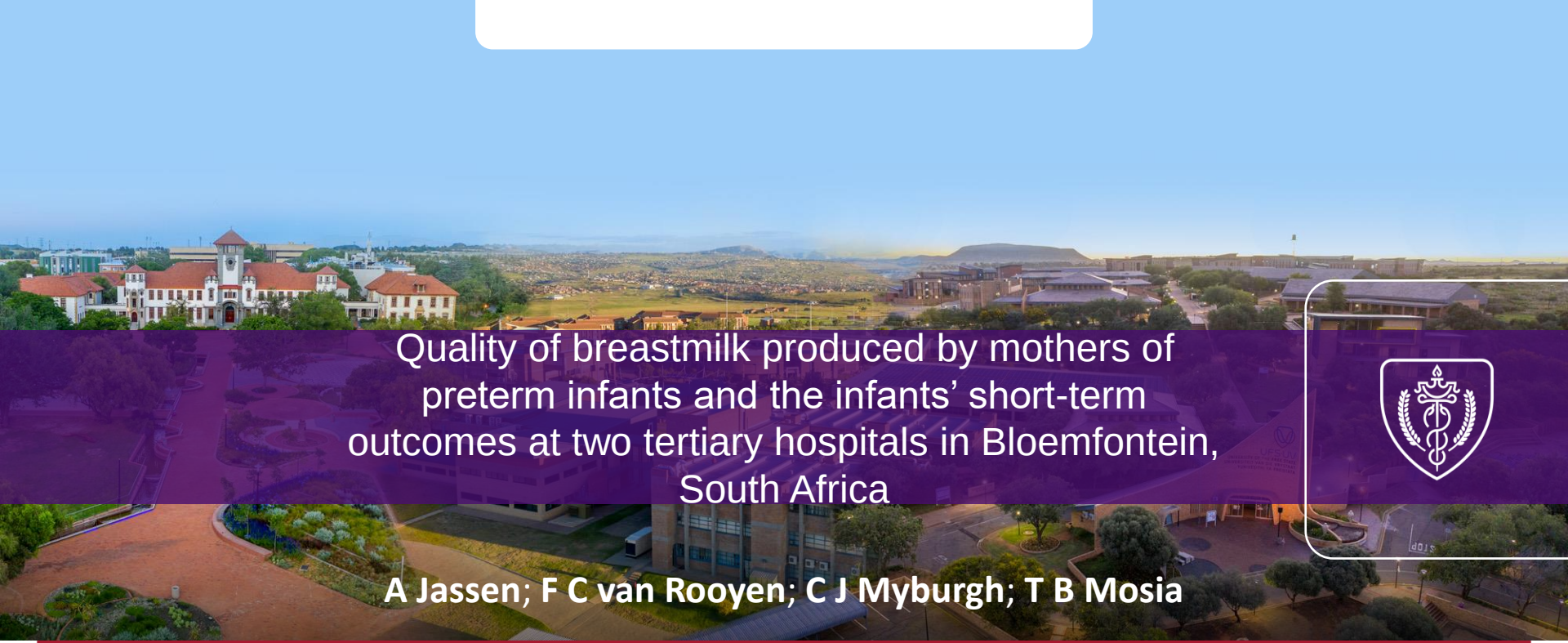
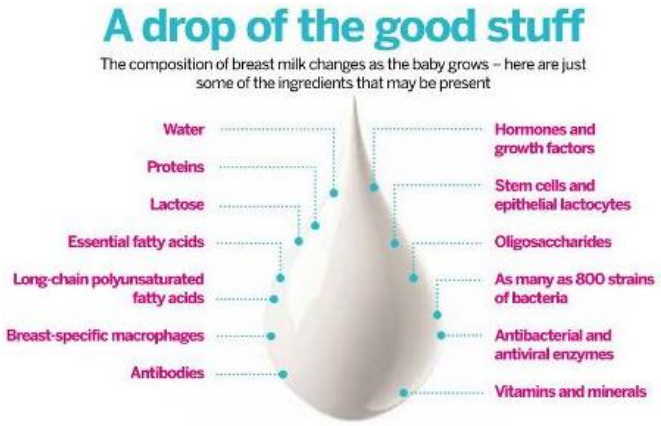


Quality of breastmilk produced by mothers of preterm infants and the infants' short-term outcomes at two tertiary hospitals in Bloemfontein, South Africa

A Jassen; F C van Rooyen; C J Myburgh; T B Mosia

Background



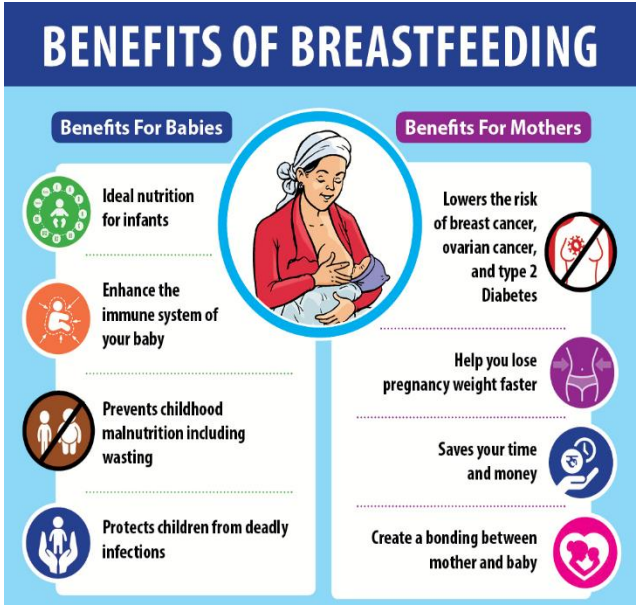
Human milk = gold standard for neonatal nutrition

Very low-birthweight (VLBW) infants have higher nutritional demands

Human milk alone may not meet preterm requirements

Growth is critical for long-term neurodevelopment & health

Challenges in LMICs



Nutritional quality of human milk influenced by:

- Stage of lactation
- Type (mother's own vs donor)
- Maternal diet

LMICs: deficiencies in protein, energy, and minerals reported

Poverty contributes to maternal undernutrition

Global and Local Context

SDG 2: End hunger, ensure nutrition for women & children

South African **BANC-Plus guidelines (2017):** MUAC & BMI for antenatal nutrition assessment

Current fortification practices: based on high-income country standards → not always applicable in LMICs

Study Objectives

Assess	Assess breastmilk composition in mothers of preterm infants (<1 500 g)
Focus on	Protein, Triglycerides, Calcium, Energy
Evaluate	Evaluate maternal nutritional status & implications for fortification

Methods

Prospective descriptive study

Setting: 2 tertiary hospitals, Bloemfontein

Sample: Mothers of infants <1 500 g

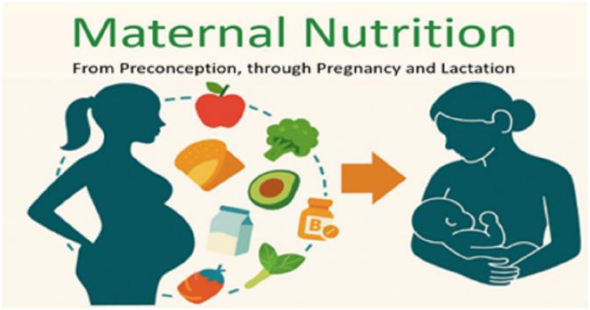
Milk samples:

- Collected on days 2–3 (week 1) & days 12–14 (week 2)
- Hindmilk (2–3 mL)

Analysis: Roche Cobas system, calorimetric & enzymatic methods

Growth: Fenton chart plotting

Results (Maternal Status)



82 mothers enrolled → 70 included in paired analysis

17% undernourished (MUAC <23 cm)

79% attended antenatal care → but **no supplementation provided**

Gaps in antenatal nutrition support

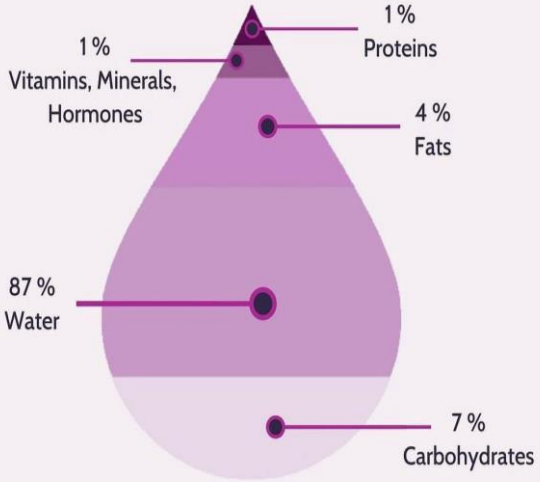
Results (Infant Growth)

Mean weight gain: **507.5 g over 38 days**

Weight gain velocity: **13.4 g/day** ($p<0.001$; $\chi 2$ test))

Days of life full feeds achieved, 9 (7 – 12)

Results (Breastmilk Composition)



Week 1 vs Week 2:

↓ Protein ($p<0.001$)

↓ Energy ($p<0.001$)

↑ Calcium ($p=0.002$)

Triglycerides: no significant change

Discussion

- Protein & energy decline in early lactation (consistent with ESPGHAN & previous studies)
- Triglycerides tend to rise over time
- Calcium trend inconsistent with literature → local maternal nutrition may influence
- Maternal undernutrition did not directly affect milk composition

Clinical Implications

- Early decline in protein & energy makes fortification essential
- Bovine-derived fortifiers at **100–150 mL/kg/day** → effective in weight gain
- Extra protein (~1 g/kg/day) significantly improves outcomes
- Fortification crucial for achieving recommended growth targets (15–20 mg/kg/day)

Study limitations

- The BMI/MUAC of the lactating mothers was used as a proxy to determine maternal nutritional status.
- The NHLS does not routinely test human milk, so the machine must be standardised.
- The carbohydrate level of human milk was not included in the study.

Recommendations

Food supplementation for mothers during the antenatal and lactating periods to optimise their nutritional status, especially those who are underweight.

Early antenatal booking, with iron, folic acid and calcium supplementation started as soon as possible, early evaluation to detect inadequate nutrition, and timeous referral to the dietician for intervention.

Promote exclusive breastfeeding practices to pregnant women and support them in achieving these, because of the benefits and cost effectiveness of human milk.

Implement strategies to sustain human milk volume, especially promoting kangaroo mother care/skin-to-skin practices that improve milk production and assist bonding between mother and infant.

Fortification of human milk to meet requirements by improving protein and energy composition to improve growth outcomes of preterm and VLBW infants could decrease hospital stays.

Standardisation of a nutrition protocol for premature infants in our setting would assist in reducing costs and supporting low income mothers.

A longitudinal meta-analysis in our setting would contribute to the minimal studies available in LMICs.

Conclusion

Human milk remains optimal but insufficient alone for VLBW infants

Tailored **nutritional interventions** (antenatal + postnatal) are required

Urgent need to:

- Strengthen antenatal supplementation
- Adapt fortification guidelines for LMIC settings
- Support maternal nutrition to improve neonatal outcomes

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