

High prevalence of low Hb among Indonesian infants aged 3-5 mo is related to maternal anemia

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High prevalence of anemia among infants 6-24 of age in developing countries

What about infants younger than 6 mo?



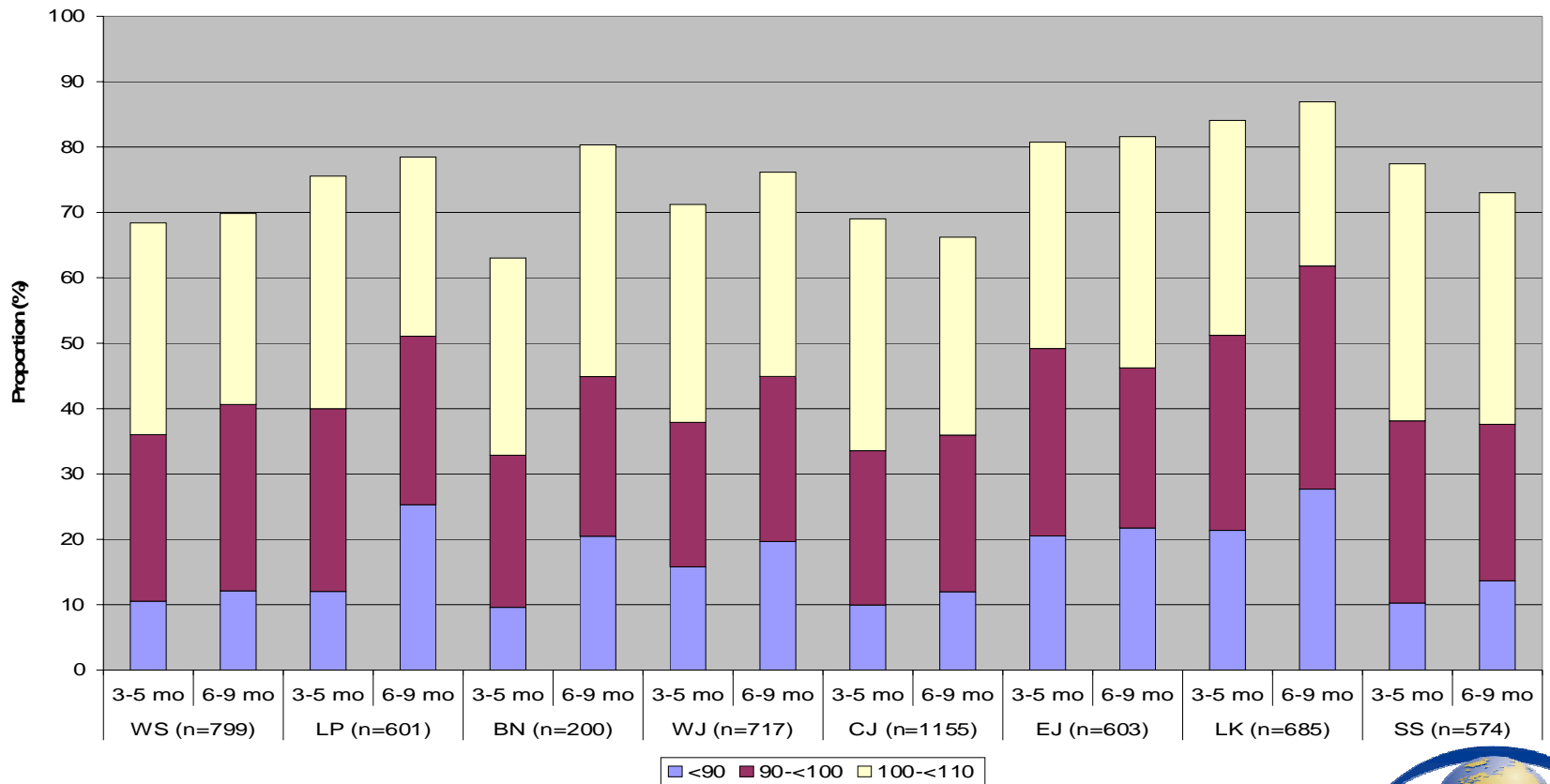
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Infants <6 mo old

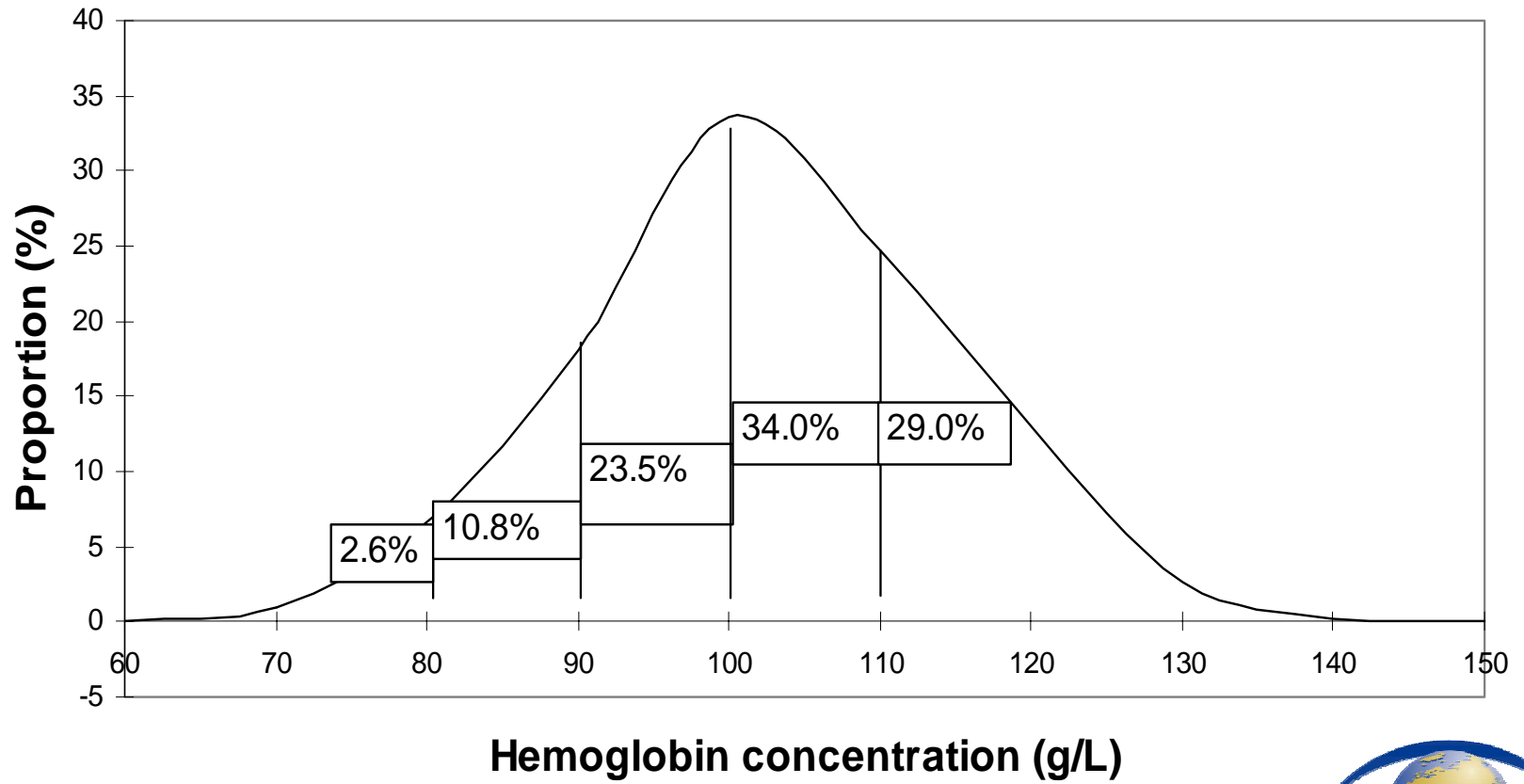
- Different cut-offs used for infants aged 0-5 mo
- Till 6-10 wk of age 'physiological anemia of the newborn', thus Hb does not reflect iron stores
- 'Given the current data it is hard to see why it is recommended that full-term, breastfed infants receive supplemental iron before six months' (Baumslag, 1992)
- *But, if prevalence of anemia is already high at 6 mo of age, does it not exist earlier, and if so why?*



Low Hb among 3-9 mo old infants in rural Indonesia, Jun 01 – May 02 (n=5334)



Hb of infants 3-5 mo old on Java, Indonesia, Sept '99 – Feb '01 (n=990, NSS HKI/GOI data)



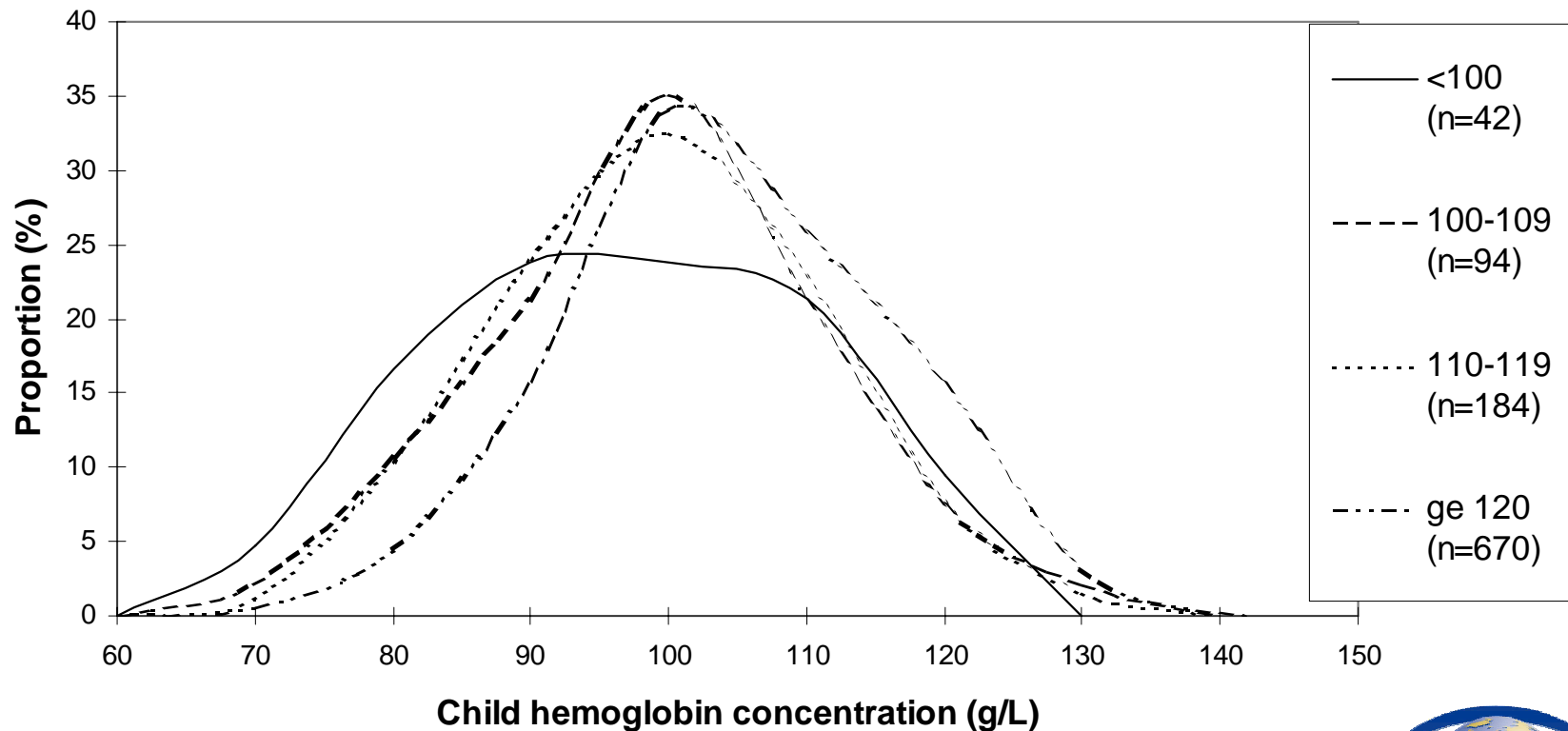
Questions:

- What is cut-off for anemia in this group?
 - 100 g/L seems most reasonable
 - 37% has Hb<100 g/L
- However, could this still be physiological? If so, older infants in this population would have less anemia.
 - They have more anemia: 44-48% with Hb<100 g/L



Questions: What is the anemia among the infants related to?

Maternal Hb?



Some factors associated with low Hb of 3-5 mo old children (n=990)

MHb and birthwt	Hb<100 g/L (%)	OR	95% CI
>=120 g/L and >2500 g	31.7 (n=622)	1.00	
>=120 g/L and <=2500 g	37.5 (n=48)	1.15	0.61-2.16
<120 g/L and >2500 g	45.3 (n=289)	1.81	1.34-2.43
<120 g/L and <=2500 g	64.5 (n=31)	3.68	1.69-8.01



Factors that were also found to be related

- Age and breastfeeding status (exclusive yes/no), inconclusive results
- Child stunting
- Maternal age <20 y
- Maternal education (SES)
- Province (SES)



Does Hb of mother 3-5 mo postpartum reflect her Hb during pregnancy?

- Most likely yes, during first few months postpartum maternal Hb returns to prepregnancy values (*Yip 1994, Allen 1997*)
- Mothers that were anemic during pregnancy had not fully recovered iron stores at 6 mo postpartum (*Kilbride 1999 and NSS data*)

Thus, mothers with low Hb 3-5 mo after pregnancy were more likely to have had low Hb during pregnancy, and that is, in this population, largely due to iron deficiency (Soeharno 1992, Kodyat 1998)



Other evidence that normal birth weight babies born to anemic mothers have accumulated less iron reserves

- 6-12 mo old infants born to anemic mothers have lower Hb (*Strauss 1993, Colomer 1990, Kilbride 1999*)
- 6-12 mo old infants iron stores are related to maternal iron stores (*Morton 1998*)
- Iron supplementation in pregnancy increased iron stores of infants at 3 and 6 mo of age (*Preziosi 1997*)
- Fetal iron stores linearly related to maternal Hb (*Ahamad 1993*)



Other characteristics that could be related to high prevalence of anemia (n=990)

Characteristic	Proportion	Comment
Exclusively breastfed	(%)	Introduction of solids reduces absorption of iron from breastmilk. But, extent unknown
3 mo (n=310)	29.4	
4 mo (n=355)	14.2	
5 mo (n=335)	7.5	
Mother's receipt of iron pills during pregnancy	88	Approx 50-60 pills, compliance?
Mother received VAC after delivery	17	VAD contributes to anemia among mothers



Conclusions

- Many infants have a too low Hb well before the age of 6 months
- We hypothesize that this is largely due to iron deficiency, as particularly indicated by the increased risk of a low Hb among infants of anemic mothers
- Other potentially contributing factors include:
 - Early introduction of solid foods (ID, morbidity)
 - VAD
 - Practices for clamping of umbilical cord??? (ID)



Recommendation

- Conduct iron, or multimicronutrient, supplementation studies among young infants (<6 mo) in populations with a high prevalence of iron deficiency to test the hypothesis that many of these infants suffer from iron deficiency anemia before the age of 6 mo