

BMJ Open Reassessing mid-upper arm circumference thresholds for predicting nutritional status and pregnancy outcomes among pregnant adolescents in Bundibugyo District, Uganda: protocol for a health facility-based prospective cohort study

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ABSTRACT

Introduction In 2023, Sub-Saharan Africa recorded the world's highest teenage pregnancy rate of 4.4 per 1000 women compared with the global average of 1.5 per 1000, highlighting the need for accurate nutritional assessment during pregnancy. Current mid-upper arm circumference (MUAC) thresholds differ between non-pregnant adolescents (18.5 cm) and pregnant adolescents (23 cm) as per the Uganda Integrated Management of Acute Malnutrition guidelines. This classification can lead to inadequate treatment and mislabelling of adolescents as non-responders, despite nutritional improvements. This study will reassess MUAC thresholds for predicting nutritional status and pregnancy outcomes among pregnant adolescents in Bundibugyo District, Uganda.

Methods and analysis This health facility-based prospective cohort study will target 241 pregnant women comprising 121 pregnant adolescents (10–19 years) and 120 adults (20–49 years) in their first trimester (≤ 12 weeks of gestation) receiving antenatal care (ANC) at Bundibugyo General Hospital and Bupomboli Health Centre III in Bundibugyo District, Uganda. Recruitment of study participants will commence in June 2026 and participants will be followed up for 6–9 months during routine ANC visits until delivery. Quantitative data will be collected through questionnaires and from patients' hospital records during routine ANC visits. The study primary outcomes are maternal gestational weight gain and maternal haemoglobin status. Secondary outcomes include pregnancy outcomes (birth weight, gestational age at delivery, preterm birth, small for gestational age status, maternal pregnancy complications and mode of delivery). The main explanatory variable is MUAC assessed as baseline MUAC, repeated MUAC measurements during subsequent ANC visits and the rate of MUAC change across gestation. Receiver operating characteristic analyses and internal bootstrap validation will be used to derive and internally evaluate study-derived adolescent-specific MUAC thresholds. Qualitative data from 10 to

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The health facility-based prospective cohort design enables repeated measurements of mid-upper arm circumference (MUAC), gestational weight gain and pregnancy outcomes from early pregnancy until delivery.
- ⇒ The study adopts a mixed-methods approach, integrating quantitative cohort data with qualitative key informant interviews to enable triangulation and provide both statistical evidence and contextual insights on MUAC use and implementation.
- ⇒ The use of standardised anthropometric measurements and extraction of clinical data from routine antenatal care (ANC) records are expected to improve the consistency and quality of longitudinal data collection.
- ⇒ Loss to follow-up may occur as some participants could miss antenatal visits or drop out during the 6–9-month follow-up period, potentially reducing sample size and introducing bias if those lost differ from those who remain in the study.
- ⇒ The study is limited to two health facilities, potentially excluding adolescents who do not attend ANC, which may limit generalisability of the findings.

12 key informants will be obtained once through key informant interviews and triangulated with the quantitative findings to explain and contextualise the results.

Ethics and dissemination Kyambogo University Research Ethics Committee (KyU-REC-2025-43) and the Uganda National Council for Science and Technology (HS7233ES) have approved this study protocol. Local administrative clearance has been sought from the Bundibugyo District Health Office and from Bundibugyo General Hospital and Bupomboli Health Centre III. Results will be published in peer-reviewed journals and summaries