

Head circumference standard affects third-trimester prediction of pathologic small head at birth

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BACKGROUND

- Accurate antenatal prediction of pathologic small head remains challenging.
- Multiple HC reference charts are used worldwide
- Their Comparative performance near delivery is uncertain



METHODS

- Retrospective study
- 57,326 US HC measurements between 28+0 and 40+0 weeks
- Five HC standards compared
- Primary analysis scans performed 0 to 6 days before delivery (n=40,684: 266 affected neonates)
- Outcome: discrimination (AUC) and positive predictive value at Z score ≤ -2

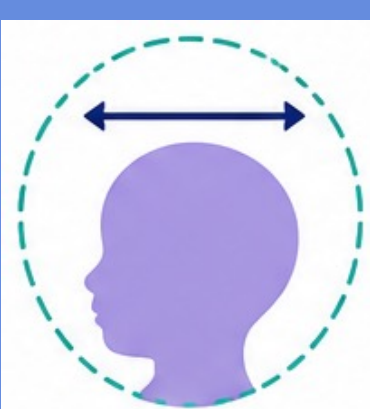
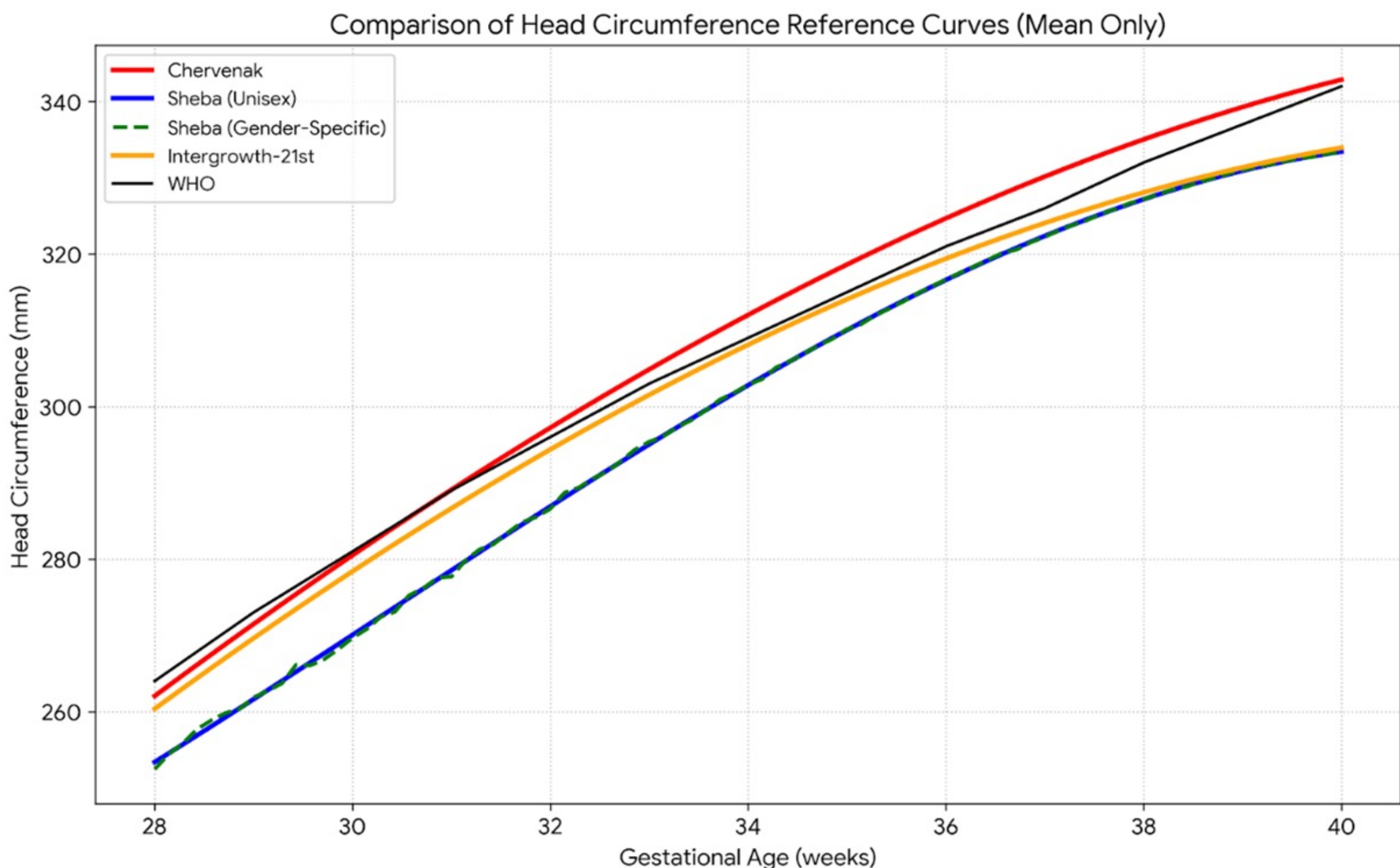


Figure 1. Comparison of Head Circumference Reference Curves — Five Standards (Scans 0-6 days Before Delivery; n=40,684)



Model	28-32 weeks	32-36 weeks	36-40 weeks	Entire Cohort (28-40)
Sheba (gender)	10.0	3.3	11.2	9.5
Sheba (Unisex)	9.4	4.1	12.8	11.3
INTERGROWTH-21st	2.2	3.4	13.8	8.7
WHO	1.8	3.6	8.7	6.8
Chervenak (legacy)	7.6	3.7	11.6	10.0



KEY FINDINGS

- Chervenak over-classifies suspected microcephaly by ~20% (10–15 mm upward HC shift vs. study population).
- INTERGROWTH-21st shows the best discrimination — AUC 0.882 vs. 0.875 for Sheba unisex (p = 0.00025).
- Sheba unisex model has the highest PPV — 7.17% overall, 7.53% at 34–40 weeks.



CONCLUSIONS

HC standards are not equivalent

INTERGROWTH-21st showed the best discrimination

The Sheba unisex model achieved the highest PPV at -2 SD