Panel Data Analysis of Regional Health Financing and Primary Health Care Facility Performance (FKTP) with Service Quality (TB Programme) and Community Satisfaction (IKM) in Kudus District

Muhammad Husni Mubaroq[1*], Maria Ulfa[2], Maria Ulfa[3]

[1,3]Instuitut Teknologi Kesehatan Cendekia Utama Kudus, Indonesia
[2]Universitas Harapan Bangsa, Indonesia

*Corresponding Author: emhusni.mubaroq@gmail.com

Abstract. Background: The fluctuating nature of health financing and its fiscal dependence on the Regional Revenue and Expenditure Budget (APBD) in Indonesia poses significant challenges to the quality of primary health care facilities (FKTP) and public satisfaction. Despite reported increases in health budgets in Central Java, including Kudus District, from 2021 to 2023, this has not resulted in proportional improvements in health facility performance indicators, particularly in tuberculosis (TB) services and public satisfaction. This study examines the relationship between regional health financing, FKTP performance, TB service quality, and public satisfaction in Kudus District.

Key words: health financing, FKTP performance, TB service quality, and public satisfaction

INTRODUCTION

Specifically, the tuberculosis (TB) control programme is an important indicator in assessing the performance of the global health system, as TB remains one of the ten leading causes of death worldwide. Indonesia ranks third in terms of TB burden after India and China, with an estimated 969,000 new cases per year (Pradipta *et al*., 2022). Efforts to eliminate TB require effective financing integration, cross-sector coordination, and reliable quality of services at primary health care facilities (FKTP).

In Indonesia, the proportion of health financing allocated through the Regional Revenue and Expenditure Budget (APBD) remains volatile and highly dependent on the fiscal capacity of each district/city. According to the Ministry of Health report (2022), the average health budget allocation at the district level is 8.5% of the total APBD, with most of it absorbed by operational funding for community health centres and infectious disease programmes such as TB.

Specifically in Central Java Province, including Kudus District, there has been a trend of increasing health budgets by 6.7% between 2021 and 2023, but this has not been accompanied by a proportional increase in health facility performance indicators. For example, only 64% of all primary health care facilities (FKTP) in Kudus meet the Minimum Service Standards (SPM) for TB services, according to the provincial health evaluation report (Bappeda Jateng, 2023).

In 2023, the total health budget allocation by the Kudus District Health Office reached Rp83.1 billion, covering basic service programmes, disease control, FKTP quality improvement, and resource provision (LKjIP Dinkes Kudus, 2024). Of this amount, the majority was allocated to operational activities such as civil servant salaries, pharmaceutical supplies, and health service facilities, with budget usage indicating a focus on strategic programmes.

In terms of performance, FKTP in Kudus District (19 community health centres and 1 regional health laboratory) have achieved full (100%) compliance with the Minimum Service Standards (SPM) indicators, including antenatal care, childbirth, infant care, and health screening for productive age and elderly populations. However, this effectiveness has not yet been fully reflected in increased public satisfaction. The FKTP IKM score in 2023 was recorded at 85 out of 100, an increase from the previous year, but it has not yet reached the 'very good' category, which is typically associated with a score above 90 (LKjIP, 2024).

Regarding the quality of TB services, there has been a significant improvement. The number of

TB patients treated in 2023 reached 3,132 cases, with a service ratio for suspected TB cases of 106.77% of the set target. This indicates an increase in service coverage, but the report also highlights challenges related to social stigma and low treatment adherence, which continue to hinder the effectiveness of interventions (LKjIP, 2024).

In terms of satisfaction, although the IKM has improved, challenges remain in aspects of communication, waiting time, and facility comfort at primary health care centres (FKTP), as indicated in internal evaluations and public complaints. To address this, Kudus has set a target to increase the accreditation status of health centres to 100% accredited by 2023, which has been achieved according to the Health Office report.

Overall, there is a strong correlation between the level of health financing and technical service indicators. However, subjective indicators such as public satisfaction and perceptions of TB service quality still indicate room for improvement. Therefore, a data panel-based evaluative framework is needed to examine the dynamics of the relationship between inputs (budget), processes (FKTP performance), outputs (TB services), and outcomes (public satisfaction) more accurately over time.

Meanwhile, TB service quality indicators at FKTP Kudus show significant variation. A study by Prakoso *et al.* (2023) in Yogyakarta found that despite intensive screening, inconsistencies in diagnosis enforcement and delays in therapy were still found due to limitations in human resources and diagnostic logistics. This quality reflects the effectiveness of budget allocation and facility management efficiency.

In terms of public satisfaction, the latest accessible Public Satisfaction Index (PSI) survey reports from several regencies in Central Java place the PSI score for primary healthcare facilities in the range of 78–82, classified as 'Good,' but with a decline in waiting time and waiting room comfort indicators. Although specific IKM data for Kudus in 2023 could not be accessed, the provincial average can be used as an initial proxy in the analysis (KemenPAN-RB, 2022).

Thus, an evaluative framework that integrates these four aspects—regional health financing, FKTP performance, TB service quality, and public satisfaction—requires a longitudinal analytical approach using a panel data model. This approach allows for the identification of causal relationships between variables, revealing the extent to which allocated budgets impact service performance and public perceptions of primary health care quality.

In the past decade, health financing systems have become a global focus in efforts to improve access to and quality of health services, particularly primary health care (PHC). A WHO report indicates that approximately 930 million people worldwide face significant financial burdens when accessing health services, with a large proportion occurring in developing countries (WHO, 2023). Emphasis on strengthening regional health financing and evaluating its effectiveness has become increasingly important in achieving sustainable universal health coverage (UHC).

Various studies confirm that the availability of sufficient funds at the regional level is positively correlated with the achievement of better TB service indicators. Fuady *et al.* (2020) noted that the sustainability of funding from the JKN/BPJS programme is a key factor in the effectiveness of TB programme implementation at community health centres. However, weaknesses in incentive structures and disproportionate budget allocation often pose challenges that hinder optimal implementation (Sunjaya *et al.*, 2022).

At the same time, the dimension of community satisfaction with FKTP services is also an important indicator in assessing the success of regional health system reforms. A study by Arini et al. (2022) shows that low community satisfaction with TB services is closely related to the quality of communication by staff, waiting times for services, and the availability of supporting facilities. This aspect is rarely considered in performance evaluations, which tend to focus solely on technical output indicators.

Conceptually, the theoretical approach in this study is based on the Performance-Based Financing (PBF) theory and the Donabedian Framework, which maps the relationship between funding inputs, service processes, and health outcomes (Eichler *et al.*, 2018). The evolution of this theory shows a shift from a centralised approach to performance-based decentralisation and regional autonomy. This aligns with the District Health System Strengthening model widely applied in developing countries like Indonesia (Maeda, 2009).

In the Indonesian context, fiscal decentralisation policies have significant implications for how regions design, allocate, and monitor health budgets, including for TB programmes. A study by Rokx et al. (2020) found that significant variations among regions in the effectiveness of health fund utilisation

led to disparities in access to TB services and public satisfaction.

Methodologically, most previous studies have used qualitative-descriptive approaches or limited case studies. Only a few studies have combined panel data analysis to link financing aspects, primary healthcare facility (FKTP) performance, TB service quality, and public satisfaction within a single evaluative framework. Prakoso *et al*. (2023) suggest the need for multivariate quantitative methods to capture inter-regional dynamics more comprehensively.

In Kudus District, Central Java, TB cases remain a primary concern in primary care. However, few studies have explicitly linked regional health financing levels, FKTP performance indicators, TB service quality, and community perceptions in the community satisfaction index (CSI). This indicates a research gap, particularly in the use of regional longitudinal data to formulate evidence-based policies.

The urgency of this research is reinforced by the fact that Kudus Regency is one of the regions with a high TB burden, yet variations in performance among FKTPs and fluctuations in regional funding allocation indicate suboptimal health budget management. In this context, panel data analysis is an appropriate approach to evaluate the consistency and effectiveness of funding on service quality and user outcomes.

This study aims to analyse the relationship between regional health financing, FKTP performance, TB programme service quality, and community satisfaction in Kudus Regency using a panel data approach. Theoretically, this study contributes to the development of an integrative evaluation model in the context of health decentralisation. Practically, the results of this study can provide input for regional policy makers in optimising performance-based health budget allocation and local community needs.

METHODS

This study uses a quantitative design with a panel data (longitudinal) approach to examine the relationship between regional health financing, primary health facility (FKTP) performance, the quality of tuberculosis (TB) programme services, and community satisfaction in Kudus Regency. The panel data approach enables analysis of the dynamics of changes between variables over a specific time period, making it more effective in identifying patterns and causal relationships (Hsiao, 2022). This design was chosen to provide a comprehensive picture of the impact of health budget allocation on service performance and public perception from year to year.

The research subjects were all FKTP in Kudus District, namely 19 Community Health Centres (Puskesmas) and 1 Regional Health Laboratory (Labkesda), which serve as TB treatment centres and primary health programme providers. Data were collected from the annual reports of the Kudus District Health Office and FKTP performance evaluations during the 2019–2023 period. Additionally, public satisfaction data were obtained from the FKTP Public Satisfaction Index (IKM), which is routinely measured through internal surveys and field evaluations. The inclusion of all FKTPs allows for regional generalisation of the research results.

The analysis method used was panel data regression with fixed effects and random effects models to test the relationship between funding variables, FKTP performance, TB service quality, and public satisfaction. This model can control for heterogeneity among FKTPs and identify temporal effects on the dependent variable (Baltagi, 2021). The Hausman test was also applied to determine the most appropriate model. The analysis was conducted using meta data regression analysis.

The primary data sources were secondary data obtained from official documents of the Kudus District Health Office, LKjIP reports, and the TB programme and IKM databases. Funding data was obtained from the regional budget allocation for health, while performance and service quality data were obtained from SPM evaluation reports and TB programme achievements. Data validity and reliability were maintained through cross-checking from various sources and verification of official reports. This approach aligns with best practices in

health programme evaluation research (Krauss *et al*., 2020).

Overall, this methodology adopts a multivariate quantitative approach based on panel data to capture the dynamics of relationships between variables in greater detail and accuracy. This approach is in line with the latest trends in regional health research, which emphasise the importance of longitudinal analysis in evidence-based policy-making (Nguyen *et al*., 2021; Almeida *et al*., 2023).

RESULTS AND DISCUSSION

Data Description and Descriptive Statistics
Health Budget Allocation for Kudus Regency in 2023

In 2023, the Kudus District Health Office allocated a budget of Rp83.1 billion for the health sector. Most of this funding was used for the operational costs of health facilities, including health worker salaries, pharmaceutical supplies, and health service facilities. For example, in 2023, the Kudus District Health Office allocated a budget of Rp4 billion for the renovation and construction of new health facilities, such as the Rejosari Community Health Centre, Jati Community Health Centre, Jekulo Community Health Centre, and Rendeng Community Health Centre, as well as the construction of a health post in Hadipolo Village and the renovation of a health post in Karangampel. (radarmurianews.com)

Performance of Primary Health Care Facilities (FKTP)

Kudus District has 19 Community Health Centres (Puskesmas) and 1 Regional Health Laboratory (Labkesda) that function as Primary Health Care Facilities (FKTP). In 2023, all FKTP in Kudus District achieved 100% compliance with the Minimum Service Standards (SPM) indicators, including antenatal care, childbirth services, infant care, and health screening for productive-age and elderly populations. However, despite this achievement demonstrating operational effectiveness, challenges remain in terms of service quality, particularly in the Tuberculosis (TB) programme.

Quality of Tuberculosis Programme Services (TB)

In 2023, the number of TB patients treated in Kudus Regency reached 3,132 cases, with a service ratio for suspected TB cases of 106.77% of the set target. While there has been a significant increase in service coverage, the report also highlights challenges related to social stigma and low treatment adherence, which continue to hinder the effectiveness of interventions.

Community Satisfaction Index (IKM)

The Community Satisfaction Index (IKM) for FKTP in Kudus District in 2023 was recorded at 85 out of a scale of 100. Although this represents an increase from the previous year, this figure has not yet reached the 'very good' category, which is typically associated with a score >90. Internal evaluations and public complaints indicate that communication, waiting times, and facility comfort remain challenges in improving public satisfaction with primary healthcare services.

Analysis of the Relationship Between Regional Health Financing and FKTP Performance
The Impact of Budget Allocation on Achieving Minimum Service Standards (SPM)

Panel data regression results indicate that an increase in local health budget allocation has a positive and significant impact on the achievement of Minimum Service Standards (SPM) indicators at FKTP in Kudus District. Each 1% increase in the budget is associated with an average increase in SPM achievement of 0.35% ($p < 0.05$). This indicates that larger funds enable FKTP to improve basic service capacities such as antenatal care, childbirth, and health screening.

Operational Budget Use and FKTP Performance Efficiency

Data shows that the proportion of the budget absorbed by operational costs such as civil servant salaries, pharmaceutical supplies, and health service facilities is quite large, reaching around 75% of the total allocation. However, the efficiency of budget use contributes to the operational stability of FKTP, as reflected in consistent performance achievements during the 2019–2023 period. Nevertheless,

variability among FKTP indicates that facilities with more optimal budget management are able to achieve better performance.

Implications of Findings

These findings underscore the importance of adequate budget allocation and effective financial management in improving FKTP performance. However, focusing on the efficient use of funds is also crucial to maximising the outcomes of primary health care services in Kudus District.

Analysis of Tuberculosis (TB) Programme Service Quality
TB Service Coverage and Its Impact on Service Quality

Panel data analysis reveals that increased regional health funding is positively correlated with TB service coverage at FKTP Kudus. In 2023, the number of TB patients treated reached 3,132 cases with a suspected TB service ratio of 106.77% of the target. This indicates the success of improving access to TB services, particularly in the screening and early diagnosis stages.

Challenges in TB Service Quality: Stigma and Treatment Adherence

Despite quantitative improvements, significant challenges remain in terms of social stigma and low treatment adherence rates. Survey data indicate that stigma against TB patients hinders their ability to access and consistently continue treatment. This factor reduces the effectiveness of programme interventions and indicates the need for more intensive social and health education interventions.

Relationship between Service Quality and FKTP Funding and Performance

The analysis shows that TB service quality is not only influenced by the size of the budget, but also by FKTP performance factors, such as the availability of trained health workers, the completeness of diagnostic equipment, and good programme management. FKTPs with better resource management tend to provide higher-quality TB services, even with the same budget allocation.

Analysis of Community Satisfaction with FKTP Services (Community Satisfaction Index/IKM)
Trends in the Community Satisfaction Index (IKM) at FKTP Kudus

Data on the IKM of FKTP in Kudus Regency shows an upward trend during the 2019–2023 period. In 2023, the IKM score reached 85 out of 100, an increase compared to 2022 (82), but it remains in the 'Good' category and has not yet reached the 'Very Good' level (≥ 90). This increase indicates an improvement in public perception of FKTP services in general.

Service Dimensions Influencing the IKM

Based on internal evaluations and survey reports, the three main aspects most influencing the IKM score are:
- Service waiting time: Public complaints remain relatively high regarding the length of queuing and examination processes, particularly during peak hours.
- Quality of healthcare staff communication: Some respondents stated that staff communication, particularly in TB services, remains rigid and lacks information.
- Comfort of waiting areas and supporting facilities: Although some health centres have been renovated, limitations in space and ventilation still affect patient comfort.

Relationship between Funding and IKM

Panel regression results indicate that an increase in budget does not automatically improve IKM scores. The positive effect of budget on public satisfaction only becomes significant when accompanied by improvements in service processes, communication, and infrastructure. This reinforces previous findings (see Subsections 3.2 and 3.3) that the efficiency and quality of fund utilisation are more determinative than the nominal amount alone.

Integrative Model and Implications of Findings
Relationships Among Variables in the Donabedian and PBF Frameworks

Comprehensive analysis of panel data confirms the strong interconnection among the four main components: regional health financing (input), FKTP performance (process), TB service quality

(output), and public satisfaction (outcome). This framework aligns with the Donabedian Framework and the theory of Performance-Based Financing (PBF), which states that the quality of health service outcomes is highly dependent on the effectiveness of inputs and processes implemented.

Key Findings from the Panel Regression Model
The fixed-effects regression analysis shows that:
- Increased regional financing significantly improves FKTP performance scores ($p < 0.05$), particularly in SPM indicators and TB programme management.
- Good FKTP performance has a direct relationship with TB service quality, reflected in increased diagnosis and treatment coverage.
- However, the IKM variable is not directly influenced by the amount of funding, but rather through an indirect pathway via improvements in service processes and communication quality (mediating effect).

These findings indicate that strategies to improve public satisfaction require cross-dimensional interventions, not just budget increases.

3.5.3 Implications for Planning and Policy
The practical implications of this study's findings for local policymakers are:
- Health budget allocations should be directed proportionally, not only for operational purposes but also for enhancing human resource capacity and supporting infrastructure for FKTP.
- Strengthening communication training for staff, particularly in TB programmes, is necessary to improve public emotional response and trust.
- A more adaptive performance-based monitoring and evaluation system is needed, integrated with community satisfaction surveys.

The theoretical implication is that the use of panel data analysis allows for a more targeted evaluative approach compared to cross-sectional studies, as it can capture the dynamics of change between years and between service units.

CONCLUSION

1. Regional health financing shows an upward trend, but it is not yet fully proportional to service quality achievements. The total health budget allocation for Kudus has increased year by year, with most of it absorbed by operational costs for primary health care facilities (FKTP). However, the budget increase has not directly impacted perceptions of service quality, particularly in tuberculosis (TB) services and user satisfaction with primary care services (see Subsections 3.1 and 3.4).
2. The performance of FKTP, particularly in achieving the Minimum Service Standards (SPM), is very good overall, but has not fully aligned with increased public satisfaction. Indicators for basic services such as antenatal care, infants, and the elderly show optimal values (>95%). However, regression results indicate that FKTP performance variables do not significantly influence IKM scores, suggesting a missing link in public perception of service quality (see Sub-sections 3.2 and 3.4).
3. TB service quality has seen significant coverage improvements but still faces structural challenges. The TB case detection rate exceeded 100% of the 2023 target, but treatment adherence and social stigma remain barriers. Statistically, TB service quality has a positive influence on community satisfaction, underscoring the importance of technical quality and service interactions in user perceptions (see Subsections 3.3 and 3.4).
4. The Public Satisfaction Index (PSI) has increased over the past five years but has not yet reached the 'very good' category. The PSI value for Kudus Primary Health Care Facilities

(FKTP) shows a positive trend, but communication, waiting time, and comfort remain critical aspects in users' perceptions of the service. This reinforces that public satisfaction is more influenced by service experience than solely by technical output indicators (see Subsection 3.4).

5. The panel data regression model shows that the relationship between financing and public satisfaction is indirect, mediated by TB service quality and partly by FKTP performance. The Hausman test confirms that the fixed-effects model is more appropriate, and these findings support the Donabedian framework (input → process → output → outcome) and the Performance-Based Financing (PBF) approach, which emphasises the interconnection between incentives, service quality, and outcomes perceived by the public (see Subsection 3.5).

Overall, the results of this study emphasise the importance of an integrative approach in evaluating regional health systems, which not only measures technical achievements but also considers the quality of user experience and managerial effectiveness in budget utilisation.

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