Original Research

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v12i1.2024.62-73

HEALTH FINANCING ANALYSIS OF MINIMUM SERVICE STANDARDS IN THE HEALTH SECTOR

Analisis Pembiayaan Kesehatan Standar Pelayanan Minimal Bidang Kesehatan

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Abstract

Background: This research focuses on health financing Minimum Service Standards (MSS) in the health sector in Lumajang Regency, Indonesia, spanning 2019 to 2022. Despite the government's emphasis on Health MSS, disparities in service access and health conditions persist across different regions.
Aims: The research aims to provide insights into the effectiveness of health financing, serving as a foundation for policy recommendations to enhance the efficiency and effectiveness of health fund allocation in Lumajang Regency.
Methods: The research employs a quantitative descriptive approach, utilizing DHA and CBA. The study also investigates the budget allocation for MSS Health services.
Results: The findings of the research reveal that the realization of Local Original Revenue (LOR) in the Health sector tends to fall below targets. Non-Physical DAK dominate the funding sources in Community Health Centers (*Puskesmas*). Maternal health services receive the highest MSS Health budget allocation, but the spending proportion relative to total health expenditure is decreasing.
Conclusion: The research underscores the importance of addressing disparities in health financing and service access in Lumajang Regency. Recommendations include the diversification of funding sources, optimization of financing at the Puskesmas level, and a reevaluation of the budget allocation for maternal health services.

Keywords: *CBA, DHA, health financing analysis, minimum service standards*

Abstrak

Latar belakang: *Penelitian ini berfokus pada pembiayaan kesehatan dalam penerapan Standar Pelayanan Minimal (SPM) sektor kesehatan di Kabupaten Lumajang, Indonesia, selama kurun waktu 2019 hingga 2022. Meskipun pemerintah menekankan pada SPM Kesehatan, namun kesenjangan dalam akses layanan dan kondisi kesehatan masih terus terjadi di seluruh sektor wilayah yang berbeda.*
Tujuan: *Penelitian ini bertujuan untuk memberikan wawasan mengenai efektivitas pembiayaan kesehatan, sehingga dapat menjadi landasan rekomendasi kebijakan untuk meningkatkan efisiensi dan efektivitas alokasi dana kesehatan di Kabupaten Lumajang.*
Metode: *Penelitian ini menggunakan pendekatan kuantitatif dengan menggunakan District Health Accounts (DHA) dan Cost and Benefit Analysis (CBA). Studi ini juga menyelidiki alokasi anggaran untuk berbagai layanan SPM.*
Hasil: *Temuan penelitian mengungkapkan bahwa realisasi Pendapatan Asli Daerah (PAD) bidang Kesehatan cenderung dibawah target. Dana kapitasi JKN mendominasi sumber pendanaan di Pusat Kesehatan Masyarakat (Puskesmas). Pelayanan kesehatan ibu menerima alokasi anggaran SPM Kesehatan tertinggi, namun proporsi pengeluaran terhadap total belanja kesehatan mengalami penurunan.*
Kesimpulan: *Penelitian ini menggarisbawahi pentingnya mengatasi kesenjangan dalam pembiayaan kesehatan dan akses layanan di Kabupaten Lumajang. Rekomendasinya antara lain diversifikasi sumber pendanaan, optimalisasi pembiayaan di tingkat Puskesmas, dan evaluasi ulang alokasi anggaran pelayanan kesehatan SPM Bidang Kesehatan.*

Kata kunci*: analisis pembiayaan kesehatan, CBA, DHA, standar pelayanan minimal*

Indonesian Journal of Health Administration (*Jurnal Administrasi Kesehatan Indonesia*)
p-ISSN 2303-3592, e-ISSN 2540-9301, Volume 12 No.1 2024, DOI: 10.20473/jaki.v12i1.2024.62-73.
Received: 2023-11-24, Revised: 2024-04-14, Accepted: 2024-04-30, Published: 2024-06-20.
Published by Universitas Airlangga in collaboration with *Perhimpunan Sarjana dan Profesional Kesehatan Masyarakat Indonesia (Persakmi)*.

How to cite:
Risdiyanti, A., Paramu, H. and Sunarto. (2024) "Health Financing Analysis of Minimum Service Standards In The Health Sector", *Indonesian Journal of Health Administration*, 12(1), pp. 62-73. doi: 10.20473/jaki.v12i1.2024. 62-73.

Indonesian Journal of Health Administration
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Introduction

Quality health services are a fundamental prerequisite for achieving societal well-being. In this context, the health sector's Minimal Service Standards (MSS) are a crucial benchmark (World Health Organization, 2022). MSS in Health, as regulated by Minister of Health Regulation No. 4 of 2019, mandates that every citizen is entitled to basic health services of a minimal type and quality. However, despite Health MSS being a government priority to narrow regional gaps, on-the-ground realities still reveal significant disparities in service access and health conditions across various regions. The implementation of MSS poses a complex challenge, particularly concerning local health financing schemes (Myloneros and Sakellariou, 2021). In this context, the study of local health financing schemes in Indonesia becomes a focal point of interesting debate. Local governments are responsible for planning, financing, and distributing health services, but policy complexity and local political interests influence their role in health financing allocation (Sunarto, 2020; Santinha *et al.*, 2023). In an effort to achieve Health MSS targets, the central government's role in health financing regulation remains dominant. In Lumajang Regency, despite an increase in the regional budget value in recent years, the budget allocation for health MSS has not seen a proportional increase.

The data show that health financing in Lumajang Regency is still far from the desired target, as reflected in the decreasing percentage of the budget allocated to health MSS from year to year. Reconciliation results of the Regional Budget Implementation of Lumajang Regency (2019-2022) reveal data for Health MSS financing recorded as 5.89% of the regional government's health budget in 2019 (amounting to IDR 19,871,181,718 out of a total of IDR 337,220,278,143.91). Subsequently, in 2020, it was 3.94% of the regional government's health budget (amounting to IDR 13,175,653,782 out of a total of IDR 334,306,388,483.6). In 2021, it was only 2.01% of the regional government's health budget (amounting to IDR 8,525,902,328 out of IDR 423,663,017,207.13). The latest data for 2022 show a further decrease to 1.89% of the regional government's health budget (amounting to IDR 7,963,801,042 out of IDR 421,720,186,525.47) (Pemkab Lumajang, 2022).

Reconciliation results of budget and Health MSS realization data from 2019 to 2022 indicate significant fluctuations, with some Health MSS indicators still below 50% of the target. This condition raises serious concerns, especially when compared to the monitoring and evaluation results of the Lumajang Regency Health MSS team, noting that the performance of the Health MSS program has not yet reached the 100% target. Therefore, this study delves deeper into the health financing scheme in Lumajang Regency. The primary focus will be on District Health Account (DHA) analysis as a tool to understand health fund flows systematically (Haryani, Nasution, and Ginting, 2022; Gani, 2022). Additionally, the Cost and Benefit Analysis (CBA) approach will be applied to measure the economic efficiency of basic health services and evaluate the impact of investments in fulfilling Health MSS financing (Brent, 2023). This study is expected to reveal a clearer connection between health financing schemes, the fulfillment of Health MSS targets, and the economic impact of these investments (Darrudi, Khoonsari, and Tajvar, 2022). Better alignment between programs, activities, outputs, and outcomes is anticipated through comprehensive and evidence-based analysis (Lundmark *et al.*, 2021). This serves as an important initial step to enhance the effectiveness and efficiency of resource utilization in achieving Health MSS targets in Lumajang Regency (Xu *et al.*, 2018).

Method

This research employed a descriptive research design with a quantitative analysis approach to provide an overview or description of government-sourced health financing in the implementation of Minimal

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Service Standards (MSS) in the health sector in Lumajang Regency from 2019 to 2022. The integrated approach includes a District Health Account (DHA) and Cost-Benefit Analysis (CBA) with a focus on income allocation, expenditure allocation, and budget expenditure appropriateness (Murniati, Indrayathi, and Januraga, 2020). Secondary data used are derived from MSS Health budget documents in Lumajang Regency from 2019 to 2022. Secondary data collection involves instruments in the form of data collection forms prepared by the researchers. Data analysis was carried out through pivot tables, considering nine dimensions of the District Health Account (DHA), involving funding sources, budget managers, service providers, types of activities, budget items, programs, activity levels, and beneficiaries (John *et al.*, 2019).

The research was conducted in the Lumajang Regency Government, involving the Health Office and Community Health Centers. The research period extended from January to September 2023, covering the permission process, primary data collection, data cleaning and processing, data analysis, and result writing. The research object is MSS Health service activities in the Health Office and Community Health Centers in Lumajang Regency. Data processing used a computer with simple calculations using pivot tables, followed by data analysis (Palupi *et al.*, 2020). Identification of costs and benefits was conducted to illustrate the comparison between total costs and total benefits received from MSS Health financing (Hauck *et al.*, 2018).

After identifying the value of benefits and costs, a Benefit-Cost Ratio (BCR) calculation was performed to evaluate whether the benefits are proportional to the investment made (Rahmiyati *et al.*, 2019). BCR was calculated by comparing total benefits with total costs. Research ethics approval involves informed consent, anonymity, and confidentiality of research subject information. This research has been submitted to the Ethics Commission of the Faculty of Dentistry, University of Jember. The analysis was conducted to assess the cost requirements for meeting the targets of the Minimal Service Standards in the Health Sector in the Lumajang Regency. The gap between needs and the budget spent was also evaluated.

The classification of budget based on programs helps clarify program objectives by determining the desired outputs. Additionally, the program's impact was evaluated based on health outcomes, financial protection, and community responsiveness (Kruk *et al.*, 2018). The research findings are presented in tables, graphs, and narratives to facilitate readers' understanding of the study's discoveries. This research is expected to provide insights into the effectiveness of health financing in implementing the SPM in the Health Sector in Lumajang Regency. This analysis can serve as a foundation for local government policies to enhance the efficiency and effectiveness of health fund allocation.

Result and Discussion

Health Financing MSS

The allocation of the income budget in the health sector in Lumajang Regency during 2019-2022 highlights the reality that the Local Original Revenue (LOR) in the health sector generally did not reach the set target, except in 2019, when it reached 109.59%. The realization of income from LOR sources remains stable, rarely exceeding 50 billion rupiahs, with the capitation funds from Social Security Administrative Body - National Health Insurance Program (BPJS JKN) being the main contributor, especially after the status of public health centers changed to Regional Public Service Bodies in 2021. Despite yearly fluctuations, income from JKN capitation funds remains dominant, reaching 97.56% in 2022, while income from local levies tends to decline after 2020. Budget allocation for health services under the Health Sector MSS during 2019-2022 shows fluctuations. In 2019, maternal health services received the highest allocation, while in 2020, services for individuals with severe mental disorders had the highest allocation. Expenditure realization tends to decrease from 2019 to

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2022, with an average expenditure absorption of around 65.73%. Although the highest budget allocation is for maternal health services, the highest absorption percentage is in the services for Hypertension and TB patients. Compared to the budget allocation, the total expenditure realization shows fluctuations, with a significant decrease in 2020 and fluctuations in the following years.

Identification of BCR

Table 1 shows that from the 4-year time series data, the direct benefit-to-cost ratio (BCR) is consistently greater than one each year. In 2019, the BCR was 1.72, meaning that for every 1 million rupiahs spent on the direct costs of implementing Health Sector MSS (SPM), a profit of 1.72 times was gained in the effort to improve the public health status. In 2020, the BCR was 1.09, signifying that for every 1 million rupiahs spent on the direct costs of implementing Health Sector MSS, a profit of 1.09 times was obtained. In 2021, the BCR was 1.42, indicating that for every 1 million rupiahs spent on the direct costs of implementing Health Sector MSS, a profit of 1.42 times was gained. In 2022, the BCR was 4.91, meaning that for every 1 million rupiahs spent on the direct costs of implementing Health Sector MSS, a profit of 4.91 times was achieved in the effort to improve the public health status. In 2022, the direct benefits received by the community reached the highest BCR value. The district's ratio of direct benefit value to direct expenditure for Health Sector MSS is relatively consistent and stable. The value of benefits obtained closely matches the cost incurred. The calculation of total cost elements (total cost), derived from the summation of direct and indirect costs, is compared with total benefit elements (total benefit), obtained by summing direct and indirect benefits, as detailed in Table 2.

Table 2 shows that the total benefit value of financing the implementation of Health Sector MSS for improving the public health status is much greater than the total cost value. It is almost ten times and even reaches thirty times. One of the reasons is that the value of indirect benefits is greater than direct benefits, significantly influencing the BCR value. The BCR values range from a minimum of 9.56 in 2020 to a maximum of 34.11 in 2022. In 2019, with a BCR of 10.41, it means that for every 1 million rupiahs spent on the implementation of Health Sector MSS, a profit of 10.41 million rupiahs is gained. In 2022, with a BCR of 34.11, it means that for every 1 million rupiahs spent on the implementation of Health Sector MSS, a profit of 34.11 million rupiahs is obtained. In 2022, the value of benefits received is significantly higher compared to previous years. The results of comparing the value of benefits and the value of financing Health Sector MSS found that the volume of cases drives the difference in benefit values served. All results show that BCR > 1, indicating that financing Health Sector MSS should be a regional priority program in addressing regional health issues.

Table 1
BCR for Direct Cost- Benefit

Variable	Value of SPM Health Services (in million rupiah)			
	2019	2020	2021	2022
Direct Cost (DC)	19.890,98	13.159,54	8.515,10	7.923,52
Direct Benefit (DB)	34.189,83	14.354,09	12.099,05	38.904,12
Net direct benefit D(B-DC)	14.298,85	1.194,55	3.583,95	30.980,60
BCR (DB/DC)	1,72	1,09	1,42	4,91

Indonesian Journal of Health Administration
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Table 2
BCR for Total Cost-Benefit

Variable	Value of SPM Health Services (in million rupiah)			
	2019	2020	2021	2022
Total Cost (TC)	19.871,19	13.175,66	8.525,90	7.963,80
Total Benefit (TB)	206.941,21	126.230,34	103.453,59	271.607,81
Net benefit (TB-TC)	187.070,03	113.023,10	94.927,69	263.644,01
BCR	10,41	9,56	12,13	34,11

Table 3
MSS deviation in Lumajang Regency

No	SPM Health sector	MSS deviation (%Performance Achievement - %Financing Fulfillment)				Average	Standard Deviation
		2019	2020	2021	2022		
1	Pregnant Women's Health Services	-24,83	33,52	30,66	-0,05	9,83	27,65
2	Maternal Health Services	-119,33	-28,86	11,68	68,73	-16,95	79,13
3	Newborn Health Services	30,04	49,59	92,82	85,61	64,52	29,76
4	Toddler Health Services	78,72	75,87	84,5	88,01	81,77	5,49
5	Health Services at Primary Education Age	-18,05	53,87	31,55	69,25	34,16	38,09
6	Health Services in the Productive Age	76,58	49,86	64,5	68,78	64,93	11,22
7	Health Services for the Elderly	71,46	56,38	70,94	76,06	68,71	8,54
8	Health Services for Hypertension Sufferers	21,66	13,43	37,69	39,35	28,03	12,59
9	Health Services for Diabetes Mellitus Sufferers	28,07	47,21	90,25	73,3	59,71	27,53
10	Health Services for People with Serious Mental Disorders	-193,23	-178,19	93,9	43,66	-58,47	148,48
11	Health Services for People with TB	49,02	27,28	-9,21	52,88	29,99	28,46
12	Health Services for People at Risk of HIV Infection	-11,43	-21,24	35,86	49,65	13,21	34,81

Information:
Negative deviation (%performance achieved-%direct cost fulfillment <0)
Positive deviation (%performance achievement-%direct cost fulfillment >0)

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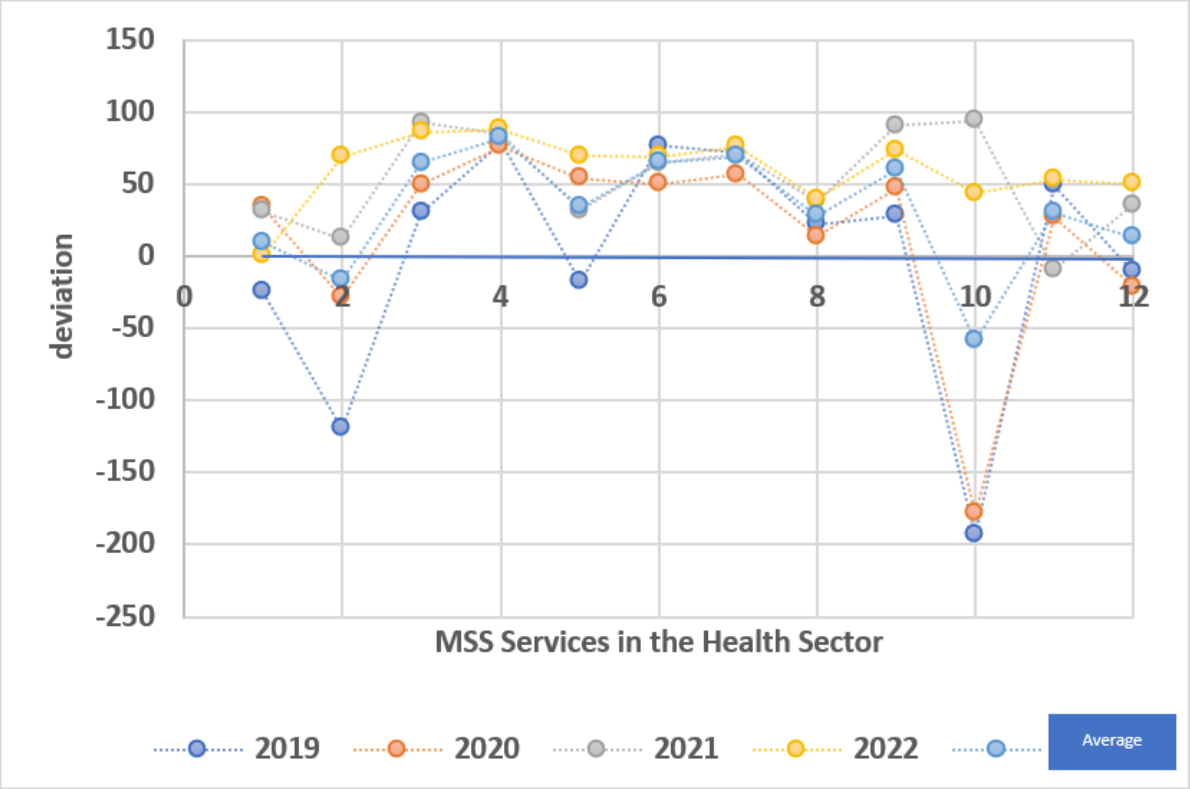

SourceL Primary Data

Figure 1. Scatter Diagram of MSS Deviation

In 2021, negative deviations were only found in health services for TB patients (-9.21). Other Health Sector MSS services had positive deviation values. In fact, three services had positive deviations of more than 90, namely services for newborns, patients with diabetes mellitus, and individuals with severe mental disorders. In 2022, negative deviations were only found in antenatal care services (-0.05). Other Health Sector MSS services had positive deviation values, with the highest score in services for toddlers (88.01). The average deviation results show that two Health Sector MSS services have negative average deviations, namely services for individuals with severe mental disorders (-58.47) and services for maternal health (-16.95). Other services have positive average deviations, with the highest score in toddler health services (81.77). The distribution of deviation values over four years is presented in the form of a Scatter Diagram in Figure 1.

In Figure 1, the distribution of percentage deviation in performance target achievement with the percentage of total cost fulfillment for Health Sector MSS services in Lumajang Regency is dominated by positive values compared to negative deviation values. It means that the performance achievement of the Health Sector MSS implementation in Lumajang Regency is already performance-based. The total allocated and spent costs provide leverage for the success of the Health Sector MSS program. However, there are still some services that show significant negative deviation values, resulting in a large standard deviation, such as services for maternal health and services for individuals with severe mental disorders.

Discussion

Health Financing of MSS

Despite becoming the foundation of a high-quality health system, Primary health services in Indonesia often fail to fulfill their roles. The government is responsible for providing basic health services based on MSS, but health financing remains a challenge. Health expenditure in Indonesia

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p-ISSN 2303-3592, e-ISSN 2540-9301
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is low compared to other countries, and the budget proportion for the Health Sector MSS tends to decrease (Au Yong *et al.*, 2021). The ability of regions to fulfill the financing needs of basic health services, especially to achieve MSS targets, is still not optimal. Despite the increase in regional health budgets, they are not fully allocated effectively for the Health Sector MSS. There is a decrease in the percentage of regional health spending directed towards meeting MSS service needs, while the total budget increases. The limitation of Health Sector MSS funding is one of the reasons for the low achievement of MSS performance targets in Lumajang Regency. The focus on the quantitative aspects of services to meet MSS targets, without ensuring equality and accessibility of services for vulnerable populations, is a major constraint. The largest source of funding comes from central government transfer funds, especially from the Revenue Sharing Fund, indicating a high dependence on central funds. Financing for the Health Sector MSS in Lumajang Regency has not yet become a priority in health budget allocations (Indriyanti, 2023). Studies indicate that the proportion of government financing for public health will not be sustainable in the future, given the faster growth of health financing needs than economic growth. An aging population and epidemiological transitions will increase the financing burden, requiring modifications or interventions in health financing (Cristea *et al.*, 2020).

Funding for the implementation of Health Sector MSS is still highly dependent on funding sources from the central government, while SPM has become the mandatory responsibility of local governments. District/city governments should be able to allocate sufficient Regional Budget to achieve SPM indicator targets. Financing for health promotion and prevention programs, especially Health Sector MSS services, is still relatively small compared to curative financing (Tandon and Reddy, 2021). The study also notes variations in SPM achievements among Puskesmas caused by inhibiting factors, such as budget limitations, infrastructure, and human resources. Dependence on assistance from the state budget, while budgets from village funds and Puskesmas BLUD are relatively small, hinders the achievement of MSS performance targets. Additionally, the study results show that financing is more dominant for curative-rehabilitative activities compared to promotive-preventive activities, reflecting budget cuts in preventive health sector MSS services (Zeng *et al.*, 2020). Improvements in budget allocation and financing priorities are needed to ensure that preventive efforts receive more attention. The new Health Law Number 17 of 2023, which eliminates mandatory spending for health expenditures, demands a performance-based budget principle. In this context, health financing in Lumajang Regency tends to be an operational (direct spending) of more than 98%, with the capital expenditure of less than 1%. The allocation of financing based on the level of activities shows that the implementation of Health Sector MSS activities is predominantly received by the community at the district, village, and community levels (Syafrawati *et al*., 2023). Although there are monitoring and evaluation programs, the intensity and methods of monitoring and evaluation vary between programs. Financing based on beneficiaries shows almost equal distribution across all age groups, but further investment is still needed in specific age groups, such as the productive age and the elderly. In order to improve the quality of health services and achieve Health Sector MSS targets, coordination of health financing among involved agencies is required. Overall, this study highlights the need for expanded financing, increased budget allocation for Health Sector MSS services, and a greater focus on preventive efforts to ensure comprehensive public health (Yaghoubi *et al.*, 2023).

Adequacy Costs of Minimum Service Standards in Lumajang Regency

Information on MSS costs in Indonesia is limited, while variations in healthcare costs between regions are quite significant. A study in Lumajang Regency shows that the direct cost estimate to

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achieve Health Sector MSS targets requires a significant budget allocation. The unit cost of MSS at the District Health Office ranges from IDR 24,872 to IDR 1,580,122. The total estimated direct cost needs are highest for TB and HIV, while the lowest is for Hypertension. In 2019-2022, the estimated direct cost needs increased from IDR 90.051 billion to IDR 117.235 billion. However, cost fulfillment only reached about 8.33%-22.07% of the total estimated needs each year. This gap indicates that the available and spent financing is insufficient, and there is potential for an increase in financing needs as fulfillment decreases (Clark *et al.*, 2018).

The study also highlights the practice of annual MSS budgeting in districts/cities that tends to use the estimated expenditure from the previous year, not reflecting the actual costs. Research conducted at the Puskesmas Palengaan, Pamekasan Regency, shows that the income projection in 2021 increased by 10%, but the fulfillment of Health Sector MSS performance indicators decreased due to the insufficient budget allocation. Health service analysis shows a gap between fulfillment and estimated needs, especially in services for toddlers, productive ages, and elderlies. Some services have fulfillment below IDR 10 billion compared to estimated needs. Conversely, there are services with fulfillment of more than 100%, indicating excessive cost allocation. Disease prevention and service integration are recognized as crucial factors for a quality healthcare system (AbdulRaheem, 2023). Increasing fiscal space for health can be achieved through macroeconomic improvements, health reprioritization, tax allocation, grants, and efficiency. Although creating new resources is important, improving efficiency is also recognized as a practical way to increase fiscal space in countries with low resources (Zeng *et al.*, 2020).

Identification Costs and Benefits of Minimum Service Standards in Lumajang Regency

The analysis of budget performance aims to ensure the effectiveness and efficiency of the government intervention towards the root problems of the community. Cost-Benefit Analysis (CBA) is conducted to evaluate programs by calculating total monetary costs and benefits. Financing for the Health Sector MSS in Lumajang Regency (2019-2022) is divided into direct and indirect costs. Generally, direct costs are greater than indirect costs, indicating the performance basis in Health Sector MSS services. The highest fulfillment of direct costs is in maternal health services, while the lowest is in newborn care services. Direct costs show a decreasing trend each year (*Hyeda et al.*, 2022).

The total benefits of implementing Health Sector MSS, including direct and indirect benefits, vary each year. The highest benefit value was achieved in 2022 at IDR 271.61 billion, while the lowest was in 2021 at IDR 103.45 billion. Direct benefits come from avoiding inpatient and outpatient costs for patients at Puskesmas. Direct benefits show annual variations, with the largest component coming from avoiding outpatient costs at Puskesmas. Indirect benefits are greater than direct benefits, especially from avoiding the loss of productivity for patients and their companions during outpatient treatment (Zawudie *et al.*, 2022).

Analysis of Budget Outputs MSS

Health Sector MSS services in Lumajang Regency have been implemented by the District Health Office and *Puskesmas*, but their overall performances have unreached the targets. The graphical display shows variations in the achievement of Health Sector MSS among services from 2019 to 2022. Although some services achieve 100% of the target, there are achievement gaps for some services below 50% in certain years. Successful implementation is related to internal and cross-sector communication and coordination, from planning to monitoring and evaluation (Gooding *et al.*, 2022). Plans for achieving Health Sector MSS targets are outlined in local government planning documents such as RPJMD, *Renstra*, and RKPD. The year of 2022 indicated a more balanced radar of performance achievement. The research

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findings highlight deviations in the percentage of performance target achievement and direct cost fulfillment for Health Sector MSS (Légaré *et al.*, 2018). Most of the positive deviation values indicate that performance-based achievement and financing influence the success of the program (Amin and Cek, 2023). However, some services, such as for maternal health and severe mental disorders, show significant negative deviation, creating a large standard deviation.

Conclusion

Based on this research, it is concluded that in Lumajang Regency, the realization of Local Original Revenue (LOR) in the Health Sector tends to be lower than the target, Central transfer fund (Non-physical DAK) domination of funding sources from Puskesmas. The highest budget allocation for Health Sector MSS is in maternal health services, while the expenditure proportion to the total district health budget is decreasing. High dependence on central transfer funds indicates the need for diversification of funding sources. Puskesmas plays a key role in managing, financing, and providing Health Sector MSS services, with the involvement of the District Health Office and BPJS *Kesehatan*. The estimation of direct cost needs shows variation, and although there is an annual increase in financing, it is not optimal to finance all the direct cost needs of basic health services in Health Sector MSS.

The impact analysis of implementing Health Sector MSS shows that the direct benefit-to-cost ratio remains stable and relatively similar, with the total benefit-to-cost ratio being greater. Although most of the performance achievements of Health Sector MSS are performance-based, there are still some services with significant negative deviations, such as services for maternal health and severe mental disorders.

Abbreviations

BCR: Benefit Cost Ratio, *BPJS: Badan Penyelenggara Jaminan Sosial* (Social Security Administrative Body); *BLUD: Badan Layanan Umum Daerah,* LOR: Local Original Revenue, MSS: Minimum Service Standart, *RPJMD: Rencana Pembangunan Jangka Menengah Daerah* (Regional Medium-Term Development Plan), *Renstra: Rencana Strategis* (Strategic Plan), *RKPD: Rencana Kerja Pemerintah Daerah* (Regional Government Work Plan).

Declarations

Ethics Approval and Consent Participant

Respondents were addressed before the survey about the survey's objectives and purposes, and verbal consent to participate in the study was taken from ethical FKG Unej No.1785/UN25.8/KEPK/DL/2022

Conflict of Interest

The authors declare no conflict interest in this study.

Availability of Data and Materials

Not applicable.

Authors' Contribution

AR wrote the original draft, concept, methodology, reviewed, and edited the manuscript. HP and SS: conceptualized, and reviewed the methodology.

Funding Source

Not applicable.

Acknowledgment

We would like to acknowledge all respondents and Universitas Jember

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
p-ISSN 2303-3592, e-ISSN 2540-9301
10.20473/jaki.v12i1.2024.62-73

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