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The role of the government internal control system (SPIP) in budget optimization in local governments in Indonesia

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ABSTRACT

This study analyzes the role of SPIP, the internal control of Indonesia, within the broader framework of Public Financial Management (PFM) and how it influences the appropriation of health budgets to achieve Sustainable Development Goal 3 (SDG 3). In contrast to previous studies, which have predominantly focused on the coverage of health budgets, SPIP emerges, theoretically, as a moderating variable intervening between the relationship between expenditure on health and health results. Using JKN coverage, Indonesia's National Health Insurance program and chief tool for pursuing universal coverage for health, for tracking the realization of SDG 3, a dataset of 538 municipalities for a period of five years, from 2018 until 2022 (2,690 observations), the study conducts Moderated Regression Analysis using Generalized Least Squares, considering heteroscedasticity, as well as autocorrelation, for estimation. While the results confirm that a greater appropriation of the health budget promotes the success of JKN, whose impact is significantly boosted by SPIP due to the enhancement of transparency, accountability, and due utilization of the budget, evidence exists that points towards a strong internal control, when complemented with effective management of the budget, facilitating a catalyst towards SDG 3 realization. Furthermore, it provides impetus towards another motivation for policymakers to increase sustainability, along with greater inclusivity, for health developmental efforts, strengthen strategies for health budgeting, and realize SPIP implementation strategies.

Keywords: Function Budget, SDGs, SPIP

1. INTRODUCTION

The third Sustainable Development Goals (SDGs), which speaks to Good Health and Well-being, requires the provision of access to a health service that is universal, equitable, and of high quality. However, several problems, particularly at the local government level, hinder the fulfillment of this aim in Indonesia. Unequal distribution of the health budget, not being able to use it efficiently, and having weak monitoring and supervisory systems are the main problems that do not allow the optimization efforts to work for this sector (Putri et al., 2024). In such an instance, several studies have started focusing on analyzing the impact that SPIP has on making health budgets more effective in local governments in Indonesian regions and its impact on attaining SDGs. Many earlier works, such as Stenberg et al. (2017) and Hasanah (2017), articulate the fact that low-income countries do not usually have sound estimates of the incremental resources needed to improve comprehensive health service delivery, since attaining SDGs involves heavy investments in different sectors. Studies by Anantika & Sasana (2020); Mahulauw et al. (2017); Sari et al. (2016) & Febrianto & Astrid Maria Esther (2023) have proved that health budgets are of great value in raising the Human Development Index. Safitri (2022) further established that increasing health budget allocations leads to improvements in public health welfare. Ziolo et al. (2021) showed that the effective realization of the SDGs requires an integrated and efficient financial model, grounded in public financial systems and markets, which are inherently interdependent in achieving sustainable financing Kennedy et al. (2020) stated that one of the determinants of budget absorption is the government's internal control system Malelea et al. (2024) asserted that strong local supervisory mechanisms are crucial for realizing the SDGs, while Sakinah et al. (2024) confirmed that the Government Internal Control Apparatus significantly influences SDG attainment. Most existing research tends to focus on broad issues, such as investment needs, financial frameworks, and international oversight, rather than zeroing in on how the SPIP system could be fine-tuned to manage health budgets at the local government level in Indonesia, with the aim of advancing health-related SDG targets. This leaves a significant gap in the existing literature. This study aims to examine the specific role of SPIP in optimizing local health budgets in Indonesia and to assess its impact on achieving health-related SDG goals.

The attainment of the SDGs is undeniably a collective responsibility that must be pursued by all stakeholders (Adikancana, 2024). At the global level, countries under the United Nations have designed and implemented programs to achieve SDG targets, one of which is Universal Health Coverage (Nurul & Fithriana, 2017). As a UN member, Indonesia faces complex challenges in its health sector, driven by rapid urbanization and unequal distribution of health budgets (Hosiana et al., 2024). To achieve this goal, local governments strive to achieve the objectives of SDG 3 by expanding access to JKN, a nationally established health insurance program for individuals. This study represents SDG 3, which encompasses multiple health targets through National Health Insurance (JKN) coverage. JKN, Indonesia's National Health Insurance, is significantly influential in the country's healthcare sector. This is not merely a mundane insurance card; it functions similarly to a thermometer, assessing the efficacy of the system. While it does not resolve every significant issue associated with SDG 3, such as maternal mortality, severe infectious diseases, or the challenges posed by chronic illnesses, it nonetheless provides valuable insights into Indonesia's progress towards universal healthcare. Individuals who rigorously analyze this subject, along with politicians who frequently discuss it, utilize JKN data to assess the government's fiscal and managerial capabilities. Furthermore, because of JKN's pervasive presence and frequent discourse, it serves as a reliable indicator for the general populace—and indeed, anyone attentive within the government—to assess whether conditions are genuinely improving in terms of equity and health for all, rather than merely benefiting a fortunate minority.

The implementation of JKN in 2014 marked an important milestone in Indonesia's efforts to improve public health (Syarwi & Roring, 2024). The health budget subsequently assumed a pivotal role and became essential for the program's ongoing viability. This shift also introduced fundamental changes to the structure of the health budget, as both central and local governments must allocate substantial resources to guarantee program continuity (Stenberg et al., 2017). Law Number 17 of 2023 concerning Health stipulates that regional governments are responsible for allocating health budgets sourced from

regional revenues and expenditures while maintaining alignment with regional fiscal policies and financial coordination with the central government. In practice, the primary priority of this budget, whether sourced from the State Budget or the Regional Budget, is to cover the contributions of Contribution Assistance Recipients (PBI), who are predominantly low-income households. In addition to PBI financing, health funds are also directed toward improving infrastructure through the development of health facilities, procurement of medical equipment, and training of health workers, ensuring that program implementation can be sustained in the long term (Anderson et al., 2020).

Even in academic circles, it is clear that the Sustainable Development Goals (SDGs) will not gain meaningful traction without the proactive involvement of local governments. Law No. 23 of 2014 lays this out quite explicitly: local administrations are entrusted with the planning, execution, and proper oversight of development initiatives, ensuring that essential public services reach those who need them. This is not merely lip service.

Law No. 17 of 2023 goes further by pointing out that local governments are responsible for handling health budgets, all within the framework of regional fiscal policy and in coordination with both the central and regional financial systems. This is not just about writing checks and walking away; there is a real expectation to monitor how funds are used, ensuring that every rupiah genuinely advances public health. The integration of the SDGs further enhances the quality of planning and implementation, helping us move closer to better health outcomes for communities (Kricy & Simbel, 2021), by increasing transparency, enhancing accountability, and aligning resource allocation with community priorities. Thus, the SDGs serve as a crucial oversight tool that ensures the effectiveness, efficiency, and accuracy of SDG 3 health program implementation.

This study analyzes data acquired from 2018 through 2022, which covered 2,690 observations drawn from provincial, district, and city administrations, and finally arrives at the finding that the health function budget has a positive impact on achievement of Sustainable Development Goal 3 (SDG 3). Moreover, the study reveals that the System of Internal Control (SPIP) strengthens the health budget's effectiveness in pushing health development towards SDG 3. In summary, the findings and implications are presented as follows. First, this study provides new empirical evidence revealing a positive correlation between disbursements from the health budget and the attainment of SDG 3 (Good Health and Well-Being), particularly concerning National Health Insurance (JKN) coverage. This study confirms that expanded provisions out of the health budget will directly increase the coverage of communities under the JKN scheme, as hypothesized from a study of observational evidence borrowed from various local governmental administrations across Indonesia. Second, this study uncovers that SPIP serves a moderating role and therefore fortifies the correlation between the health budget and the attainment of SDG 3. This consequently means that a sound internal control mechanism shall facilitate local governments to ensure that their systems for managing their budgets are effective, transparent, and accountable. In summary, SPIP is a governance tool that confirms that disbursements outside the budget are properly distributed and have a quantifiable impact on health outcomes for all.

This study is unique because it combines the health function budget, the Strategic Plan for Investment in Public Health (SPIP), and Sustainable Development Goal 3 (SDG 3) under a unified analytical framework. Unlike earlier studies that mostly focused on the direct association between financial spending and health outcomes, this study identifies SPIP as a moderating factor. This approach provides a new perspective for evaluating the impact of internal control mechanisms on the effectiveness of health spending for SDG 3 support. Previous studies, for instance, have been carried out by Hasanah (2017) and Putra et al. (2023), which mostly analyzed the impact of budgets on the Human Development Index (JKN) coverage, without examining the workings of internal control mechanisms. In addition, this study adopts a five-year panel dataset covering 538 local governments, which is rare in the previously established literature. The adoption of SPIP as a moderating variable and a large panel dataset form key additions to the novelty of this study.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Agency Theory

Jensen and Meckling (1976) first pioneered analyzing agency theory, which explains the contractual relationship between a principal, who grants authority, and an agent, who executes that authority. In the public sector, local governments act as agents for the public (principals) and are responsible for the effective, efficient, and ethical use of public funds, such as health budgets. This conceptual framework asserts that conflicts of interest can arise due to information asymmetry, as agents often have a more comprehensive perspective of activities than principals. To counter this limitation and reduce opportunities for moral hazards, a robust internal control system must be established. In this study, the Government Internal Control System (SPIP), founded on agency theory, plays a central role in ensuring that public health funds are used with transparency and consistency with Sustainable Development Goal 3 (SDG 3). SPIP acts as a tool for oversight, ensuring that all parties seamlessly execute their responsibilities. By countering information asymmetry, SPIP increases public accountability and allows principals to determine the degree to which agents discharge their public obligations.

2.1.1 Sustainable Development Goals (SDGs)

The Sustainable Development Goals (SDGs) have 17 specific goals and 169 specific targets with defined deadlines for achievement. The United Nations (UN) adopted the SDGs as a framework for enhancing human life quality and, at the same time, safeguarding the environment. The SDGs were formally adopted on October 21, 2015, by a UN resolution. This is significant because it reflects the commitment of nations across the globe towards a shared developmental goal by 2030. The SDGs represent an evolution from the Millennium Development Goals (MDGs), which 189 leaders signed at the Millennium Declaration at the UN Headquarters in 2000 and at the stroke of 2015's close.

2.1.2 The Role of the Health Function Budget in the Achievement of the SDGs

The rather small amount of the state budget allocated for the health sector indicates a minimal consideration of health as a component of national development (Syamsul, 2023). This can result in the creation of new structural issues that, in the long term, require increasingly larger public financial expenditures. The health functions budget serves as a significant policy tool for enhancing both accessibility and quality of health services (Devi et al., 2024). Excessive government spending on health services promotes the expansion of national health insurance coverage. This evolution has led to the creation of additional healthcare centers, the use of additional physicians and other health experts, and the assurance that patients have access to essential medicine. Empirical evidence indicating that significant boosts in health allocations trigger the expansion of health insurance coverage in developing nations, as ample fiscal funds facilitate the execution of additional effective and comprehensive health programs. They also demonstrated that enhanced health allocations significantly facilitate the expansion of health insurance coverage in developing nations, such that appropriate fiscal allocations facilitate the distribution of additional effective and comprehensive health programs. Similarly, Putra et al. (2023) established that administrations within Indonesia that received larger health allocations accelerated the enrollment of beneficiary entities in the National Health Insurance (JKN) scheme at a faster rate than administrations that received smaller allocations (Rahman et al., 2021), unearthed a positive relationship between expansion in health expenditures and the success of health insurance implementation within Southeast Asia. From a theoretical perspective, the input–output model postulates that the budget functions as a core input within the health system, with the anticipated output being the enhancement of health indicators, such as national health insurance coverage. Therefore, effective health budget allocation enables the provision of effective and non-discriminatory health programs, directly influencing the achievement

of SDG 3. Thus, it is assumed that the health function budget plays a crucial role in sustaining health-related SDGs. Based on this, the first hypothesis (H1) of this study is proposed as follows:
H1: Health function budgets have a positive effect on the achievement of SDG 3, as proxied by JKN coverage at the local government level

2.1.3 The Role of SPIP in Strengthening the Role of the Health Function Budget in Achieving the Health SDGs.

Several studies have directly suggested that the effectiveness of local government internal supervision plays a crucial role in achieving SDGs. Malelea et al. (2024) and Sakinah et al. (2024) highlight that the performance of the Government Internal Control Apparatus plays a critical role in advancing the achievement of the SDGs. The Government Internal Control System (SPIP) serves as a governance mechanism designed to ensure that public budget management, including allocations to the health sector, is carried out in an efficient, effective, and accountable manner (Aziz & Susilowati, 2023; Barroy et al., 2024; Tapsoba et al., 2024). In addition to agency theory, the COSO Internal Control Framework offers another theoretical foundation for comprehending the role of the Internal Control System. COSO outlines five interrelated elements: the control environment, risk assessment, control activities, information and communication, and monitoring. Together, these elements enable an organization to accomplish its goals. These factors help clarify how the Internal Control System works to ensure that health outcomes and health sector spending allocations are better aligned. This is achieved by decreasing wastage, decreasing the possibility of misuse, and making health program implementation more accountable.

If effective, the System of Internal Control (SPIP) can enhance the relationship between the health budget and the provision of health insurance coverage for the entire citizenry by restraining misappropriation of the budget, boosting transparency, and ensuring that financial resources for public health purposes are utilized according to public health priorities. Wijayanti & Pratama (2021) provide empirical evidence showing that effective SPIP practices in Indonesian local governments improve the efficiency of budget utilization in the National Health Insurance (JKN) program, thereby improving access to health services. Their research shows that a robust SPIP ensures appropriate allocation of the health budget, facilitating the expansion of JKN membership. Furthermore, research by Yusuf et al. (2022) in developing countries revealed that the implementation of strong internal control systems increases public trust in national health initiatives, thus encouraging increased enrollment in health insurance programs. Many agree that being transparent and accountable with public funds is one of the most important things that can be done to improve the quality of public services in Indonesia (Furqan et al., 2020). In this regard, SPIP provides local governments with a means to directly monitor and assess the effectiveness of health initiatives. The SPIP ensures that health budget allocations are managed effectively and used to advance SDG 3. Accordingly, it is posited that the implementation of the SPIP strengthens the role of health budget functions in achieving the SDGs, particularly within the health sector. Thus, the second hypothesis (H2) is formulated as follows:
H2: SPIP strengthens the relationship between health function budgets and the achievement of SDG 3, as proxied by JKN coverage at the local government level

2.2 RESEARCH METHODOLOGY

2.2.1 Data

This study employed purposive sampling to determine the sample. The dataset utilized comprises information from 548 districts and cities across Indonesia from 2018 to 2022. Nevertheless, six districts/cities within the Special Capital Region (DKI) of Jakarta, which are incorporated into the reporting entity of DKI Jakarta Province, along with four regions lacking health budget data, were excluded from the research sample. Consequently, the final sample consisted of 538 local governments, representing approximately 98.17 percent of the total districts/cities and provinces in Indonesia for each

observation year. Given that the study covered a five-year observation period, the total number of observations was 2,690. All data employed in this research were obtained from official government institutions in Indonesia: the Ministry of Home Affairs for health function budget data, local government age, and total asset information; the Financial and Development Supervisory Agency (BPKP) for data on the maturity level of the Government Internal Control System (SPIP); and Bappenas for data on the achievement of SDG 3, particularly on national health insurance coverage.

2.2.2 Analytical Techniques

This study applies the Moderated Regression Analysis (MRA) technique to examine the influence of independent variables on the dependent variable by incorporating the interaction between moderating variables and the primary independent variables. The use of MRA is justified by the objective of this research, namely, to assess whether the SPIP variable reinforces the effect of the health function budget on the attainment of SDG 3. To address potential classical econometric issues, such as heteroscedasticity and autocorrelation within panel data, the Generalized Least Squares (GLS) approach with robust standard error adjustments is employed. This method is deemed more suitable than Ordinary Least Squares (OLS) as it produces more efficient estimates in the context of panel data encompassing both cross-sectional and time-series dimensions. The estimation procedure is conducted using STATA version 14 software.

2.2.3 Empirical Models and Variable Operationalization

To answer the research problem and at the same time test the empirical model in this study, the following hypotheses are proposed:

$$SDG3_{It} = \beta0 + \beta1Angkes_{it} + \beta2Bpkspip_{it} + \beta3(Angkes_{it} \times Bpkspip_{it}) + \beta4Size_{it} + \beta5Ages_{it} + \varepsilon_{it} \quad \text{.....(1)}$$

$SDG3_{it}$ serves as an indicator to assess progress toward the Sustainable Development Goals (SDGs) by measuring the percentage of National Health Insurance (JKN) coverage; a higher percentage reflects broader access to health insurance across the regions. JKN coverage is employed as a proxy for SDG 3 because it directly represents Indonesia's official pathway to achieving Universal Health Coverage (UHC), a core component of SDG 3. Although it does not capture all health dimensions, this indicator provides a reliable and policy-relevant measure of progress in Indonesia. $Angkes_{it}$ represents the variable for health function budgeting by local governments at the district, city, and provincial levels in Indonesia, measured using the natural logarithm of the allocated health function budget. $Bpkspip_{it}$ denotes the SPIP maturity variable, which is assessed on a scale from 0 to 5. Level 0 indicates that the local government has no policy for implementing internal control practices. Level 1 reflects the presence of internal control practices, although they are not systematically organized around risk management and control, thereby limiting the identification of weaknesses. Level 2 signifies that internal control practices exist but remain poorly documented, are heavily reliant on individuals rather than institutional structures, and lack evaluations of control effectiveness, leaving significant deficiencies unaddressed. Level 3 shows that internal control practices are implemented and documented, although evaluation procedures are not sufficiently formalized. Level 4 demonstrates that internal controls are effectively executed, including adequate documentation and evaluations. Finally, Level 5 indicates that internal control practices are institutionalized, integrated, and supported by automated monitoring through computer applications. A higher maturity level reflects stronger SPIP implementation in terms of the control environment, risk assessment, control activities, communication and information, and monitoring mechanisms.

Control variables are incorporated to account for external factors influencing SDG 3 outcomes that are not the primary focus of the study. Their inclusion enhances the accuracy of the analysis by isolating the genuine effects of the main variables, namely the health function budget and SPIP, on SDG 3's achievement. Moreover, the size and age of local governments may shape their capacity for health

budget planning and implementation, necessitating control to prevent biased results. In this study, $Size_{it}$ is operationalized using the natural logarithm (LN) of total local government assets. In this context, the size of local governments illustrates the scope of available human resources and assets, encompassing current assets, investments, and fixed assets, including infrastructure and public service facilities such as roads, irrigation systems, office buildings, schools, and other facilities. $Ages_{it}$ represents the age of local governments from 2018 to 2022, measured by the number of years since the establishment of the respective local government until 2022. See Table 1

Tabel 1. Variable Operationalization

Variabel	Variable Operationalization	Data Source
$SDG3_{It}$	It is a variable for the achievement of the Sustainable Development Goals (SDGs) which is measured using the percentage of National Health Insurance Coverage (JKN), an increasing percentage illustrates the increasing health insurance coverage in the regions.	National Development Planning Agency (BAPPENAS)
$Angkes_{it}$	It is a variable of budgeting for the health function of the local government of districts/cities/provinces in Indonesia which is measured by the natural logarithm of the budget of the health function.	Ministry of Home Affairs (KEMENDAGRI)
$Bpkspip_{it}$	It is a SPIP maturity variable measured using levels 0-5.	Financial and Development Supervisory Agency (BPKP)
$Size_{it}$	It is a variable of local government size measured using the Natural Logarithm (LN) of Total Local Government Assets.	Ministry of Home Affairs (KEMENDAGRI)
$Ages_{it}$	It is the variable of the age of the Regional Government in 2018-2022 which is measured using the number of years of formation of the local government until 2022	Ministry of Home Affairs (KEMENDAGRI)

Data Source: Processed by Researcher (2025)

3. RESULTS AND DISCUSSION

3.1 Statistics Descriptive

The complete descriptive statistical overview of the variables in this study is presented in Table 2.

Table 2. Descriptive Variable in Statistics

Variable	Mean	Std. Dev.	Min	Max
$SDG3_{It}$	40.36	18.39	0	97.64
$Angkes_{it}$*	330.91	553.29	38.37	13,660.76
$Bpkspip_{it}$	2.43	0.72	0	3
$Size_{It}$ *	5,331.47	24,471.74	50.17	684,976.32
$Ages_{it}$	43.11	24.02	4	72

Number of Observations = 2.690
*) In billions of rupiah
$SDG3_{it}$ is a variable for the achievement of the Sustainable Development Goals (SDGs) which is measured using the percentage of National Health Insurance (JKN) coverage, an increasing percentage illustrates the increasing coverage of health insurance in the regions. $Angkes_{it}$ Angkesit is the independent variable for local government health function budgets (district/city/province), reported in nominal values (billions of rupiah) in this table for descriptive clarity. For regression analysis, this variable is transformed into the natural logarithm to address scale differences and improve statistical robustness (Wooldridge, 2012). $Bpkspip_{it}$ is the moderating variable measuring the maturity of the Government Internal Control System

(SPIP) on a theoretical scale of 0–5. During the observation period (2018–2022), the maximum observed score was 3, reflecting the actual maturity levels of local governments. The $size_{it}$ is a control variable representing the size of local governments, measured by the natural logarithm of total local government assets. $Ages_{it}$ is a variable of the age of local governments in 2018-2022 which is measured using the number of years of local government formation until 2022.

Source: Secondary data, STATA-14 output (processed 2025).

Table 2 presents the results of the descriptive statistical analysis for all variables employed in this study. The mean value of $SDG3_{it}$ is 40.36, indicating that, on average, the sampled local governments remain within a moderate level of JKN coverage, with a minimum score of 0 and a maximum of 97.64. Substantial variation is reflected in the standard deviation of 18.39, suggesting pronounced disparities in health coverage across regions. The $Angkes_{it}$ variable reveals that the average allocation of health budgets in local governments amounts to 330.91 billion rupiah per year. Nevertheless, this allocation displays considerable variation, with a standard deviation of 553.29 billion rupiah, a minimum of 38.37 billion rupiah, and a maximum of 13,660.76 billion. Such wide disparities most likely capture the differences in fiscal capacity and budgetary priorities among the regions included in the sample. The $Bpkspip_{it}$ variable shows that the mean SPIP maturity level across local governments is 2.43, suggesting that, on average, the sampled regions fall within the "developing" category.

In addition, the average total assets of local governments were recorded at 5,331.47 billion rupiah, with the lowest at 50.17 billion rupiah and the highest reaching 684,976.32 billion rupiah, a pattern that plausibly reflects the gap between smaller jurisdictions and metropolitan areas. Meanwhile, the **$Ages_{it}$** variable indicates that the average age of local governments in the dataset is 43.11 years, implying that most regions possess a relatively mature governmental structure. With the youngest local government aged 4 years and the oldest 74 years, this variation illustrates the coexistence of newly established regions alongside those with a long institutional history dating back to independence. Furthermore, the results of the correlation analysis among the variables are presented in Table 3.

Table 3. **Variable Correlation Analysis**

Variabel	**$SDG3_{It}$**	**$Angkes_{it}$**	**$Bpkspip_{it}$**	**$Size_{It}$**	**$Ages_{it}$**
$SDG3_{It}$	1.000				
$Angkes_{it}$	0.118***	1.000			
	0.000				
$Bpkspip_{it}$	0.144***	0.251***	1.000		
	0.000	0.000			
$Size_{It}$	-0.041**	0.762***	0.996***	1.000	
	0.033	0.000	0.000		
$Ages_{it}$	0.270***	0.597***	0.303***	0.365***	1.000
	0.000	0.000	0.000	0.000	
Number of Observations = 2,690 **Explanation of the operationalization of variables in table 1** *****, **, * = P-value significant 1%, 5% and 10%**					

Source: Secondary data, STATA-14 output (processed 2025).

Table 3 presents the correlation analysis, illustrating how the primary variables assessed in this study are interconnected. The data reveal a significant relationship among *Angkesit*, *Bpkspipit*, and *SDG3it*, which reinforces their mutual influence and provides a solid foundation for subsequent hypothesis testing.

These results underscore that health budget distribution and the sophistication of internal control systems are critical components in driving the achievement of health-related Sustainable Development Goals (SDGs) at the local government level. Furthermore, the strong relationship between *Bpkspipit* and *Sizeit* indicates that regions with a larger asset base tend to have more mature internal controls. This relationship demonstrates the importance of regional asset capacity in building a strong and effective internal control system.

Regarding the control variables, *Agesit* shows a significant positive correlation with *SDG3it*, *Angkesit*, and *Sizeit*. This suggests that the age of local governments, which is a good measure of their administrative experience, is an important factor in helping them achieve health-related SDG goals and in improving local asset management. On the other hand, *Sizeit* has a negative correlation with SDG3it, suggesting that regions with many assets may not be fully optimizing the use of their resources for health services.

3.2 Hypothesis Testing

Hypothesis testing in this study was carried out using the Moderated Regression Analysis (MRA) method to analyze the influence of independent variables on dependent variables by including the interaction between the moderation variable and the independent variable. The analysis was carried out with the help of STATA 14 software. To ensure reliable results, this test uses Generalized Least Squares (GLS) with robust error standard adjustments. The results of the hypothesis test can be seen in the following Table 4.

Tabel 4. Hypothesis Testing Results

$SDG3_{It} = \beta0 + \beta1Angkes_{it} + \beta2Bpkspip_{it} + \beta3(Angkes_{it} \times Bpkspip_{it}) + \beta4Size_{it} + \beta5Ages_{it} + \varepsilon t$.....(1)			
Variabel	**Expected Sign**	**Individual Model Test**	**Full Model Test**
		$SDG3_{it}$	**$SDG3_{it}$**
Cons		105.623	223.161
		0.000	0.000
$Angkes_{it}$	H1: (+)	3.945***	-0.513
		0.000	0.791
$Bpkspip_{it}$	(+/-)	2.271***	-46.044***
		0.000	0.011
$Angkes_{it}$*$Bpkspip_{it}$	H2: (+)		1.847***
			0.007
$Size_{it}$	(+/-)	-6.397***	-6.437***
		0.000	0.000
$Ages_{it}$	(+/-)	0.198***	0.197***
		0.000	0.000
Prob > F		**0.000**	**0.000**
Adj R-Square		**0.109**	**0.111**
Obs		**2.690**	**2.690**
Explanation of the operationalization of variables in table 1 *****, **, * = P-value significant 1%, 5% and 10%**			

Source: Secondary data, STATA-14 output (processed 2025).

The model's Adjusted R-Square value of 0.110 indicates that 11% of the variation in SDG 3 achievement can be explained by the variables included. Nevertheless, this relatively modest value suggests that additional factors beyond those examined may better capture the determinants of SDG 3

performance. The Prob > F statistic ($p < 0.01$) confirms that the research model is statistically significant in explaining the moderating role of SPIP in optimizing the health budget toward achieving SDG 3. Table 4 further shows that the health function budget has a positive and significant effect on SDG 3 achievement, with a coefficient of 3.945 at the 1 percent significance level. Given the log-level specification of the model, this result should be interpreted as indicating that a one-unit increase in the logarithm of the health budget is associated with an approximate 3.945 percent change in JKN coverage, thereby supporting H1. Moreover, the interaction term between the health budget and SPIP, as the moderating variable, also exerts a positive and statistically significant influence on SDG 3 achievement, with a coefficient of 1.847 at the 1 percent significance level. This finding validates H2 and suggests that the effectiveness of health budget utilization in advancing SDG 3 is significantly reinforced when local governments implement SPIP effectively. Regarding the control variables, local government size and age produced significant coefficients of -6.397 and 0.198, respectively, at the 1 percent level. These results imply that while larger government size (as proxied by assets) may complicate resource prioritization toward health outcomes, longer-established local governments tend to demonstrate more institutional maturity in achieving SDG 3.

The first set of findings broadly corroborates prior studies by by Sari et al. (2016); Stenberg et al. (2017); Hasanah (2017); Mahulauw et al. (2017); Anantika & Sasana (2020); Safitri (2022) and Febrianto & Astrid Maria Esther (2023), which collectively affirm that optimization of the health budget contributes to enhanced SDG attainment. Health sector budget optimization, encompassing more effective and efficient allocation of resources, has been empirically demonstrated to improve the quality of healthcare services, broaden accessibility, and enhance key public health indicators. Strategic and well-targeted budgetary increases in this sector directly elevate community welfare and advance SDG targets, particularly those pertaining to health and well-being. This study shows that incremental increases in health spending help achieve the SDGs by expanding the coverage of the National Health Insurance (JKN). This growth not only improves overall public health but also makes social and economic conditions more equitable and sustainable (Hapsoro & Bangun, 2020). Therefore, policymakers should strive to improve strategic health budget management so that everyone in society can benefit from inclusive and sustainable development.

The second finding emphasizes the importance of the Government Internal Control System (SPIP) in improving the link between local government health budgets and the achievement of health-related Sustainable Development Goals (SDGs). Kennedy et al. (2020) asserted that the integrity of internal controls within government entities is a crucial factor for efficient budget absorption, as a well-organized system ensures the proper allocation of resources, reduces discrepancies, and enhances accountability in program implementation. Malelea et al. (2024) and Sakinah et al. (2024), also provide supporting evidence by demonstrating that internal control mechanisms ensure regulatory compliance and directly contribute to achieving SDG goals. In practice, effective control systems enable local governments to improve the implementation of health programs, resulting in improvements in key health indicators, including reduced maternal and child mortality, increased immunization coverage, and more effective management of infectious diseases (Collins et al., 2023; Soucat et al., 2023).

Evidence from Wijayanti & Pratama (2021) in the Indonesian context shows that effective implementation of SPIP improves the efficiency of health budget utilization in the National Health Insurance (JKN) program. This efficiency not only reduces waste but also improves access to quality services and health coverage, especially in remote and underserved areas. Yusuf et al. (2022) also show that developing countries with strong internal control systems generate greater public trust in their national health programs. This trust is crucial for encouraging people to enroll in health insurance programs like JKN, which contributes to the program's long-term sustainability. High levels of public trust also mean that the public has a positive opinion of how the health budget is managed, which helps achieve more health-related SDGs. In line with these findings, SPIP can be considered a significant moderating variable that enhances the impact of the health budget on achieving SDG 3 (Musiega et al., 2024). By using SPIP appropriately, local governments can manage health budgets more effectively, transparently, and accountably, while reducing errors that can slow program implementation (Lathifah et al., 2024).

Furthermore, strong oversight through SPIP increases government responsiveness in addressing issues such as unequal access and resource allocation constraints during program implementation.

These findings indicate that local government size, as measured by total assets, is negatively correlated with SDG 3 achievement. This result suggests that jurisdictions overseeing larger asset portfolios may face greater challenges in prioritizing health-related initiatives, in part due to conflicting fiscal obligations or complexities in resource distribution. On the other hand, local government age has a positive effect on SDG 3 performance. This means that older local governments tend to have greater institutional maturity and experience in managing health budgets. This finding aligns with Setyaningrum & Syafitri (2012), who stated that older local governments are typically more capable of implementing health programs effectively, thus enhancing their ability to meet health-related SDG targets.

4. CONCLUSION AND SUGGESTION

This analysis confirms that health budget optimization in local government administrations is a vital determinant of Sustainable Development Goals (SDGs) achievement relevant to the health area, as assumed from preliminary findings. This type of optimization that entails the efficient and effective use of funds strengthens health services quality, boosts coverage of health centers, and results in improved health outcomes, such as lowered mortality rates for children and mothers, enhanced infectious disease coverage, and improved life expectancy. The current study corroborates earlier studies that underscore the role of health budget strategic planning for achieving health development that is inclusive and equal. One of the subsequent findings identifies the role of the Government Internal Control System (SPIP) as a significant moderating factor that strengthens the relationship between health budget expenditure and health-related SDGs achievement. The effective use of the SPIP ensures that local administrations utilize their budgets in a clear and transparent manner that is accountable and consistent with national health development objectives. A robust internal control system bolsters the use of funds from the budget, builds public trust, emboldens civic participation in national health activity, and curtails the risk of financial scandals. These mechanisms together reinforce each other in accelerating and sustaining health-related SDGs gains.

Overall, this study reveals that successful achievement of Sustainable Development Goals (SDGs) in the health field greatly relies on harmonious alignment between maximizing health budgets and effective execution of efficient Health Service Support (SPIP). The interaction of these elements promotes effective governance, improved resource use, and highly effective health programs that bring on board all the pertinent actors. Therefore, it is critical for local authorities to strengthen strategic planning in health budget allocation as well as embrace aggressive SPIP practices for ensuring sustainability and long-term success in health development goal achievement.

4.1 Suggestion

In future works, it will be valuable for the analytical model to incorporate additional variables like participation from the communities, the performance of local government organs (OPDs), and the implementation of digital technology in the usage of budgets and internal control mechanisms. The implementation of longitudinal design will enable researchers to determine the long-run effects of implementing SPIP and health budgets administration on meeting health-related Sustainable Development Goals (SDGs). The comparative studies at various regions or nations can provide valuable insights on the gaps in the implementation of policies and assist in identifying best practices that can be transferred from different contexts of governance.

SPIP implementation for steadily increasing transparency, accountability, and efficiency in health budget management is also crucial for local governments. The budget planning needs to be responsive and dynamic with respect to the requirements of communities and responsive to emerging issues such as health emergencies. Involvement of communities in the reporting and follow-up process is equally important as it can instill confidence and encourage public accountability. The local jurisdictions also need

to interface with other stakeholders for maximum impact on accessible resources. These steps need to function in unison for efficient and sustainable attainment of health-related SDGs.

4.2 Implication

These findings present important policy implications, particularly for local governments, in strengthening the quality of SPIP implementation. Embedding a robust internal control system within the planning and execution of health budgets enables governments to achieve not only greater efficiency and effectiveness in resource utilization but also sustained progress in meeting the SDGs. This highlights that the success of health programs is shaped not solely by the magnitude of budget allocations, but by the extent to which those resources are managed under sound governance principles reinforced by SPIP.

Ethical Approval
Not Applicable

Informed Consent Statement
Not Applicable

Authors' contributions
IA contributed to the conceptualization, research design, data collection, and formal analysis. He also prepared the first draft of the manuscript and coordinated the revision process. ACF contributed to the supervision, methodological guidance, data interpretation, and critical review of the manuscript. Both authors are affiliated

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