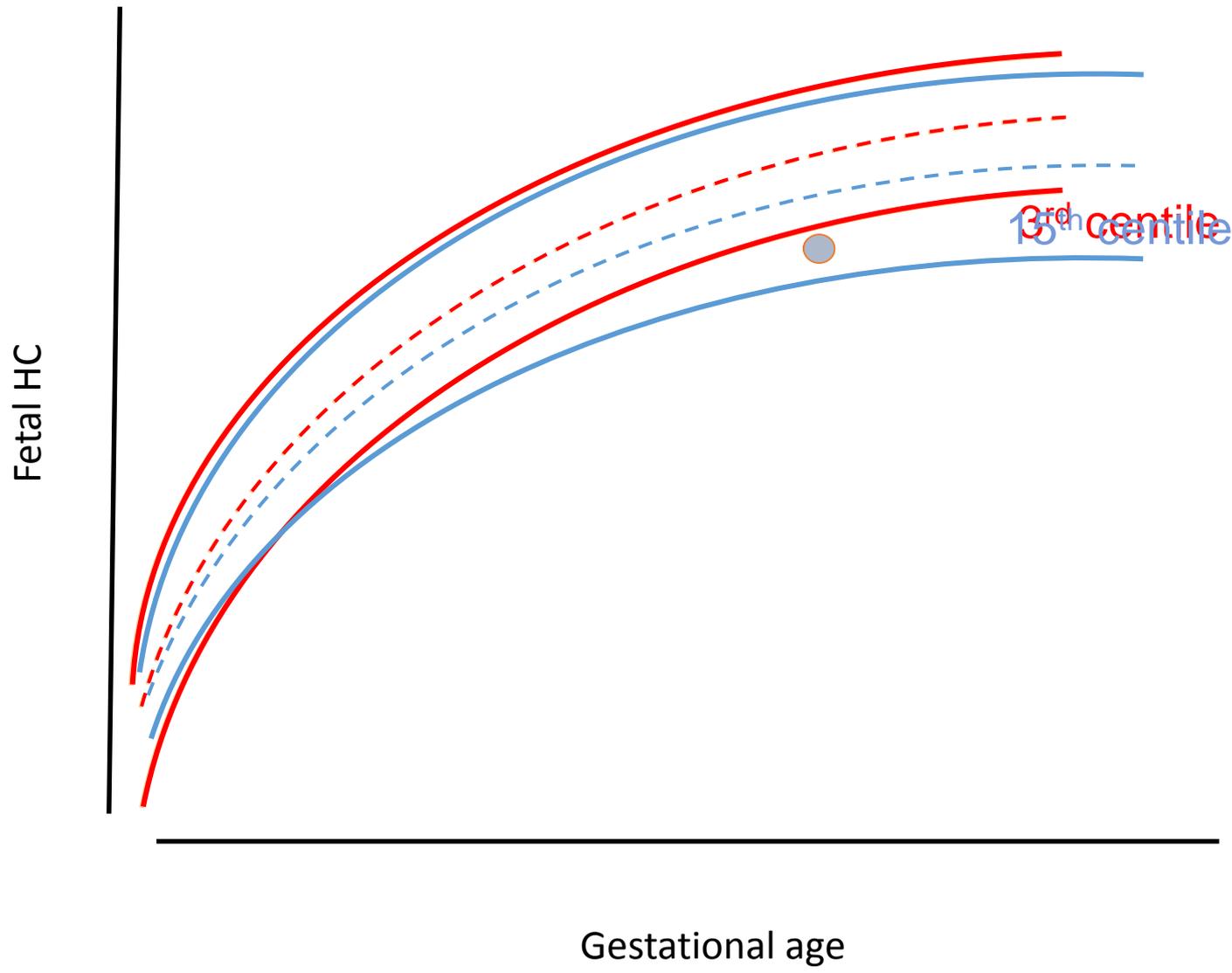
on behalf of

The International Fetal and Newborn Growth Consortium for the 21st Century



Oxford Maternal & Perinatal
Health Institute
Green Templeton College





How is size assessed currently?

Crown-rump length / gestational age estimation

- 29 charts
- 4 low risk of bias

Napolitano et al, 2014 *BJOG*

Fetal growth monitoring by ultrasound

- 83 charts
- Only 12 used reliable dating

Ioannou et al, 2012 *BJOG*

Birth weight charts

- 102 charts
- 8 low risk of bias

Giuliani et al, 2015 *Acta Paediatr*

WHO Multicentre Growth Reference Study (MGRS)



De Onis et al, 2006 *Acta Paediatr*

INTERGROWTH-21st Project

Primary objective

To develop international “prescriptive” fetal growth, newborn size and preterm postnatal growth standards



Three complementary studies

- **Newborn Cross-Sectional Study (NCSS)** of all newborns in eight centres over 12 months
- **Fetal Growth Longitudinal Study (FGLS)** from $<14^{+0}$ weeks to birth, with follow-up to age 2
- **Preterm Postnatal Follow-up Study (PPFS)** of all preterm infants in FGLS to age 2



A rapid questionnaire assessment of environmental exposures to pregnant women in the INTERGROWTH-21st Project

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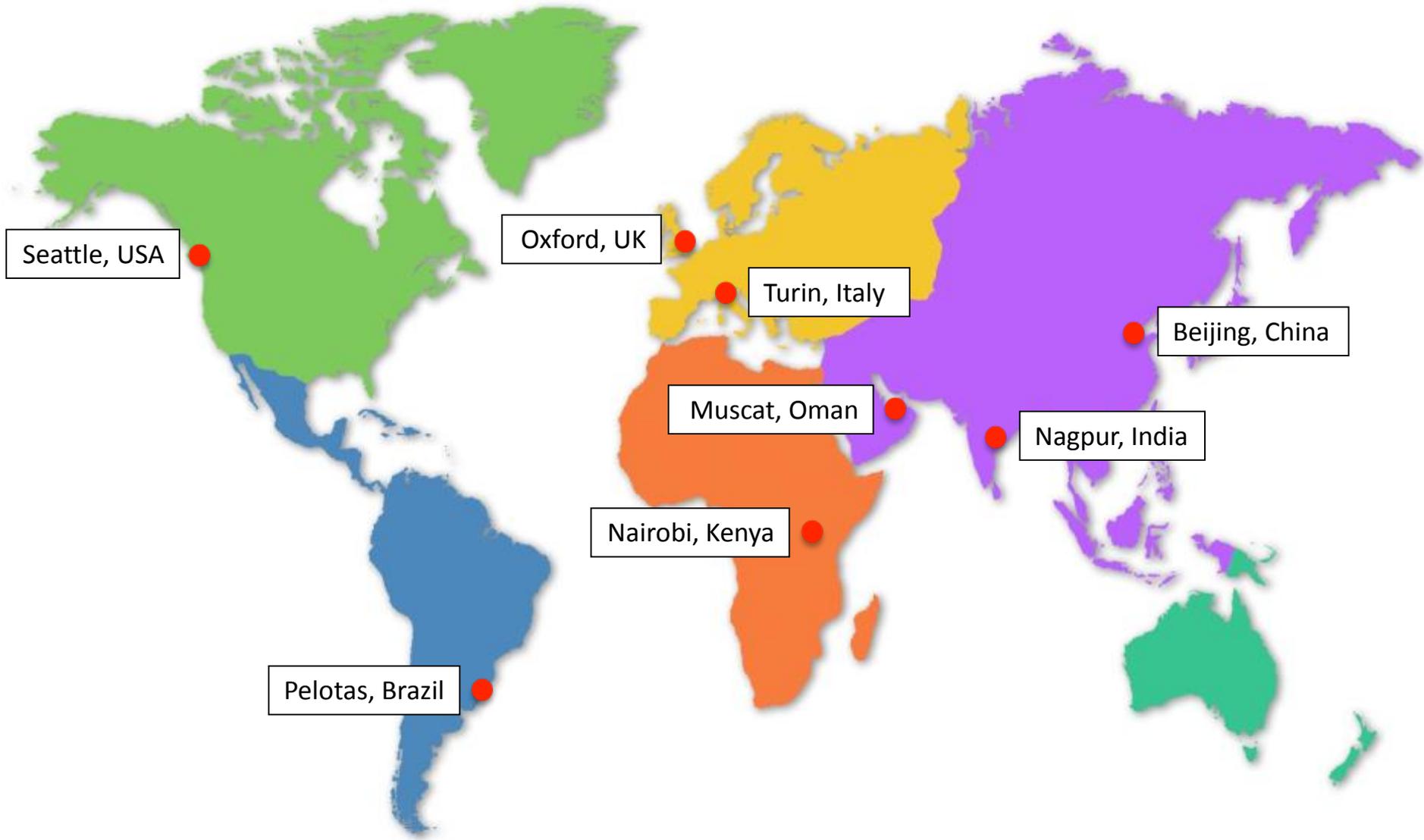
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“Healthy” environment criteria for selection of sites in Fetal Growth Longitudinal Study

- Low birth weight rate <10%
- Mean birth weight >3100g
- Perinatal mortality <20 per 1000 live births
- >75% mothers have attained an educational level/socio-economic status indicator greater than the locally defined cut-off points
- Lack of known, major, non-microbial environmental contaminants
- Altitude <1600m



INTERGROWTH-21st sites

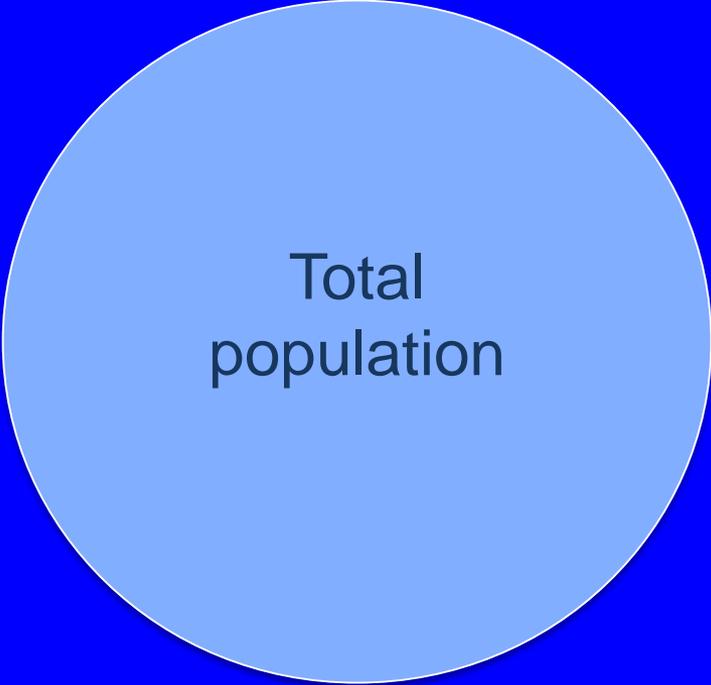
BILL & MELINDA
GATES *foundation*



INTERGROWTH-21st populations 2009-13

All pregnancies in 8 sites

n = 59,137

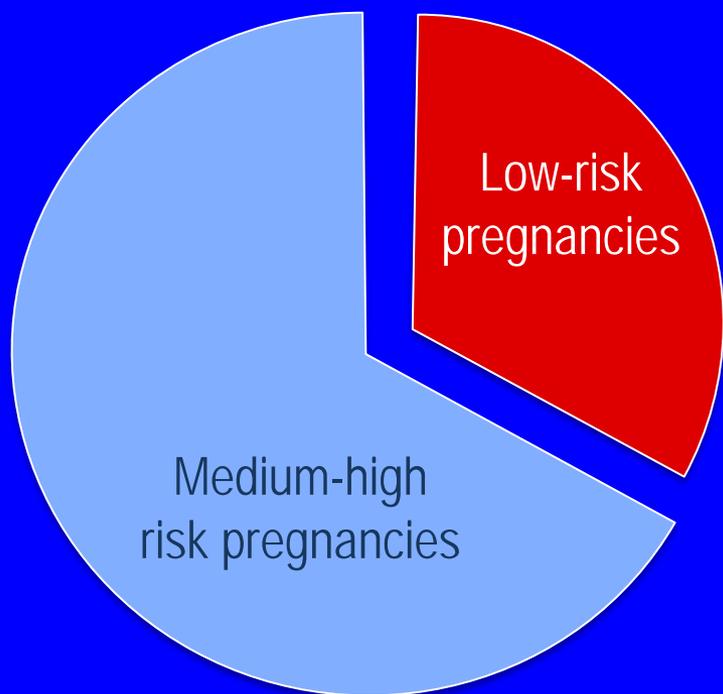


Total
population



INTERGROWTH-21st populations

Low-risk pregnancies
n = 20,486



Low-risk pregnancy criteria

- a) aged ≥ 18 and ≤ 35 years;
- b) BMI ≥ 18.5 and < 30 kg/m²;
- c) height ≥ 153 cm;
- d) singleton pregnancy;
- e) a known LMP with regular cycles (defined as a 26-30 day cycle in the previous 3 months), without hormonal contraceptive use, pregnancy or breastfeeding in the 3 months before pregnancy;
- f) natural conception

Criteria defining a low-risk study population as healthy and well-nourished (both before and during pregnancy) to ensure that fetal growth is optimal

condition;

- o) no clinically significant atypical red cell alloantibodies;
- p) negative urinalysis;
- q) systolic blood pressure < 140 mmHg and diastolic blood pressure < 90 mmHg;
- r) haemoglobin ≥ 11 g/dl;
- s) negative syphilis test and no clinical evidence of any other sexually transmitted diseases, including clinical Trichomoniasis;
- t) not in an occupation with risk of exposure to chemicals or toxic substances, or very physically demanding activity to be evaluated by local standards. Also women should not be conducting vigorous or contact sports, as well as scuba diving or similar activities



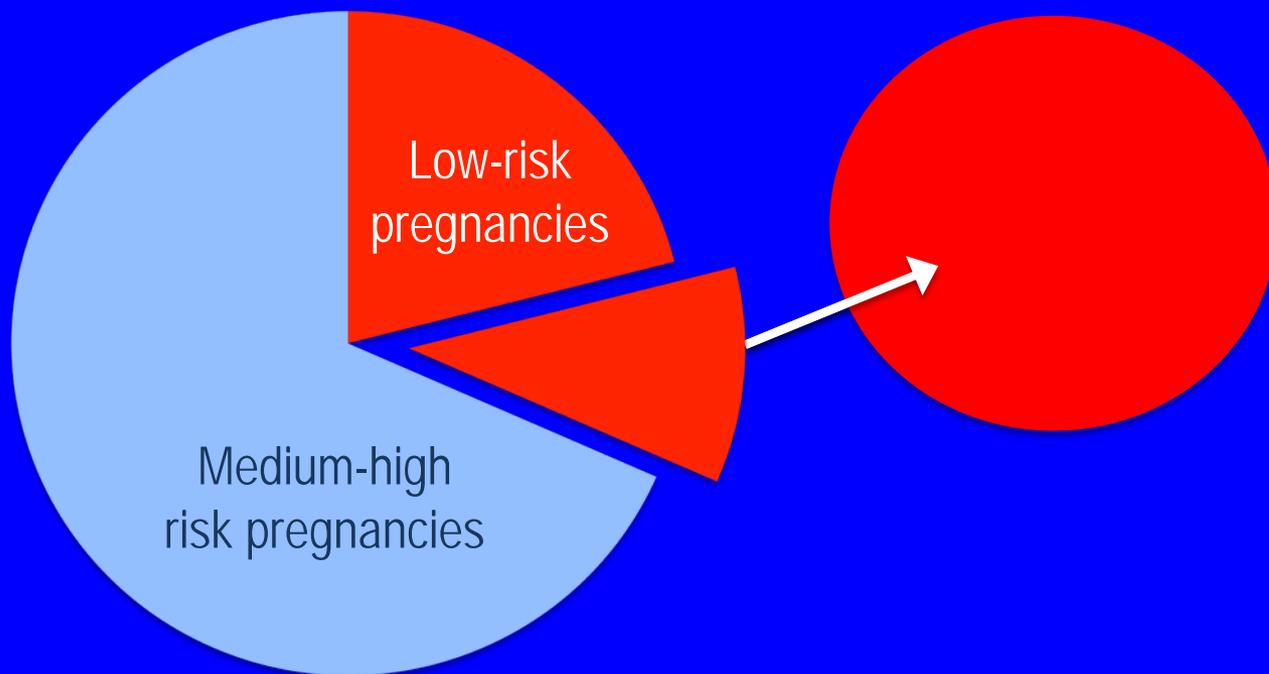
INTERGROWTH-21st populations

Low-risk pregnancies

n = 20,486

Fetal Growth Longitudinal Study

n = 4,607





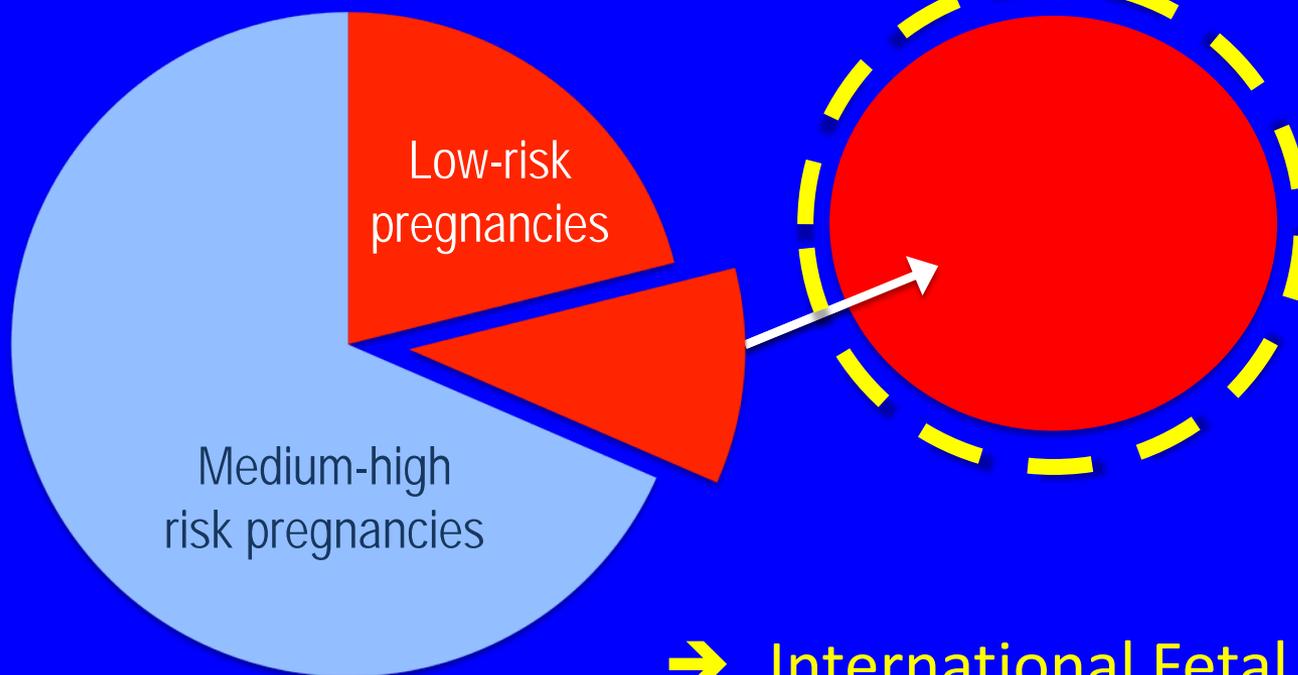
INTERGROWTH-21st populations

Low-risk pregnancies

n = 20,486

Fetal Growth Longitudinal Study

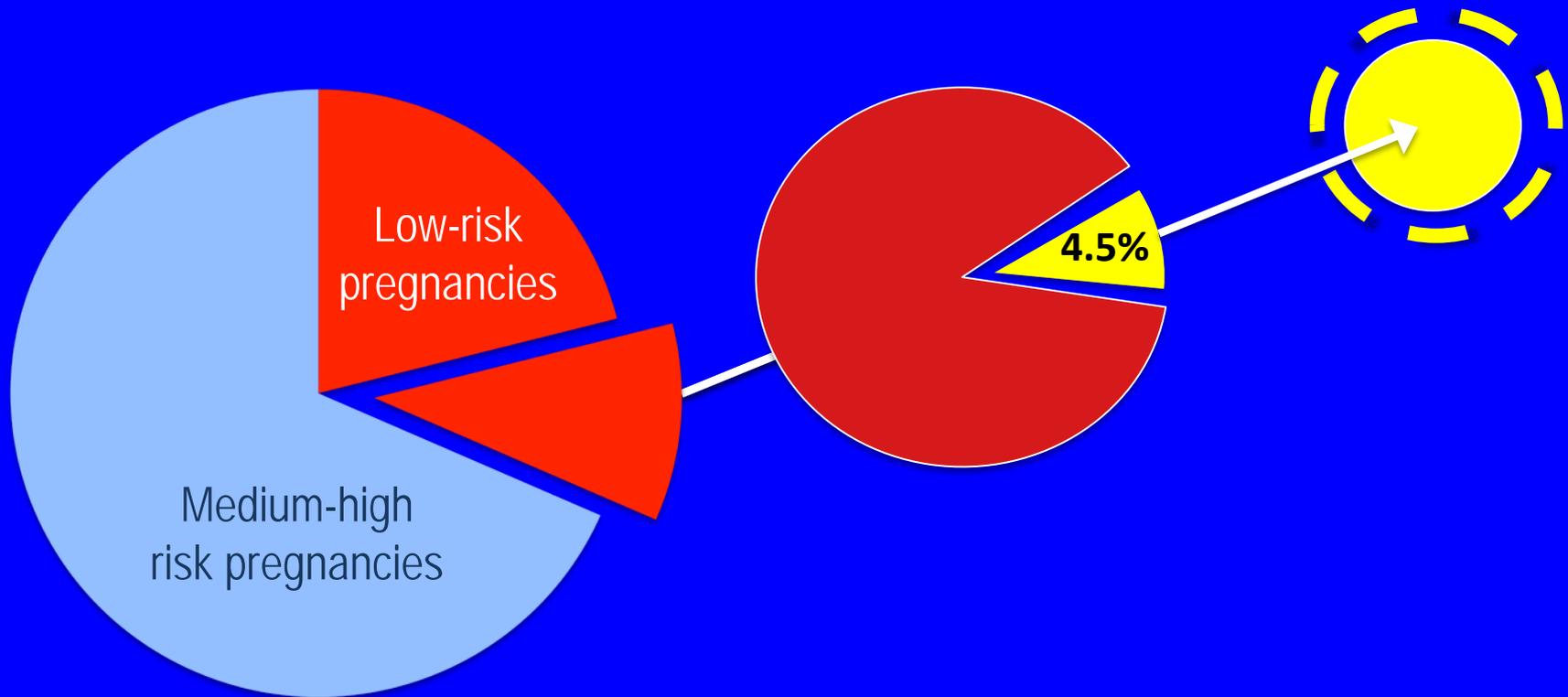
n = 4,607



➔ International Fetal Growth Standards

Preterm births in Fetal Growth Longitudinal Study

Preterm Postnatal
Follow-up Study (n = 193)



➔ International Preterm Postnatal Growth Standards

Fetal Growth Longitudinal Study (FGLS)

N = 4,607



Anthropometric measurements:
Length/height
Weight
Head circumference

Ultrasound measures:
9-14 weeks
Then every 5 ± 1 weeks

Neurodevelopment assessment:
Psychometric tests
Wireless EEG
Actigraphy

Anthropometric measurements at birth



Assessing neurodevelopmental outcomes at 2 years in FGLS cohort (Brazil, India, Italy, Kenya & UK)

Vision: Cardiff Acuity & Contrast Tests

Cognition, language development, behaviour and fine/gross motor skills:
INTERGROWTH-21st Neurodevelopmental Assessment Tool

Attention: Child Behaviour Check List

Auditory processing: Evoked response potentials to an auditory paradigm (ERP)

Sleep: Brief Infant Sleep Questionnaire and actigraphy



Information collected on all births

INTERGROWTH-21st
International Fetal and Newborn Growth
Standards for the 21st Century

The International Fetal and Newborn Growth Consortium



**PREGNANCY AND DELIVERY FORM
INSTRUCTIONS**

September 2009



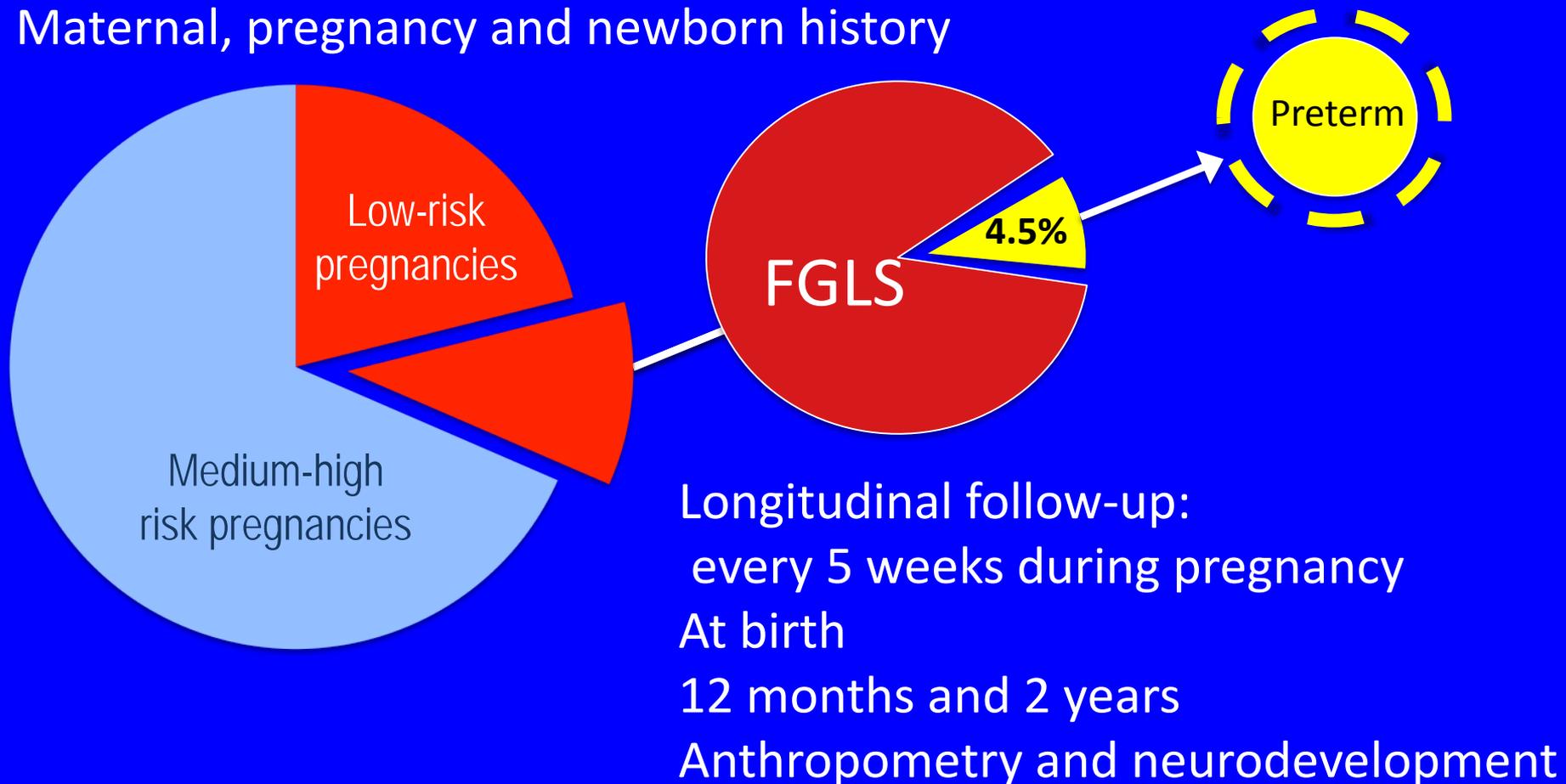
Potential populations available for future studies

60 000 babies from 8 countries:

Well dated pregnancies

Detailed newborn anthropometry

Maternal, pregnancy and newborn history



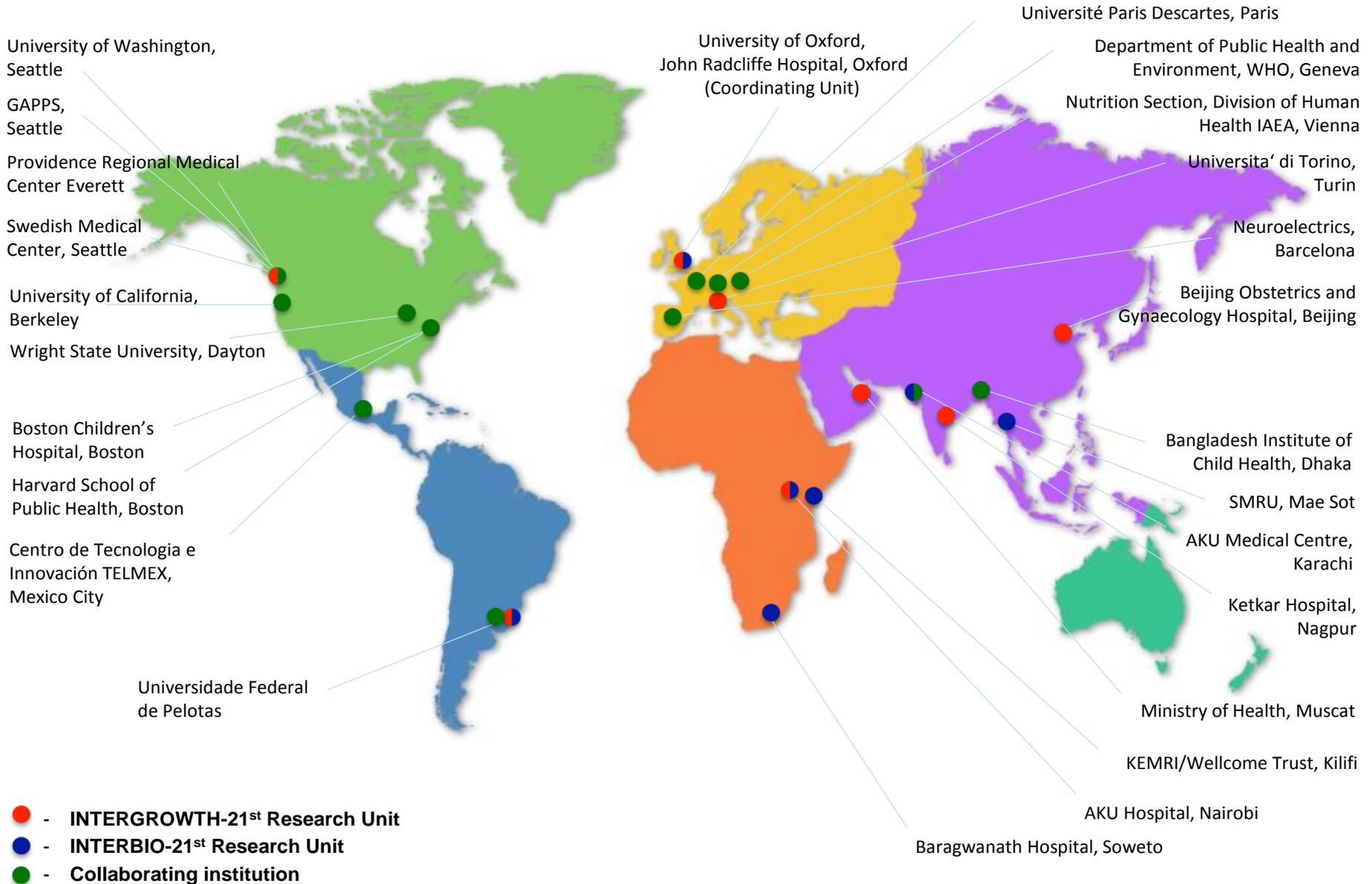
Future work..

The INTERBIO-21st Study

The Functional Classification of Abnormal Fetal
and Neonatal Growth Phenotypes

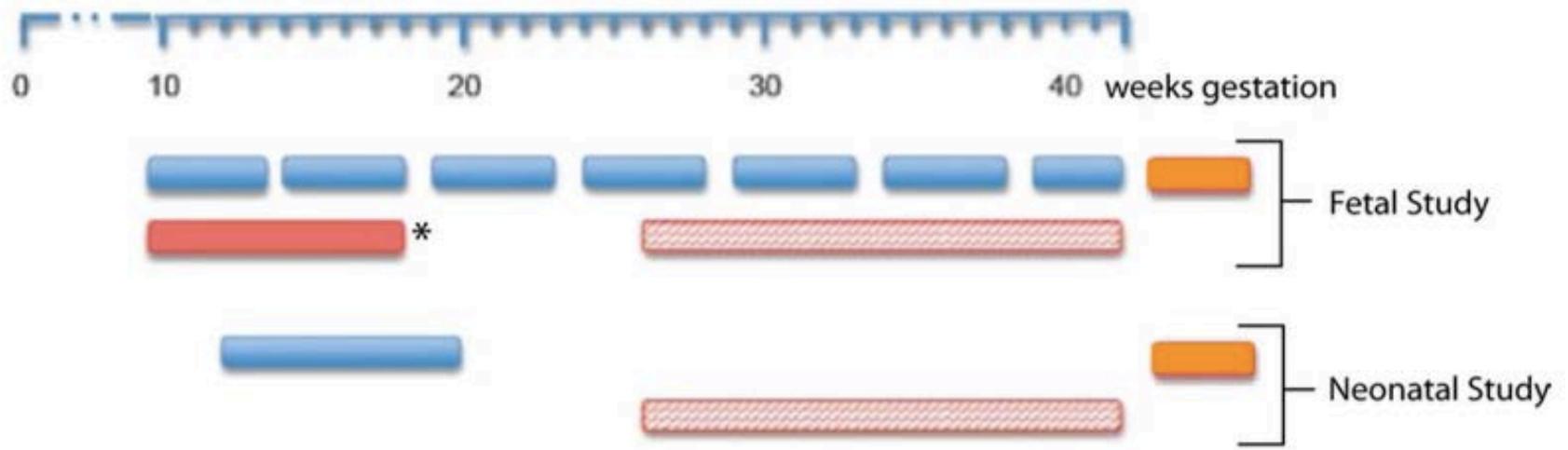


The INTERGROWTH-21st Project Network



INTERBIO-21st ongoing data collection

Figure 3: INTERBIO 21st Fetal and Neonatal Studies: data and sample collection periods



Data sample collection periods

-  Fetal and maternal measurements
-  * Maternal blood samples (at booking) will be taken at some centres
-  Maternal blood, cord blood, faeces and placental samples (at delivery)
-  Newborn measurements at birth