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Analysis of Anemia Screening Policy Implementation for Pregnant Women in Tier I Healthcare Facilities: A Mixed-Methods Study in Urban-Rural Areas of South Tapanuli

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ABSTRACT

Background: Anemia in pregnant women remains a significant public health issue in Indonesia, including in South Tapanuli. Anemia screening is a crucial policy for early detection and timely intervention, yet its implementation in primary healthcare facilities (Tier I) remains suboptimal. **Objective**: This study aims to analyze the implementation of anemia screening policies for pregnant women in Tier I healthcare facilities across urban-rural areas of South Tapanuli using a mixed-methods approach. **Methods**: The study employed a sequential explanatory mixed-methods design, combining quantitative data (a survey of 150 pregnant women and 30 healthcare workers) and qualitative data (in-depth interviews with 15 stakeholders, including health workers and policymakers). Quantitative data were analyzed using descriptive statistics, while qualitative data were examined using framework analysis. **Results**: Quantitatively, anemia screening coverage reached 68%, with disparities between urban (78%) and rural (58%) areas. Barriers included limited equipment, insufficient healthcare worker training, and low public awareness. Qualitative findings revealed issues in inter-stakeholder coordination, uneven budget allocation, and inadequate policy socialization. **Conclusion**: The implementation of anemia screening policies in South Tapanuli remains suboptimal, particularly in rural areas. Improvements in infrastructure, healthcare worker training, and culturally adapted community education are needed to enhance screening coverage.

Keywords: Anemia screening, pregnant women, policy implementation, Tier I healthcare facilities, mixed-methods.

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1. INTRODUCTION

Anemia in pregnant women is a major public health concern globally, particularly in low- and middle-income countries (LMICs), where it contributes to adverse maternal and neonatal outcomes, including preterm birth, low birth weight, and maternal mortality (WHO, 2022). In Indonesia, the prevalence of anemia among pregnant women remains high, with national estimates ranging from 37% to 48% (Ministry of Health Indonesia, 2021). Despite government efforts to implement mandatory anemia screening in antenatal care (ANC), disparities in policy execution persist, particularly in rural and underserved regions (Sutanto et al., 2020).

South Tapanuli, a region with both urban and rural characteristics, exemplifies these challenges. While Tier I healthcare facilities (puskesmas and posyandu) are the frontline providers of maternal health services, their capacity to conduct consistent anemia screening is often hindered by resource constraints, workforce shortages, and logistical barriers (Dinas Kesehatan Tapanuli Selatan, 2023). Previous studies in similar settings have highlighted gaps in policy implementation, including inadequate training for healthcare workers, insufficient diagnostic tools, and low community awareness (Rahman et al., 2019;

Agustina et al., 2021). However, few studies have employed a mixed-methods approach to comprehensively assess these barriers in urban-rural contexts.

This study aims to fill that gap by evaluating the implementation of anemia screening policies for pregnant women in Tier I healthcare facilities across South Tapanuli. By integrating quantitative data on screening coverage with qualitative insights from healthcare providers and policymakers, this research seeks to identify systemic bottlenecks and propose context-specific solutions. The findings will contribute to evidence-based strategies for improving maternal health services in similar LMIC settings.

Anemia during pregnancy remains a persistent global health challenge, with the World Health Organization (WHO) estimating that 40% of pregnant women worldwide are anemic, rising to over 50% in developing countries (WHO, 2022). In Indonesia, the situation mirrors this global trend, where anemia affects approximately 48% of pregnant women, making it one of the most common complications of pregnancy (Kementerian Kesehatan RI, 2021). This condition significantly elevates risks for both mother and child, including postpartum hemorrhage, fetal growth restriction, and cognitive impairments in children (Rahman et al., 2019). Despite being preventable and treatable, anemia continues to contribute substantially to Indonesia's maternal mortality ratio of 177 deaths per 100,000 live births (Kemenkes RI, 2022).

The Indonesian government has implemented various policies to address this issue, including the mandatory anemia screening program for pregnant women as part of standard antenatal care (ANC) services (Peraturan Menteri Kesehatan No. 21 Tahun 2021). However, implementation remains inconsistent across regions, particularly in resource-limited settings like South Tapanuli, where geographical challenges and healthcare disparities between urban and rural areas create significant barriers (Dinkes Tapsel, 2023). Studies have shown that while urban primary healthcare facilities (puskesmas) achieve approximately 75% screening coverage, rural counterparts often fall below 50% (Agustina et al., 2021). This urban-rural gap reflects broader systemic issues in Indonesia's decentralized healthcare system, where regional capacity and resource allocation vary considerably (Mahendradhata et al., 2017).

Several studies have examined anemia screening implementation in Indonesia, but most have focused either on quantitative coverage metrics or qualitative assessments of single settings (Sutanto et al., 2020; Andriani et al., 2022). There remains a critical knowledge gap regarding how policy implementation varies across different healthcare system tiers and geographical contexts within the same region. Furthermore, few studies have comprehensively examined the interplay between supply-side factors (healthcare resources), demand-side factors (community awareness), and policy design factors that collectively influence screening effectiveness (Peters et al., 2023).

This study employs a mixed-methods approach to bridge these gaps by analyzing anemia screening implementation in Tier I healthcare facilities across urban and rural South Tapanuli. By combining quantitative assessment of screening coverage with qualitative exploration of stakeholder perspectives, the research aims to: (1) document current implementation status, (2) identify key barriers and facilitators, and (3) propose context-specific recommendations for improving policy effectiveness. The findings will contribute to Indonesia's efforts to achieve Sustainable Development Goal targets for maternal health and provide insights for similar settings in other LMICs.

2. METHOD

Study Design

This study employed a sequential explanatory mixed-methods design (Creswell & Plano Clark, 2018), combining:

1. Quantitative phase: Cross-sectional survey assessing anemia screening coverage
2. Qualitative phase: Exploratory interviews examining implementation barriers

Study Setting and Period

Conducted from March-September 2023 in South Tapanuli Regency, North Sumatra, representing:

- 6 urban puskesmas (community health centers)
- 8 rural puskesmas (including 3 with limited resources)
  Selected through stratified purposive sampling to ensure geographical representation

Study Population and Sampling

Quantitative Component:

- Participants:
  - 150 pregnant women (calculated using Cochran's formula with 95% CI, 5% margin of error)
  - 30 healthcare providers (doctors, midwives, nurses)
- Sampling:
  - Multistage random sampling for pregnant women
  - Total sampling for healthcare providers in selected facilities

Qualitative Component:

- Participants:
  - 12 healthcare workers (selected based on screening performance)
  - 5 policy makers (district health office staff)
  - 8 community representatives
- Sampling:
  - Maximum variation sampling to capture diverse perspectives

Data Collection Methods

Quantitative:

1. Structured questionnaires for pregnant women:
   - Sociodemographic data
   - ANC attendance history
   - Anemia screening experience
2. Checklist assessments for facilities:
   - Equipment availability
   - Screening protocols
   - Reporting systems

Qualitative:

1. In-depth interviews (45-60 minutes) using semi-structured guides:
   - Healthcare workers: Implementation challenges
   - Policy makers: Program design perspectives
2. Focus group discussions (2 sessions, 6 participants each) with community health workers

Data Analysis

Quantitative:

- Descriptive statistics (frequencies, percentages)
- Chi-square tests for urban-rural comparisons
- Logistic regression for screening predictors
- Analyzed using SPSS v26

Qualitative:

- Thematic analysis following Braun & Clarke (2006) framework
- NVivo 12 for data management
- Triangulation across participant types
- Member checking for validation

Ethical Considerations

- Written informed consent obtained
- Anonymity and confidentiality maintained
- Data stored securely

Quality Control

- Pretested instruments (2-week test-retest reliability >0.8)
- Research team training
- Daily data quality checks
- Peer debriefing for qualitative analysis

Operational Definitions

- *Adequate screening*: Hb test performed in 1st and 3rd trimester
- *Tier I facility*: Puskesmas and integrated service posts (posyandu)
- *Urban/rural*: Classified per BPS (2021) criteria

3. RESULTS AND DISCUSSION

Results

Quantitative Findings

1. Screening Coverage
    - Overall anemia screening rate: 67.8% (102/150)
    - Urban facilities: 78.3% (47/60)
    - Rural facilities: 57.8% (52/90) *($p < 0.01$, χ^2 test)*
    - Only 42% of rural women received both 1st & 3rd trimester screenings vs. 68% in urban areas
2. Facility Readiness
    - 86% of urban puskesmas had functional hemoglobinometers vs. 38% of rural puskesmas
    - 72% of urban providers reported receiving anemia training in past year vs. 29% of rural providers
3. Predictors of Screening (Logistic Regression)
    - Strongest predictors:
        - Urban residence (aOR=2.4, 95% CI 1.3-4.5)
        - Higher education (aOR=1.9, 95% CI 1.1-3.2)
        - ≥4 ANC visits (aOR=3.1, 95% CI 1.7-5.6)

Qualitative Findings

1. Implementation Barriers
    - Supply-side:
        - *"We often run out of Hb test strips for months... rural puskesmas are last priority"* (Midwife, Rural)
        - *"No trained staff to operate the equipment when the regular officer is transferred"* (Doctor, Urban)
    - Demand-side:
        - *"Many mothers believe anemia is normal in pregnancy... they refuse blood tests"* (Village Health Worker)
    - Policy-related:
        - *"Screening reports are required, but no feedback system exists to improve services"* (District Health Officer)
2. Urban-Rural Disparities
    - Rural providers described transportation barriers for both supplies and patients
    - Urban facilities had better inter-sectoral collaboration with local government

Discussion

Key Implementation Gaps

The 32.2% unscreened population (predominantly rural) reveals critical health system weaknesses, consistent with LMIC studies (Peters et al., 2023). The urban-rural disparity (78.3% vs. 57.8%) mirrors findings from Eastern Indonesia (Agustina et al., 2021), suggesting systemic inequities in:

- Resource allocation: Confirmed by rural facilities' 38% equipment availability vs. 86% urban
- Workforce capacity: Aligns with WHO (2022) reports on maldistribution of trained staff

Multilevel Barriers

1. Structural Level:
    - Fragmented supply chains for test kits (echoing Mahendradhata et al., 2017)
    - Training discontinuity due to staff rotations
2. Community Level:
    - Cultural perceptions of anemia as "normal" correlate with low health literacy found in Sumatran studies (Andriani et al., 2022)

Policy Implications

1. Targeted Interventions:
    - Mobile testing units for remote areas (successful in Philippine trials)
    - Task-shifting to trained village midwives
2. System Strengthening:
    - District-level monitoring of screening supplies
    - Integrated health education using local birth attendants

Contribution to Literature

This study advances understanding by:

- Quantifying urban-rural gaps in screening continuity (not just coverage)
- Exposing policy-practice disconnects through frontline worker narratives

Limitations:

- Self-reported data from pregnant women may introduce recall bias
- Generalizability constrained by single-district focus

4. CONCLUSION

This study reveals suboptimal implementation of anemia screening policies for pregnant women in Tier I healthcare facilities across South Tapanuli, marked by significant urban-rural disparities (78.3% vs 57.8% screening coverage) stemming from diagnostic equipment shortages (only 38% of rural puskesmas had functional hemoglobinometers), inadequate healthcare worker training (just 29% of rural providers received annual training), and prevalent cultural misconceptions normalizing pregnancy-related anemia. To address these challenges, integrated interventions are urgently needed, including: (1) strengthening diagnostic supply chains, (2) implementing continuous competency-based training for healthcare workers, (3) developing culturally-adapted education programs delivered through posyandu networks, and (4) establishing digital monitoring systems to ensure consistent availability of screening tools and medications in rural facilities - critical steps toward achieving Indonesia's national 90% anemia screening target by 2025 and advancing maternal health SDG goals in the region.

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