

ANALYSIS OF THE USE OF ULTRASONOGRAPHY IN ANTENATAL CARE SERVICES

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ABSTRACT

Infant mortality rate (IMR) remains a major issue in Indonesia. One strategy to reduce IMR is through early detection of complications in pregnant women using ultrasonography (USG) in antenatal care (ANC) services. However, utilization of USG at community health centers (Puskesmas) is often suboptimal. To analyze the implementation of USG use in ANC services at Puskesmas throughout Tulang Bawang District. This study is a descriptive qualitative research employing observation, surveys, document review, and in-depth interviews with head of the public health division, head of the family health section, doctors, midwives, and heads of Puskesmas providing USG ANC services, as well as analysis of monitoring documents and reporting systems. USG implementation is present in most Puskesmas; however, challenges include irregular record-keeping and lack of uniformity in USG reporting systems, as well as limitations in human resources and equipment maintenance. Not all health workers are optimally trained, and the standard operating procedures (SOP) for ANC USG services are not universally applied. Optimization of ANC USG usage must be pursued by strengthening regulations, health worker training, digitalizing reporting, and disseminating SOPs across all Puskesmas to improve early detection service quality for high-risk pregnancies.

Keywords: antenatal care; health; maternal; monitoring; puskesmas; ultrasonography

INTRODUCTION

Maternal and infant mortality rates remain major public health concerns, especially in developing countries. The Indonesian government aims to reduce maternal and infant mortality through the 2020-2024 National Medium-Term Development Plan (RPJMN). However, several regions continue to face challenges, including Tulang Bawang Regency, which is still experiencing difficulties. In 2024, the infant mortality rate in this regency was recorded at 34 cases (4.41 per 1,000 live births), far exceeding the target of 7 cases (0.9 per 1,000 live births). This situation is regarded as an indicator of suboptimal performance. Most neonatal deaths in Tulang Bawang District are caused by intrauterine fetal death (IUFD) at 29.5% and low birth weight (LBW) at 11.2%, both of which are highly influenced by the mother's health condition before and during pregnancy. For infants above the neonatal period up to one year old, the leading causes of death are infections such as pneumonia and diarrhea, which are related to healthy lifestyle behaviors and environmental factors. Maternal health issues, inadequate antenatal care, and suboptimal delivery and newborn care services are the primary contributing factors to the high infant mortality rate (Dinkes Tulang Bawang, 2025).

The government has underscored the importance of maternal and child health services, including routine antenatal care (ANC) visits. Health services during pregnancy, referred to as Ante Natal Care (ANC), are a series of activities carried out from the time of conception until before the onset of labor, which are comprehensive and of high quality, and provided to all pregnant women. The aim of ANC services is to monitor the growth and development of the fetus and to detect early any risk factors or diseases suffered by pregnant women that could contribute to infant mortality (Kemenkes RI, 2020). Sufficient and regular ANC visits have proven to reduce the risk of LBW as these visits allow early detection of complications (Ningsih, S.R, 2020). In accordance with Permenkes no 6 th 2024 about Technical Standards for

Fulfilling Health Minimum Service Standards, pregnant women must undergo at least six ANC visits, including physician examination and ultrasound (USG).

Ultrasonography (USG), particularly in obstetrics, based on Porche LM (in Endjun J. J., 2020) and Herlambang (2021) is a harmless, affordable, and non-invasive imaging method that assists in scanning the abdominal and pelvic cavities of pregnant women using high-frequency sound waves, providing real-time images of the fetus. In obstetrics, USG can detect fetal problems such as LBW, premature labor, fetal growth restriction, IUFD, congenital anomalies, and infant mortality (WHO, 2022). In the context of primary healthcare services, ultrasonography has become a vital diagnostic tool, facilitating accurate and efficient diagnoses. Primary healthcare facilities such as community health centers (Puskesmas) are often the first point of contact for the public seeking medical assistance, thus placing significant responsibility on medical personnel to provide quality services. The Tulang Bawang District Government has made efforts to provide USG equipment in several community health centers that are geographically challenged in accessing quality ANC services. However, a comprehensive analysis has yet to be conducted regarding the utilization of USG in ANC services, including supporting and inhibiting factors, particularly in the context of early detection of risk factors for infant mortality. Therefore, this article will further examine and identify the input, process, and output of USG utilization in ANC service community health centers within the Tulang Bawang District's working area. This is in accordance with the Health Service System Theory, which views an organization or program as a unit composed of elements that interact with one another (input, process, output, outcome, and feedback) within an environment to achieve specific goals (Arifin, S., 2022). The results of this study are expected to provide recommendations for optimizing its use to support early detection of risk factors for infant mortality and reduce infant mortality rates in the future. Thereby understanding the patterns of USG use and their obstacles at the grassroots level, this report is expected to contribute to the optimization of antenatal care services and maternal health outcomes in Tulang Bawang.

METHOD

This research utilized a descriptive qualitative design with a field study approach conducted over 25 days, from May 19 to June 26, 2025, at the Tulang Bawang District Health Office. Data were collected through direct observation, in-depth interviews with head of public health division, head of family health section, Puskesmas heads, doctors, midwives, and administrative staff, as well as documentation review of policies and ANC USG reporting systems. Problem prioritization was analyzed using the Delbeq method. The interview data were thematically analyzed, while identification of constraints and recommendations was developed through internal and external focus group discussions (FGD) with the Health Office.

RESULT AND DISCUSSION

Most Puskesmas in Tulang Bawang District are equipped with USG devices for ANC services. Identification of Inputs for Ultrasound (USG) Use in Antenatal Care (ANC), show that ultrasound machines are available in most community health centers (Puskesmas) in Tulang Bawang Regency. The healthcare personnel performing ultrasound examinations are generally doctors, where only 95% of personnel have already been trained. SWOT analysis shows strengths in the Health Office leadership's commitment and weaknesses in monitoring aspects and limited health worker training. Administrative support, standard operating procedures (SOPs) have begun but are not yet evenly implemented across all Puskesmas where only where only 75% of Puskesmas have SOPs. Supporting infrastructure such as electricity, examination rooms, and reporting facilities are also critical inputs, though not all Puskesmas have optimal facilities. Not all Puskesmas have optimal facilities or maintenance. Only 50% perform maintenance.

Implementation Process of Ultrasound Use in ANC show that scheduled ANC ultrasound examinations are conducted in community health centers. Public education is carried out through banners, posters, social media, and the involvement of community health workers (kader); however, further efforts are needed to maximize outreach. Monitoring and evaluation of the quality of examinations have never been conducted by the head of the health center or the health office; so far, supervision has only been carried out quantitatively through the collection of report data on the number of USG-ANC examinations. Only 18.6% of pregnant women received their first antenatal care (K1) with an ultrasound examination by a doctor, and 15.8% received their fifth antenatal care (K5) with an ultrasound examination by a doctor in ANC services. Cross-sectoral involvement to encourage the compliance of pregnant women in undergoing USG examinations has not been optimal. The outcomes of using ultrasonography in antenatal care indicate that the coverage of early detection of pregnancy risk factors and complications among pregnant women has increased, but has not yet reached the target. Greater community engagement in utilizing ANC ultrasound services needs to be increased, especially among high-risk pregnant women.

In-depth interviews state that supporting factors come from commitment from Puskesmas leadership and support from the Health Office. Enthusiasm among healthcare workers, volunteers, and community leaders in promoting the importance of ANC ultrasound. Existence of national and regional policies and regulations on standardized ANC services. Hindering Factors include limited training for personnel in ultrasound operation and interpretation. Some ultrasound machines in Puskesmas face technical issues or damage, requiring regular maintenance. Varied public understanding of ultrasound benefits, with some still reluctant or fearful of the procedure. Cross-sector coordination and reporting systems need improvement to ensure validated and timely data.

Table 1.
 Respondent characteristics

Respondent characteristics	f	%
Age:		
25-30 years	5	20%
31-40 years	15	60%
>40 years	5	20%
Gender:		
Female	15	60%
Male	10	40%
Work Duration:		
<5 years	5	20%
5-10 years	15	60%
>10 years	5	20%
Profession:		
Doctor	20	80%
Bidan	2	8%
Program Manajer	3	12%

The implementation of ultrasonography (USG) in antenatal care (ANC) services at primary health centers (Puskesmas) in Tulang Bawang Regency reveals both progress and several challenges. Based on field data, the use of USG has shown to improve the early detection of high-risk pregnancies and optimize referral decisions, which aligns with WHO recommendations on comprehensive ANC screening (WHO, 2022). However, several key issues still hinder the maximization of USG-based ANC in these settings.

One of the main findings from the residency activities is the variability in the availability and utilization of USG machines between Puskesmas. Some centers have adequate equipment and trained physicians, while others struggle with equipment shortages and lack of personnel capable of operating USG

independently. This situation affects the equity of high-quality ANC services among pregnant women in different districts, leading to disparities in maternal health outcomes.

In practice, standard operating procedures (SOPs) for USG ANC are not yet optimally implemented. Many centers do not have formalized guidelines for the flow of examination, documentation, and critical case response, resulting in inconsistent service quality and difficulties in standardizing data collection. Whereas through the implementation of Standard Operating Procedures (SOP), the delivery of services can proceed smoothly. Various forms of deviations can be avoided, and if deviations do occur, their causes can be identified and addressed appropriately. If all activities are carried out in accordance with the SOP, the quality of public services will gradually improve to become more professional, faster, and easier (Maningkue et al., 2022).

The digitalization of reporting systems and maintenance schedules for the equipment are still in early stages, leading to potential delays in follow-up for high-risk findings. Human resource constraints remain a critical challenge. The data show that many health workers are burdened with routine duties, making it difficult to allocate time for comprehensive USG examinations or continuous training. Moreover, access to up-to-date knowledge and skills on USG in ANC is still limited, suggesting the need for regular workshops, simulation training, and online discussions facilitated by health authorities.

Additional challenges reported include transportation barriers, particularly for health workers conducting outreach or for pregnant women in remote areas seeking USG services. This is exacerbated by the lack of mobile USG units and financial supports for transportation, which are crucial for ensuring equitable access. Strategic recommendations based on the analysis include the preparation of a policy brief, namely the development and socialization of a standardized SOP for USG ANC in all Puskesmas; digital transformation of reporting; regular training and refreshment courses for health professionals; and strengthening community education regarding the importance of USG. Multi-sector collaborations, for example with community leaders and private sector support for logistics, are also needed to address accessibility issues. The implications of these findings highlight that without uniform protocol implementation and data reporting, early detection efforts and rapid responses to critical cases may be compromised. Addressing these gaps through integrated strategies involving policy, infrastructure, human resources, and community involvement is essential for advancing maternal and infant health outcomes in Tulang Bawang Regency.

CONCLUSIONS

The implementation of ultrasonography (USG) in antenatal care (ANC) services at public health centers (Puskesmas) in Tulang Bawang Regency offers clear benefits in improving early detection of pregnancy risks and supporting proper referral systems. However, this study highlights that significant disparities still exist in USG equipment availability, human resource capacity, and adherence to standard operating procedures among health centers. Efforts to improve program effectiveness should focus on equalizing infrastructure, strengthening regular health worker training on ANC and USG, developing and disseminating standardized SOPs, and optimizing digital reporting systems. Collaborative strategies involving local authorities, private sectors, and communities are essential to address physical access barriers and ensure the sustainability of high-quality ANC services. Strengthening these components is expected to contribute significantly to reducing maternal and infant morbidity and mortality rates in Tulang Bawang.

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