

# Percentiles

for documentation of BMI,  
weight, height of boys



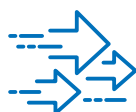
# Malnutrition in Paediatrics

Children have enhanced nutrient requirements due to their need for **growth** and **development**.



## Risk factors for malnutrition<sup>1-3</sup>

- **Inadequate oral intake** (e.g. dysphagia, altered taste, abdominal pain, nausea/vomiting, severe gastroesophageal reflux, anorexia, tumors, critical illness)
- **Disorders of digestion and absorption** (e.g. cystic fibrosis, short-bowel syndrome, inflammatory bowel diseases (IBD), disorders of GI-motility, malabsorption, enteritis, protracted diarrhoea, intestinal fistula)
- **Increased nutritional requirements and/or losses due to**
  - acute metabolic stress (e.g. surgery, multiple trauma, extensive burns, mechanical ventilation)
  - chronic diseases (e.g. renal/heart/liver disease, cystic fibrosis, IBD, cancer cachexia)



## Consequences of malnutrition<sup>4</sup>

- Higher risk of infections due to poor immune defense
- Wound healing problems
- Reduced gut function
- Longer hospital stay
- Poor growth
- Reduced or delayed mental and psychomotor development

Impaired quality of life



## Diagnosis of malnutrition

**Percentile curves and/or Z-scores (SD)** are used to evaluate the course of individual development and to assess the sufficiency of nutritional therapy in children. The 2006/2007 **WHO-growth charts** include standards for BMI-for-age, length/height-for-age and weight-for-age.

While impaired linear growth ("stunting") is indicative of **chronic malnutrition**, disorders of the weight curve ("thinness") point to **acute malnutrition**.<sup>5</sup>

|                         | WHO cut-offs for 5-19 years (2007)                                          | Corresponding percentile |
|-------------------------|-----------------------------------------------------------------------------|--------------------------|
| <b>Obesity:</b>         | BMI Z-score > +2SD*<br>→ equivalent to BMI 30 kg/m <sup>2</sup> at 19 years | ~ 97 <sup>th</sup>       |
| <b>Overweight:</b>      | BMI Z-score > +1SD<br>→ equivalent to BMI 25 kg/m <sup>2</sup> at 19 years  | ~ 85 <sup>th</sup>       |
| <b>Thinness:</b>        | BMI Z-score < -2SD                                                          | ~ 3 <sup>rd</sup>        |
| <b>Severe thinness:</b> | BMI Z-score < -3SD                                                          | < 1 <sup>st</sup>        |

\*SD - standard deviation



## Criteria for the institution of nutritional therapy<sup>2,6</sup>

- Expected **inability to consume at least 80% of calculated energy needs by mouth**
- **Children < 2 years:** Inadequate growth or weight gain for > 1 month
- **Children > 2 years:** Weight loss or no weight gain for a period of > 3 months
- **Disabled children:** Total feeding time > 4 h/day
- Decrease in height velocity: **Children < 4 years:** 0.5-1 SD/y, **Children > 4 years:** 0.25 SD/y  
From the preceding year during **early/mid puberty:** > 2 cm/y



## Target height and catch-up growth

For the evaluation of growth in children, genetic factors (e.g. parental heights) should be considered in the calculation of the **target height**.<sup>7</sup>

**Catch-up growth:** a phase of accelerated linear growth (beyond the normal rate for age/genetic disposition) following a period of impaired growth due to prolonged illness or malnutrition.<sup>8</sup>

### References:

1. Braegger C, Decsi T, Dias JA et al. A practical approach to paediatric enteral nutrition: a comment by the ESPGHAN committee on nutrition. JPN. 2010;51:110-122.
2. Axelrod D. Pediatric enteral nutrition. JPN. 2006;30:S21-S26.
3. Gibbons T, Fuchs GJ. Malnutrition: a hidden problem in hospitalized children. Clin Pediatr (Phila). 2009;48(4):356-361.
4. Joosten KFM, Hulst JM. Prevalence of malnutrition in pediatric hospital patients. Curr Opin Pediatr. 2008;20:590-595.
5. Puntis JWL. Malnutrition and growth. JPN. 2010;51:S125-S126.
6. Davis A. Indications and techniques for enteral feeds. In: Baker SS, Baker RD, Davis A, editors. Pediatric enteral nutrition. New York: Chapman and Hall, 1994: 67-94.
7. Joosten KFM, Hulst JM. Malnutrition in pediatric hospital patients: Current issues. Nutrition. 2011;27:133-137.
8. Kays SK, Hindmash PC. Catch-up growth: an overview. Pediatr Endocrinol Rev. 2006;3:365-378.

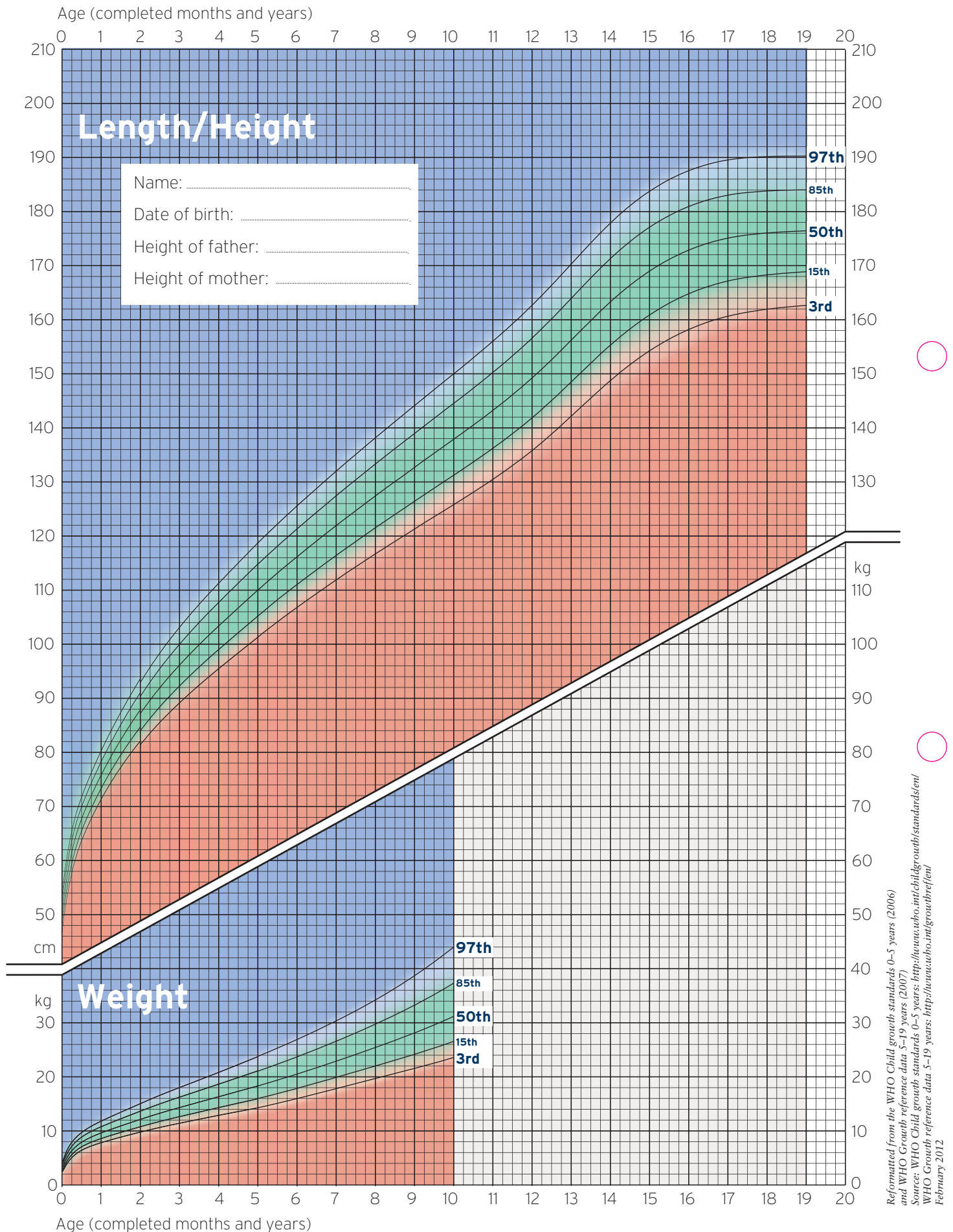


# Length/height-for-age boys

Birth to 19 years (percentiles)

## Weight-for-age BOYS

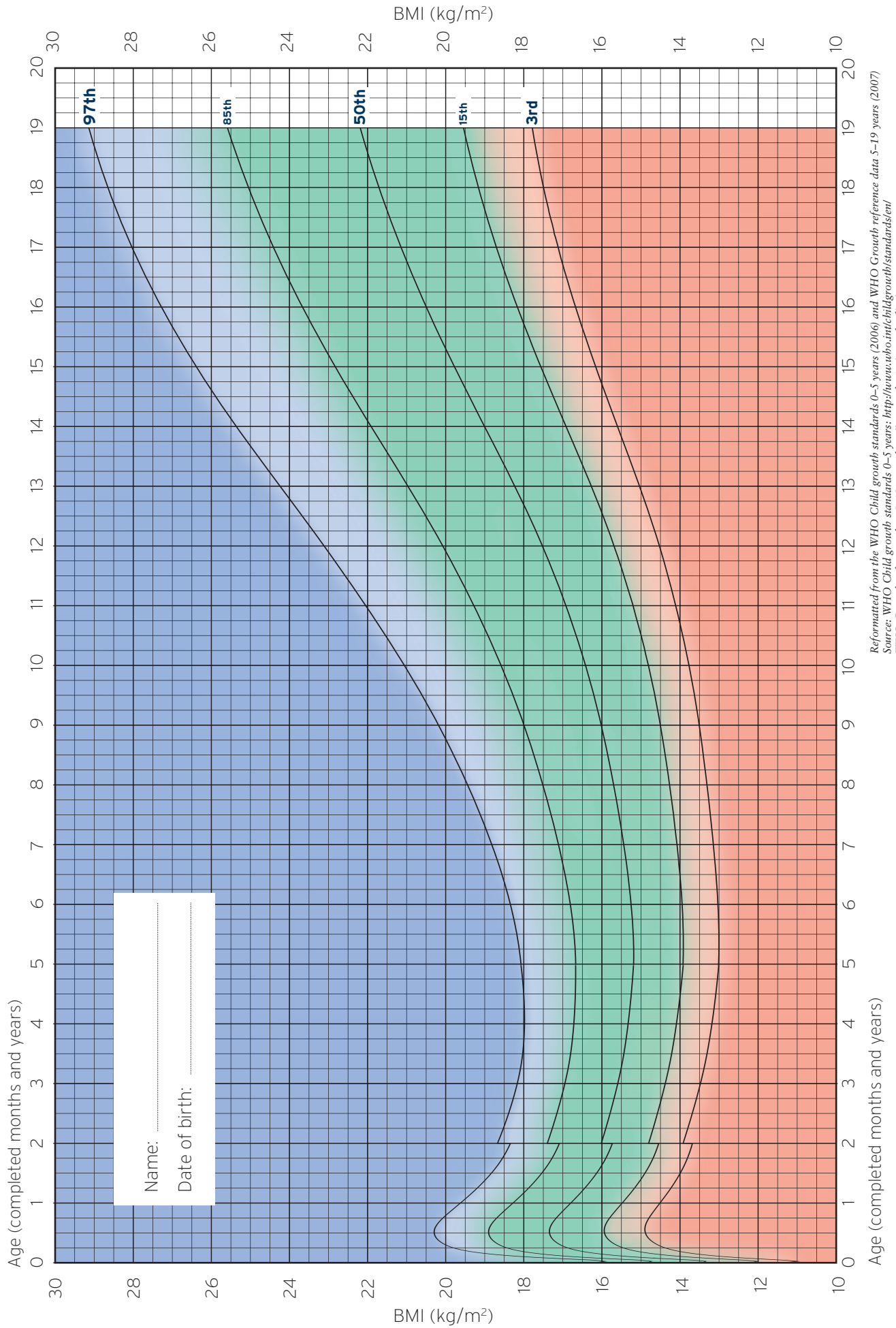
Birth to 10 years (percentiles)





# BMI-for-age boys

Birth to 19 years (percentiles)





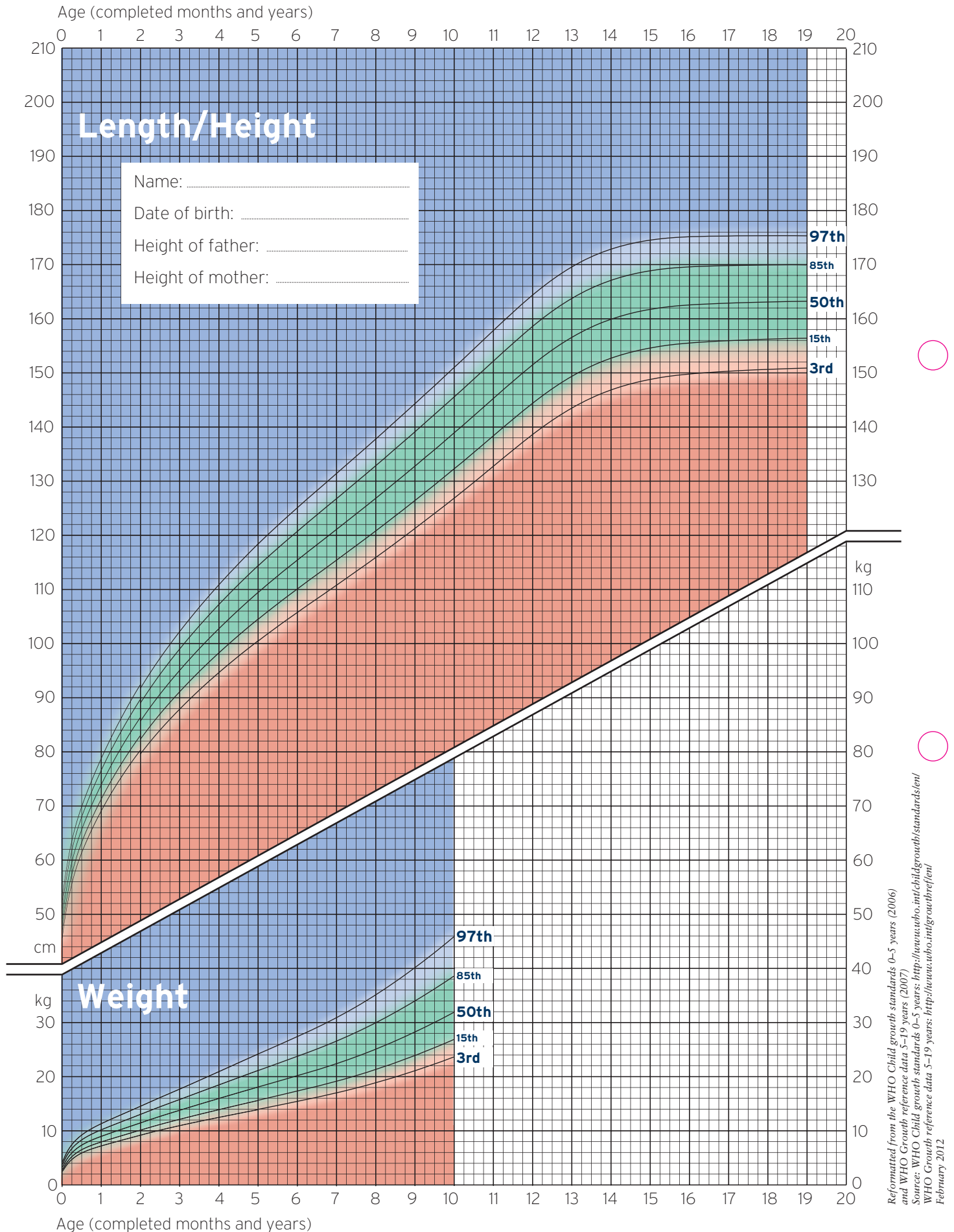


# Length/height-for-age girls

Birth to 19 years (percentiles)

## Weight-for-age GIRLS

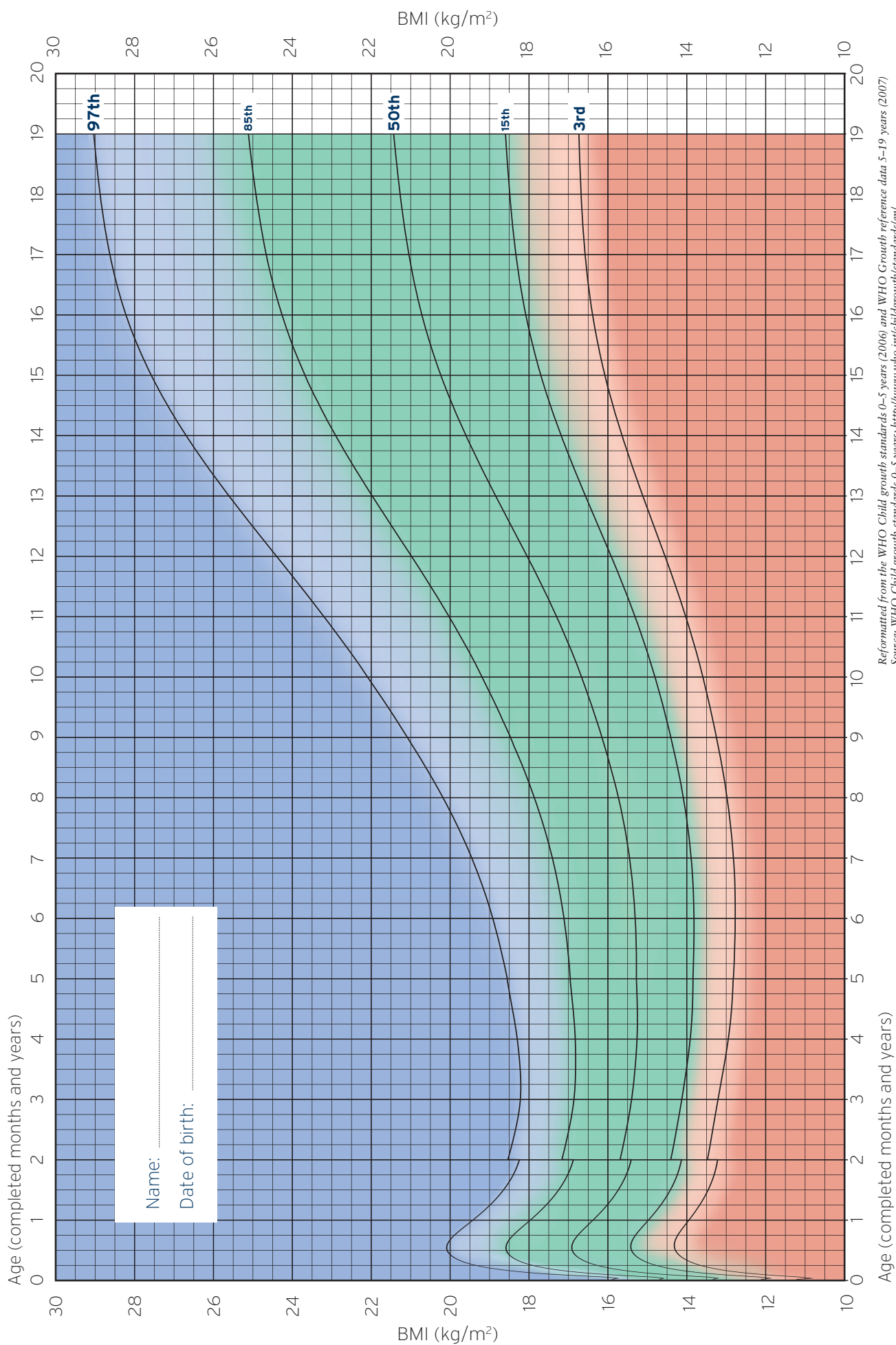
Birth to 10 years (percentiles)





# BMI-for-age girls

Birth to 19 years (percentiles)



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