

Benchmarking the quality of antenatal care services in public health services in Timor-Leste and the Setabelan Community Health Center, Surakarta city, Indonesia, based on the Juran Trilogy

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Graphical Abstract

Highlights

- Surakarta and Timor-Leste both performed well in the quality of antenatal care.
- Surakarta and Timor-Leste conducted maternal satisfaction assessments to measure the quality of antenatal care.
- Formal quality improvement teams in health services play a role in improving the quality of antenatal care
- Strengthening quality management can increase the coverage of the fourth antenatal visit (K4).



Abstract

The achievement of the fourth antenatal visit (K4) in public health services in Timor-Leste remains low. One factor that may contribute to achieving the fourth visit target is quality management. Therefore, this research aims to provide recommendations for improving the quality of antenatal care services using the Juran Trilogy. A descriptive and cross-sectional observational approach was employed. There were 17 respondents in this study, consisting of 15 midwives and 2 Maternal and Child Health coordinators. Based on the data obtained, the implementation of quality planning, quality control and quality improvement was positive. However, there is a lack of implementation of customer knowledge and customer expectation surveys, which prevents the identification and fulfillment of customer needs. Furthermore, in quality control, there are deficiencies in the implementation of customers as service assessors, making it difficult to measure satisfaction. In terms quality improvement, there is no quality improvement team, which limits the optimal implementation of service enhancements. It is therefore recommended that public health services in Timor-Leste conduct customer knowledge, expectation, and satisfaction surveys, and establish a quality improvement team to increase the achievement of the fourth antenatal visit (K4) rate.

Keywords: Antenatal Care. Quality Control. Quality Improvement. Quality Planning.

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INTRODUCTION

According to data from the Ministry of Health of Timor-Leste, the coverage of the fourth antenatal care visit (K4) in 2022 was 85.2%, an increase from 80.9% in 2021. K4 coverage is one of the indicators of the success of the maternal and child health program. High K4 coverage indicates that pregnant women have received complete antenatal care (ANC) services, defined as a minimum of four antenatal care visits during pregnancy^{1,2}.

Timor-Leste has made progress in maternal and child health over the past few decades. Infant and child mortality rates have declined significantly since the turn of the century, with infant mortality falling by 50%. This decline demonstrates the effectiveness of health interventions implemented in Timor-Leste. The coverage of ANC services has also shown positive improvements: 84% of pregnant women in Timor-Leste received at least one ANC visit, and the majority (96%) were attended by trained health professionals. This indicates that access to ANC services is increasingly available to pregnant women in the country³.

Increasing awareness of the importance of ANC is also reflected in the proportion of pregnant women who began ANC visits in the first trimester, which reached 79%. This is a positive step toward improve maternal and child health. However, despite the significant progress, several challenges remain⁴. One of the main challenges is the still low proportion of pregnant women who complete the recommended four ANC visits: only 52% of pregnant women complete all four, meaning that many still do not receive the full benefits of ANC services⁵.

Significant risk factors for child mortality in Timor-Leste include births to very young or older mothers, short birth intervals (less than 2 years), and high birth order (greater than 3). These factors must be considered in efforts to improve maternal and child health in Timor-Leste³.

In conclusion, ANC data in Timor-Leste shows positive progress between 2009 and 2016. However, several challenges still need to be addressed to ensure equitable and optimal access for all pregnant women, and to improve overall maternal and child health^{6,7,8}.

PONED services and/or maternity hospitalization in Timor-Leste also increased in 2022. The percentage of pregnant women who received PONED services or were hospitalized for maternity care was 97.3%, an increase from 95.5% in 2021. These services are among the efforts to reduce maternal and infant mortality rates.

According to data from the Surakarta City Health Office, K4 coverage at the Setabelan Surakarta Health Center in 2022 was 98.6%, an increase from 97.5% in

2021. The high K4 coverage indicates that pregnant women at the Setabelan Surakarta Health Center have received complete ANC services⁹.

PONED services and/or maternity hospitalization at the Setabelan Surakarta Health Center also increased in 2022. The percentage of pregnant women who received PONED services or were hospitalized for maternity care was 99.8%, an increase from 99.2% in 2021. PONED services and/or maternity hospitalization are one of the efforts to reduce maternal and infant mortality rates at the Setabelan Surakarta Health Center⁹.

Based on these data, it can be concluded that the coverage of K4 and PONED service coverage, as well as maternity hospitalizations in Timor-Leste and Setabelan Surakarta Health Center, show a positive trend. This reflects the success of government efforts to improve maternal and child health¹⁰.

One of the factors that may influence the failure to achieve K4 coverage in public health services in Timor-Leste is the quality management of antenatal care services, as K4 visits represent a form of repeated use of these services. Poorly implemented quality management can lead to a mismatch between the expectations and the actual experience of services as perceived by pregnant women. As a result, customer satisfaction cannot be optimally achieved, which affects the continued use of antenatal care services¹¹.

One approach to improving the quality of health services is through benchmarking, which includes three types: internal, historical, and external benchmarking¹². Accordingly, this study conducts a benchmarking analysis of quality management based on the Juran Trilogy, which consists of quality planning, quality control, and quality improvement in antenatal care services¹³. The Juran Trilogy was selected because it is generic and can be applied universally to all types of products, across all levels of hierarchy, functions and industries, including both goods and services¹⁴. The main issue is that the K4 coverage target was not achieved in public health services in Timor-Leste during the period from 2020 to 2022.

Based on the background described above, What are the differences in K4 (fourth antenatal visit) coverage between public health services in Timor-Leste and the Setabelan Health Center in Surakarta City from 2020 to 2022, and what factors contribute to these differences?

The general objective of this study is to examine and analyze the differences in K4 coverage between public health services in Timor-Leste and Setabelan Health Center in Surakarta City during the 2020-2022 period, as well as the factors that influence these differences.

MATERIAL AND METHODS

This study is a descriptive observational study with a cross-sectional design. The cross-sectional design allows researchers to collect data at a specific point in time to analyze existing differences or characteristics¹⁵. Data were collected through interviews with Maternal and Child Health (KIA) coordinators and by administering questionnaires to KIA polyclinic health workers. The questionnaire indicators were based on the Juran Trilogy and have been tested for validity.

Data were obtained from two locations: the public health services in Timor-Leste and the Setabelan Health Center. Respondents consisted of seven midwives and one KIA coordinator at the public health services in Timor-Leste, and eight midwives and one KIA coordinator at the Setabelan Health Center.

This study was conducted at the Public Health Service in Timor-Leste and the Setabelan Health Center in Surakarta City during the 2020-2022 period. The study subjects were the implementation of antenatal care quality management at both locations. This study will focused on the quality management practices carried out by the seven midwives and one KIA coordinator in Timor-Leste, as well as eight midwives and one KIA coordinator at the Setabelan Health Center. These respondents served

as the primary data sources through interviews and questionnaire responses. The data collected covered specific aspects of antenatal care quality management, such as compliance with guidelines, monitoring and evaluation processes, and quality improvement efforts¹⁶.

The processing and analysis of research data used are:

1. Collecting data and information obtained from notes and recordings of the in-depth interviews. The interviews were conducted using guiding questions related to the study topic and were documented using a tape recorder, notes, and stationery.
2. Processing the data after collection. This included transcribing interview notes and audio recordings by converting the content into written form.
3. Classifying the data by grouping it according to similar characteristics.
4. Creating a matrix to classify the data based on the relevant variables or themes.
5. Analyzing the data through systematic and objective interpretation to draw conclusions. Data analysis is a critical step in the research process, as it serves to generate conclusions based on the study's findings.

Operational definition

Table 1 - Operational Definition of Benchmarking the Quality of Antenatal Care Services in Public Health Services in Timor-Leste and the Setabelan Community Health Center, Surakarta City, Indonesia, 2024.

Term	Definition	Data Scale
Independent Variables		
Determination of quality objectives for antenatal care services	Measurement of the level of clarity, specificity and measurability of the quality objectives established by health workers for antenatal care services.	Ordinal
Identification of characteristics of pregnant women	The process of identifying and measuring the physical, psychological, and social attributes of pregnant women, including age, health history, and socioeconomic conditions.	Nominal
Identification and determination of the needs of pregnant women	Measurement of the accuracy and completeness in identifying and determining the health needs of pregnant women by health workers.	Ordinal
Development of special antenatal care services	Assessment of the development of distinctive features or advantages in antenatal care services, such as a personalized approaches or service innovations.	Ordinal
Development of antenatal care service process	Evaluation of changes or improvements in the methods or steps involved in the antenatal care service process.	Ordinal
Creation of process control	Assessment of the success of process control implementation in antenatal care services, such as monitoring or regulatory systems.	Ordinal
Dependent Variable		
Quality of antenatal care services	The level of adequacy, sustainability, and satisfaction of pregnant women with the antenatal care services received, including aspects of service quality, safety, information availability, and patient involvement.	Ordinal

Data analysis

Data analysis in this study applies Juran's theory in the context of evaluating the quality of antenatal care services, focusing on key concepts introduced by Joseph M. Juran¹⁰.

This research follows a qualitative design, an approach that emphasizes in-depth understanding of a phenomenon through the collection and analysis of non-numerical data, such as interviews, observations, and document studies. The primary objective is to understand the meaning, experiences, and social context of a particular event or group. Data is processed in several stages: editing, coding, scoring and analysis using a 2x2 position matrix. Editing involved reviewing the data collected. Coding was conducted by assigning a code or numerical value to each response. For the assessment variables, the coding scale was as follows: 1 – Not in accordance with the attribute; 2 – Slightly in accordance with the attribute; 3 – Moderately in accordance with the attribute; 4 – In accordance with the attribute; 5 – Strongly in accordance with the attribute. For the satisfaction variable, the scale was: 1 – Dissatisfied; 2 – Slightly satisfied; 3 – Moderately satisfied; 4 – Satisfied; 5 – Very satisfied.

Scoring was performed by assigning numerical values to each respondent's answer according to the attribute being assessed. Calculation of assessment and satisfaction scores by:

$$\text{Score} = (n1 \times 1) + (n2 \times 2) + (n3 \times 3) + (n4 \times 4) + (n5 \times 5)$$

Description:

n1 = frequency of assessment or satisfaction 1

n2 = frequency of assessment or satisfaction 2

n3 = frequency of assessment or satisfaction 3

n4 = frequency of assessment or satisfaction 4

n5 = frequency of assessment or satisfaction 5

Further data processing was conducted by calculating the composite average for each attribute in the assessment and satisfaction items. The results

individual composite averages were then used to compute the overall composite average. The next step involved analyzing satisfaction using a 2x2 positioning matrix. The overall composite average serves as the threshold that divides the matrix into four quadrants.

Each attribute (sub-variable) with a composite average for assessment or satisfaction below the overall composite average falls below the axis (or intersection point), indicating low performance or satisfaction. Similarly, attributes with a composite average above the overall composite average falls above the axis, indicating high performance or satisfaction.

The position matrix divides the attributed into four quadrants: Quadrant I – customers rate the service characteristics highly, but customer satisfaction is low; Quadrant II – customers rate the service highly, and satisfaction is also high; Quadrant III – customers rate the service poorly, but satisfaction is high; Quadrant IV – customers rate the service poorly, and satisfaction is also low. The results of the 2x2 positioning matrix identify the strategic issues. Strategic issues are sub-variables located in Quadrants I, III, and IV. These attributes indicate aspects of service quality that need to be improved and enhanced.

The results of the study showed a satisfactory level of performance at both research sites across various sub-variables analyzed. Juran's Trilogy is a quality framework consisting of quality planning, quality improvement, and quality control.

In the context of this study, the application of this theory offers a deeper understanding of how organizations, both Setabelan Surakarta and Timor-Leste Health Centers, can improve the quality of their ANC services. Quality planning is reflected in the definition of ANC service quality objectives. Actions such as communicating these objectives to health workers and ensure their understanding are integral components of this planning process¹⁷.

RESULTS

Table 2 - Comparative Calculation Results, Indonesia, 2024.

Sub Variables	Indicator	Setabelan Community Health Center, Surakarta		Health Center, Timor-Leste		Used as a Benchmark for Quality Management Implementation (Yes/No)
		x	Category	x	Category	
Determination of Antenatal Care Service Quality Objectives	Communication of established objectives to health workers at the Maternal and Child Health Clinic	4.923	Very good	4	Good	Yes
	Communication of Standard Operating Procedures for Antenatal Care Services to health workers at the Maternal and Child Health Clinic	4.923	Very good	4	Good	Yes
	Health workers' understanding of antenatal care services objectives	5.0	Very good	3	Pretty good	Yes
	Health workers' understanding of Standard Operating Procedures	5.0	Very good	3	Pretty good	Yes
Identification of Characteristics of Pregnant Women	Implementation of surveillance to determine the target number of pregnant women	5.0	Very good	3	Pretty good	No
	Implementation of surveillance to determine the average age of pregnant women	5.0	Very good	3	Pretty good	No
	Implementation of socio-economic survey of pregnant women	5.0	Very good	3	Pretty good	No
	Implementation of educational background survey of pregnant women	5.0	Very good	3	Pretty good	No
	Implementation of a survey on pregnant women's knowledge	5.0	Very good	4	Good	Yes
	Identification of geographical conditions of the Community Health Center's work area	5.0	Very good	3	Pretty good	No
	Calculation of the average distance between the pregnant woman's residence and the community health center	5.0	Very good	3	Pretty good	No
Identification and Determination of Pregnant Women's Needs	Implementation of a survey on pregnant women's expectations regarding antenatal care services	4.846	Very good	3.0	Pretty good	No
	Implementation of a survey of pregnant women's needs for antenatal care services	4.846	Very good	3.0	Pretty good	No
	Formulation of antenatal care service needs based on pregnant women's input	4.846	Very good	3.0	Pretty good	No
Development of Special Antenatal Care Services	Program planning developed in accordance with guidelines	4.538	Very good	3.0	Pretty good	Yes
	Information on the flow of antenatal care services	4.538	Very good	4.0	Good	Yes
	Information on working hours of antenatal care services	4.538	Very good	3.5	Good	Yes
	Information on types of antenatal care services	4.538	Very good	3.86	Very good	Yes
	Information on costs/rates for antenatal care services	4.538	Very good	3.43	Good	Yes
Development of Antenatal Care Service Process	Translating objectives into specific goals or operational steps	4.538	Very good	3.57	Very good	Yes
	Health workers are informed and understand the specific objectives	4.538	Very good	3.0	Pretty good	Yes
	Selection of methods to achieve each specific service objective	4.538	Very good	3.0	Pretty good	Yes
	Preparation of work plans based on program data	4.538	Very good	3.0	Pretty good	Yes
Creation of Process Control	Development of standard operating procedures for antenatal care services	4.692	Very good	4.0	Very good	Yes
	Development of indicators or standards as a control tool for antenatal care services	4.692	Very good	3.0	Pretty good	Yes
	Development of a monitoring plan	4.692	Very good	3.0	Pretty good	Yes
	Development of performance indicators for evaluation	4.692	Very good	3.0	Pretty good	Yes

DISCUSSION

According to Juran's Trilogy, effective quality planning involves setting clear objectives and communicating them efficiently to all relevant parties. This aligns with the findings of the present study. Quality improvement is reflected in the identification of pregnant women's characteristics and the determination of their needs. In Juran's theory, quality improvement refers to the continuous enhancement of existing processes and systems to meet or exceed established standards¹⁸.

By gaining a better understanding the characteristics and needs of pregnant women, both the Setabelan Health Center in Surakarta and health centers in Timor-Leste can further improve their services to be more responsive and relevant to the population they serve.

Quality control is demonstrated through the development of ANC service features and the establishment of process controls. In Juran's theory, quality control refers to the ongoing monitoring and evaluation of processes to ensure that the services provided align with established standards. Actions such as the development of SOPs, the design of monitoring planning, and the application of performance indicators for evaluation are part of this quality control process¹⁷.

By carrying out effective process control, Setabelan Health Center in Surakarta and health centers in Timor-Leste can ensure that the quality of ANC services is maintained and continuously improved. Within the framework of the Juran's Trilogy, it is important to consider that quality development is an ongoing process. Therefore, identifying the characteristics and needs of pregnant women is not just a one-time activity, but must be part of a continuous improvement cycle.

In this theory, the concept of continuous improvement is central to achieving long-term success in meeting the needs and expectations of customers, in this case, pregnant women. The use of appropriate mea-

surement methods and tools in process control is essential for achieving and sustaining the quality of ANC services. In the context of Juran's Trilogy, this concept is known as performance measurement. Setabelan Health Center in Surakarta and health centers in Timor-Leste need to ensure the use of relevant and effective performance indicators to systematically evaluate the quality of their ANC services.

Collaboration between various stakeholders involved in the provision of ANC services must also be considered. According to Juran's Trilogy, collaboration between management, medical personnel, administrative staff, and the community is the fundamental to successfully improving service quality¹⁸. Therefore, both institutions must ensure effective communication and coordination among all involved parties to achieve the common goal of improving the quality of ANC services.

It is important to remember that changing the organizational culture is also an integral part of quality improvement efforts. In Juran's Trilogy, this is known as change management. Setabelan Health Center in Surakarta and health centers Timor-Leste need to ensure that there is commitment from all levels of the organization to adopt the necessary changes in order to improve the quality of ANC services. This involves the establishment of a quality-oriented organizational culture, where each team member feels responsible for the quality of service they provide.

Thus, integrating the concepts from Juran's Trilogy into the analysis of the study results provides a more holistic and in-depth view of the factors influencing ANC service quality at the Setabelan Health Center in Surakarta and health centers in Timor-Leste. This provides a strong foundation for the development of more effective and sustainable improvement strategies to ensure that pregnant women receive the best possible care tailored to their needs.

CONCLUSION

This study aimed to compare the quality of antenatal care (ANC) services between the Setabelan Community Health Center, Surakarta, and health facilities in Timor-Leste, using the Juran Trilogy as a framework. By comparing various aspects of ANC service management, this research aimed to identify strengths, weaknesses and provide recommendations for improvement.

Juran's trilogy provides a valuable framework for analyzing the quality of ANC services in both settings. By examining the planning, control, and qua-

lity improvement aspects of service management, this study highlights the importance of a systematic approach to quality improvement.

Although both the Setabelan Community Health Center and other health facilities in Timor-Leste have made great strides in providing quality ANC services, there remains room for improvement. By addressing the identified gaps, both facilities can improve the quality of care provided to pregnant women and contribute to better maternal and child health outcomes.

ANC Accessibility Improvements:

1. Exploring Diverse ANC Service Models:

Consider different ANC service models, such as community-based ANC, health facility-based ANC, and information technology-based ANC, to reach different groups and meet their specific needs.

2. Reducing Access Barriers:

Reduce the cost of ANC, transportation, and waiting times at health facilities. Consider using special transportation or subsidizing the cost of ANC, especially for pregnant women from low-income families.

3. Increasing Availability of Health Workers:

Ensure the availability of adequate numbers of health workers, especially in remote areas or areas with limited access.

4. Health Education and Promotion:

Increase community awareness of the importance of ANC and its benefits. This can be done through health promotion campaigns in various media, including social media.

Improving the Quality of ANC:

1. Training and Certification of Health Workers:

Provide training and certification to health workers who provide ANC services, including doctors, midwives, and nurses.

2. Capacity Building of Health Facilities:

Ensure health facilities have adequate equipment and facilities to provide quality ANC, such as pregnancy examination equipment, laboratories, and comfortable consultation rooms.

3. Use of Valid Clinical Guidelines:

Follow internationally agreed clinical guidelines, such as WHO recommendations, to ensure that ANC provided is quality and effective.

4. Comprehensive Counseling:

Provide counseling on the importance of ANC, healthy lifestyle during pregnancy, nutrition, and preparation for childbirth.

5. Complete ANC Implementation:

Ensure that each ANC visit includes a physical examination, blood pressure measurement, laboratory tests, immunization, and nutrition consultation.

Improving ANC Effectiveness:

1. Use of Information Technology:

Use digital applications or platforms to monitor pregnant women, provide information about ANC, and schedule visits.

2. Innovation and Research:

Conduct research to develop more innovative and effective ANC models, and identify existing problems and appropriate solutions.

3. Cross-Sector Collaboration:

Establish collaboration between various sectors, such as health, education, and social, to improve ANC.

4. Measurement and Evaluation:

Regularly measure and evaluate ANC performance and the effectiveness of interventions undertaken to ensure that ANC provided is effective and impacts maternal and fetal health.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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