Measurement of the continuum of essential maternal and neonatal care in high-mortality settings: lessons learnt from an observational study in rural Guinea-Bissau

Research Brief

Key messages

- Despite integrated, high-quality care throughout the pregnancy, childbirth, and early postnatal period being instrumental to improve maternal and perinatal survival, there is little focus on measuring continuum-of-care attainment.
- This is reflected by global health metrics focussing on the attainment of individual maternal and neonatal services rather than service integration, and a lack of conceptional clarity and international consensus on how to measure continuum-of-care attainment.
- Grounded in a review of literature including current care recommendations of the World Health Organization, we propose measuring continuum-of-care attainment of essential maternal and neonatal services based on the following indicators:
  - four or more antenatal care contacts,
  - facility-based childbirth, and
  - the first postnatal care contact within 24 hours after birth.
- We applied our proposed indicator in a cross-sectional study in rural Guinea-Bissau. Here, we assessed continuum-of-care attainment and associated background factors among 2,258 pregnancies followed through regular home visits by the nationally representative rural health and demographic surveillance system of the Bandim Health Project.
- In the study, we found an important methodological caveat: longer maternal recall time was statistically significantly associated with higher reported continuum-of-care attainment (p=0.002): women interviewed within 1-month postpartum reported continuum-of-care completion at 28%, women interviewed between 6-12-months postpartum at 46%.
- Hence, the timing of inquiring information on care attainment in household interviews seems critical: we believe that the sooner the data is collected, the more reliable it is. This warrants caution in interpreting care attainment information from household surveys, which usually employ recall times of up to 2 years. More research is needed to uncover the root causes of this association and fully understand its implications.

Background

Continuous, high-quality care throughout the pregnancy, childbirth, and early postnatal period is deemed essential for improving health outcomes and reducing mortality of mothers and newborns.[1-4] However, in high-mortality settings, the proportion of women and newborns attaining a continuum of pregnancy, birthing, and postnatal care is critically low.[5,6] At the same time, there is a lack of consensus on how to measure continuum-of-care attainment, and related routine monitoring is neglected. This is reflected by global health

metrics focussing on the coverage of individual maternal and neonatal services rather than the broader continuum of care, leaving significant gaps in the tracking of continuum-of-care attainment.

Grounded in a review of literature including current care recommendations of the World Health Organization (WHO), we propose here an operationalisation of how to measure continuum-of-care attainment of essential maternal and neonatal services. Furthermore, we describe the key methodological lessons learnt from applying our proposed indicator in an observational study in rural Guinea-Bissau.

Defining continuum-of-care attainment and operationalising its measurement

To gain an overview of existing approaches to measuring the attainment of the continuum of maternal and neonatal care, we reviewed a total of 17 related studies from the past 10 years from sub-Saharan Africa.[i] All reviewed studies had in common that they defined the continuum of care based on service attainment across three timepoints:[5-21]

- during the pregnancy,
- intrapartum, and
- in the early postpartum period.

However, we found substantial interstudy differences in how continuum-of-care measurement was operationalised (Figure 1): For care during the pregnancy, the studies commonly considered four or more ANC contacts (ANC4),[5-20] but one study also employed any antenatal care (ANC) contact (ANC1) in an alternative operationalisation,[6] while another study considered timeliness of ANC attainment in addition to ANC4.[19] One study considered eight or more ANC contacts (ANC8).[21] For intrapartum care, some studies considered skilled birth attendance (SBA),[5,9,10,13-15,17,18,20] others facility-based childbirth.[6-8,11,12,16,19,21] For care during the early postpartum period, we found the biggest variations: one study considered the first postnatal care (PNC) contact within 24 hours after birth,[21] more studies considered the first PNC contact within the first two days after birth,[6,9,13,14,16,19] others within six weeks after birth[5,7,11,15,17,18] or six weeks after discharge from the place of birth.[12] Meanwhile, two studies considered three or more PNC contacts at defined timepoints after birth (two days, one week and six weeks[10] vs. two days, two weeks and six weeks[20]) (Figure 1).[ii]

Comparing the employed measurements with the current WHO recommendations for ANC,[22] intrapartum care,[23] and PNC provision,[24,25] we found substantial deviations, especially for ANC and PNC.

For ANC, since 2016, WHO has been recommending ANC8 to ensure close pregnancy monitoring and reduce the risk of complications such as miscarriages and perinatal deaths. Thereby, the ANC8 model has replaced the previously recommended ANC4 model. However, ANC8 coverage remains critically low in high-mortality settings. Across the 54 Countdown to 2030 Initiative's priority countries, ANC8 coverage was recently estimated at 11%,[26] which is hampering a meaningful assessment of continuum-of-care attainment based on ANC8.

For PNC, WHO recommends the first care contact within 24 hours after birth regardless of the place of birth.[24,25] However, household surveys – the primary data source for service coverage in the absence of reliable routine administrative data in low- and middle-income settings – often record the timing of PNC contacts in terms of days rather than hours.[27] While this limits the accurate

classification of the contacts using the 24-hour cut-off to date, we believe that this can be addressed by (i) probing more in-depth on the timing of the first PNC contact during household interviews, or (ii) resorting to routine data, if available and reliable.

Meanwhile, WHO recommendations highlight the importance of SBA,[23] which is most commonly implemented through facility-based childbirth models in low- and middle-income settings.

Based on our literature review, we therefore propose measuring continuum-of-care completion based on the following indicators (Figure 1):

- ANC4,
- facility-based childbirth (or SBA in settings where skilled intrapartum care is also provided outside of health facilities), and
- the first PNC contact within 24 hours after birth.

We also recommend replacing ANC4 with ANC8 as the antenatal care indicator as soon as higher coverage of more ANC contacts is achieved across high-mortality settings.

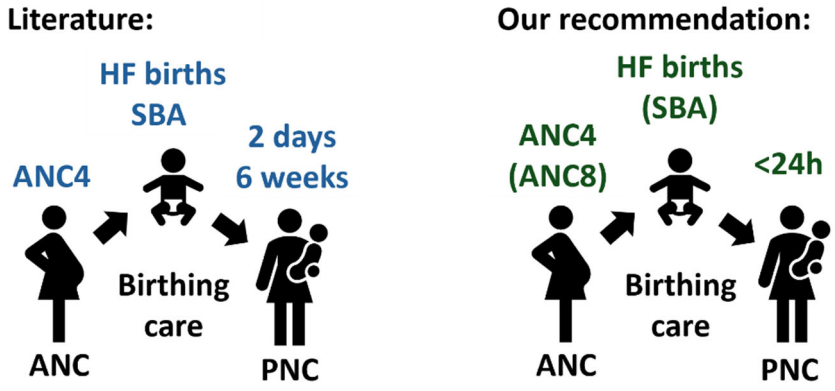

Figure 1: Most common approaches to measuring the attainment of the continuum of maternal and neonatal care identified in the literature (left) and our recommendation (right) based on a review of the current care guidelines of the World Health Organization and limitations to their employment. ANC4/8: four/eight or more antenatal care contacts; HF births: facility-based childbirth; SBA: skilled birth attendance; PNC: postnatal care contact.

Lessons learnt from the application of the continuum-of-care-attainment indicator

We applied our proposed indicator in our recent cross-sectional study using individual-level longitudinal data from the nationally representative rural health and demographic surveillance system (HDSS) of the Bandim Health Project (BHP) in Guinea-Bissau.[28] Through this system, we continuously monitor the uptake of maternal and child health services, survival and sociodemographic background factors in an open cohort of >50,000 women of reproductive age and children below 5 years of age in a random sample of 182 village clusters across all Bissau-Guinean regions with the exception of the capital region.[29]

Among HDSS-registered births between 1 February 2023 and 31 January 2024 (n=2,258), we assessed the proportion of women who attained the continuum of care of ANC4, facility-based childbirth, and the first PNC contact within 24

hours. We furthermore assessed the attainment of all contributing services and of ANC1 and ANC8, and among women who gave birth at a health facility, postpartum admission of at least 24 hours. We also assessed associations between care attainment and household wealth, maternal schooling and age, parity, region and ethnicity, distance to the nearest health facility, and recall time.[28]

While we found that 35% of the assessed births (n=798) completed the continuum of care, 22% (n=494) attained none of the contributing services (Figure 2). The coverage of the individual services included in the continuum-of-care assessment was much higher: at 62% (n=1,403) for ANC4, 56% (n=1,268) for facility-based childbirth, and 52% (n=1,167) for PNC (Figure 3), thereby underscoring the need for continuum-of-care measurement. Further, we found higher household wealth and maternal education, low parity, region and ethnicity, living near a health facility, and longer recall time associated with higher continuum-of-care completion.[28]

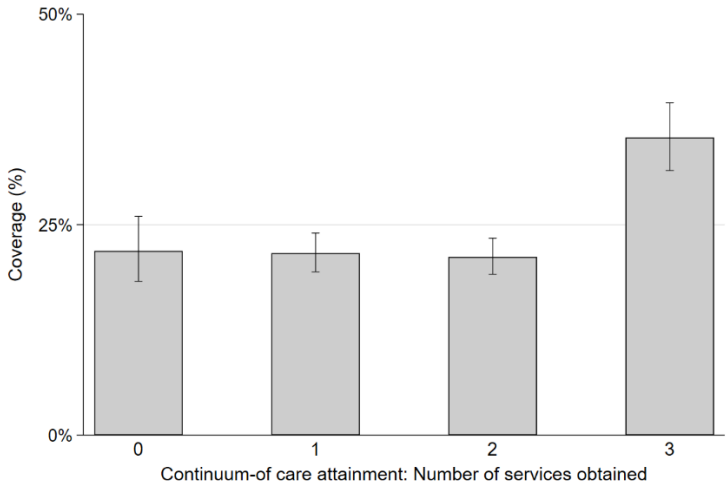

Figure 2: Attainment of the continuum of care of at least four antenatal care visits, facility-based childbirth, and the first postnatal care contact within 24 hours postpartum.

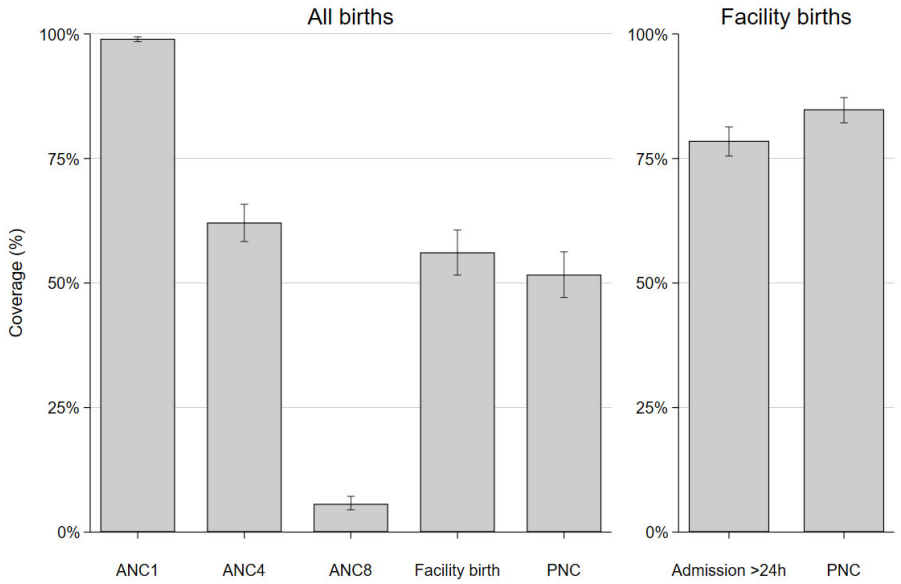

Figure 3: Coverage of at least one/four/eight antenatal care visits (ANC1/ANC4/ANC8), facility births (HF births, and postnatal care (PNC) among all registered pregnancies (left); coverage of postpartum admission and PNC among HF births (right).[28]

While the associations between care attainment and household wealth,[6,14,17] maternal education, [5-7,14] parity,[6] region of residence[6,7,14,17] (which is highly correlated with ethnicity in Guinea-Bissau), and (perceived) distance to the health facility[5,17] are well documented in the literature, previous studies have focussed less on recall time. In our literature review, we have not identified any study reporting on associations between recall time and continuum-of-care attainment. Yet, our results indicate that this is critical: The reported continuum-of-care attainment increased from 28% (173/620) for a maternal recall of less than 1 month, over 34% (326/945) for ≥1-3 months to 43% (253/592) for ≥3-6 months, and 46% (46/101) for ≥6-12 months (p=0.002) (Figure 4). Here, we believe that estimates based on a short recall period are more reliable, as:

- they are likely less affected by recall bias, and
- the temporal proximity to the event in question may mitigate the risk of women providing socially desirable answers, especially in situations where other household members are present during the inquiry.

The current lack of attention to recall time and how it influences reported care attainment is highly problematic. This is because large-scale household surveys such as Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) – the key sources for service attainment estimates in low- and middle-income settings – usually employ recall times of up to two years.[30,31] Hence, our findings call for measuring both continuum-of-care attainment and the attainment of individual maternal and child health services based on more timely routine data.

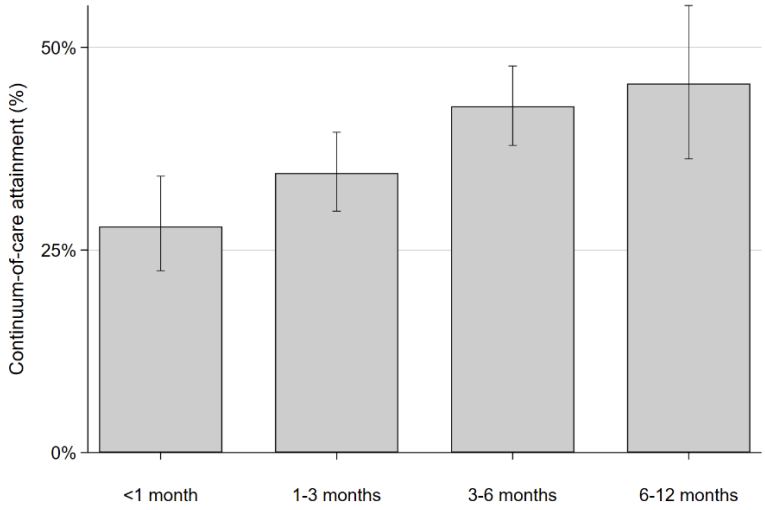

Figure 4: Reported attainment of the continuum of care of at least four antenatal care visits, facility-based childbirth, and the first postnatal care contact within 24 hours postpartum by recall time.[28]

Key recommendations

- While we propose measuring continuum-of-care attainment of essential maternal and neonatal services based on ANC4, facility-based childbirth, and the first PNC contact within 24 hours after birth, we recommend taking the following considerations into account:
    - in settings where skilled intrapartum care is also provided outside of health facilities, SBA may be more informative than facility-based childbirth and SBA should then substitute facility-based childbirth;
    - ANC4 should be replaced by ANC8 as soon as ANC8 coverage is high enough to allow informative continuum-of-care-attainment assessments across high-mortality settings.
- The identified association between longer maternal recall time and higher reporting of continuum-of-care attainment requires further in-depth research to uncover underlying determinants and implications.
- Meanwhile, the association questions the employment of data from routine surveys in continuum-of-care assessments and beckons for monitoring based on timely routine data.

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[i] We here reviewed studies focusing on the attainment of maternal and neonatal care and thereby disregarded studies including services provided beyond the neonatal period.
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