

Implementation of Internal Control Systems (*SPIP*) to Strengthen Environmental Health Program Management at Community Health Centers

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ABSTRACT

Effective management of environmental health programs in community health centers (*Puskesmas*) is crucial to prevent diseases such as acute respiratory infections, diarrhea, and leptospirosis. However, existing practices often rely on reactive rather than preventive risk assessments, limiting program effectiveness. This study investigates the application of the Government Internal Control System (*SPIP*) in managing environmental health programs, focusing on the mediating roles of transparency and data quality, and the reinforcing role of internal audits. A qualitative descriptive approach was used through interviews with *Puskesmas* leaders, sanitarians, program staff, and internal auditors, combined with observations and document review. The findings show that transparency in budgeting and program activities, as well as the quality of health data, critically mediate *SPIP*'s effectiveness, while internal audits remain compliance-oriented. The study contributes conceptually by extending internal control literature to program outcomes and recommends integrating *SPIP* with transparent, data-driven, and outcome-focused monitoring to strengthen accountability.



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1. Introduction

Health is a fundamental human right, and the most ideal achievement of this is through Universal Health Coverage (UHC), where everyone has the right to access quality health services anytime and anywhere without facing financial barriers. However, the Global Monitoring Report on UHC 2023 shows that the world is not on the right track to achieve the UHC 2030 targets, as since 2015, the coverage of health services has tended to stagnate and an increasing number of people are facing catastrophic health expenditures. In 2019, more than two billion people experienced financial hardship due to health costs, including 344 million people living in extreme poverty (WHO, 2023a).

In the Indonesian context, the report notes an improvement in reducing the proportion of the population facing catastrophic health expenditures from 0.9% in 2017 to 0.4% in 2018. Nevertheless, this figure still represents more than one million Indonesians who fell into poverty due to health costs. On the other hand, the Service Coverage Index (SCI), which had increased from 42 in 2010 to 56 in 2019, has decreased to 55 in 2021. Sub-index analysis shows that only Maternal and Child Health (MCH) falls into the 'very high service coverage' category, while control of infectious diseases, non-communicable diseases, as well as capacity and access to services remain in the 'moderate service coverage' category. This condition highlights the gap in the coverage of interventions that must be addressed urgently, particularly through strengthening primary health services (WHO, 2023b).

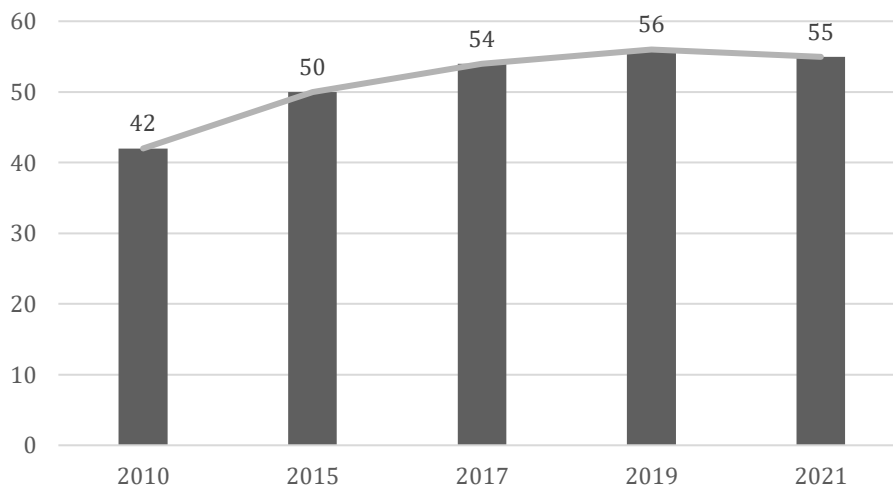


Figure 1. UHC Service Coverage Index in Indonesia, 2010-2021

Source: WHO, 2023b

The environmental health programs implemented by Community Health Centers (*Pusat Kesehatan Masyarakat/Puskesmas*) play a strategic role in preventing and controlling environment-based diseases such as leptospirosis, acute respiratory infections (ARI), and sanitation-related illnesses at the community level. As the frontline of primary healthcare services, community health centers are widely distributed across Indonesia and serve as the spearhead of government efforts to ensure equitable and responsive access to health services. However, various studies have shown that the effectiveness of environmental health program management in many community health centers remains limited.

Research conducted by Oktavidiati (2023) at Community Health Center Jalan Gedang in Bengkulu City revealed that community interventions were only carried out after cases had already occurred. A similar situation was found at the Sanitation Clinic of Community Health Center Kedung Badak in Bogor City during the COVID-19 pandemic, where Standard Operating Procedures (SOPs) were not adapted, staff training remained insufficient, and interventions were far from optimal (Nuryanto et al., 2024). These facts highlight a clear gap between the urgent need for preventive environmental health practices and the reactive tendencies of program implementation.

When examined through the lens of disease trends, data from the Kemenkes (2023) indicate that ARI cases continue to rank among the leading causes of community health centers visits, with a higher prevalence in densely populated urban areas. Diarrheal disease, linked to poor sanitation, remains a major cause of morbidity among children under five in many provinces, while leptospirosis emerges as an endemic threat in regions with high rainfall and inadequate drainage systems. These conditions underscore the critical importance of effective environmental health programs, as weak promotive and preventive measures can exacerbate the burden of environment-related diseases.

Recent epidemiological data reinforce this urgency. The WHO Health Emergencies Monthly Report (June 2024) documented an increase in ARI cases in Indonesia in early 2024 compared to the previous year, followed by a decline in line with the expansion of ILI/ARI sentinel sites from 46 to 74 units. This trend suggests an improvement in national surveillance capacity; however, the effectiveness of community health center in early detection and response to environment-related diseases remains weak (WHO, 2024).

Structural barriers at the community health centers level further weaken program effectiveness. Abdillah et al. (2025) identified four major obstacles: limited environmental health personnel, inadequate technical equipment, insufficient continuous training, and restricted operational budgets. These challenges contrast sharply with the latest accreditation standards, which require governance based on internal control, transparency, and high-quality data. Thus, the gap between governance norms and operational realities at community health centers remains significant.

In practice, several barriers persist at the community health center level. First, limited human resources with environmental health competencies often hinder sustainable monitoring and community education. Second, health environmental data are frequently incomplete or inaccurate, making it difficult to use as the basis for risk analysis or program planning (Kemenkes RI, 2022). Third, SOPs are inconsistently applied, particularly in responding to environmental emergencies or disease outbreaks, as observed at Community Health Center Kedung Badak in Bengkulu City (Nuryanto et al., 2024). Fourth, low transparency in budget management and reporting makes program accountability difficult to assess objectively. These challenges highlight the urgent need for internal control systems that function not only as compliance mechanisms but also as governance instruments to foster transparency, data quality, and effective monitoring.

The literature on internal control implementation in community health center generally emphasizes staff performance or financial accountability, while less attention is given to the effectiveness of environmental health programs. Zandrato et al. (2022) found that internal control and leadership style significantly influenced employee performance at Community Health Center Lotu in North Nias Regency. Meanwhile, Sihombing & Triani (2024) demonstrated that control activities, information and communication, and monitoring have a positive and significant effect on the performance of health workers at community health center in Sidoarjo. Suwardi et al. (2022) added that internal control affected the financial accountability of BLUD Community Health Center during COVID-19, although not all control components had a significant effect. These findings reveal a limited research focus: the effectiveness of internal control specifically in environmental health programs has yet to become a primary concern.

Contemporary public governance approaches emphasize that integrity, internal control, and auditing are mutually reinforcing pillars of service quality in public sector organizations, including community health center. The OECD stresses that integrity is one of the pillars of political, economic and social structures, and is a cornerstone of good governance (OECD, 2020). This integrity framework encourages the integration of risk management and the value-added role of internal audit in strengthening internal controls and managing integrity risks at both national and subnational levels relevant to community health centers governance in Indonesia.

In the Indonesian context, recent empirical evidence shows that the role of internal control in service quality is not always linear but often mediated by transparency. A study on community health centers during the COVID-19 pandemic concluded that internal control implementation was not associated directly with service quality but the association was mediated by transparency (Pratolo et al., 2022). This finding enriches the stewardship perspective, which suggests that compliance and accountability alone are insufficient; they must be accompanied by information openness and public accountability for internal control to truly enhance service performance.

Cross-national evidence also underscores the importance of internal control in public sector governance. A study conducted in 2024 emphasizes that the main objective of internal auditing is to assess the effectiveness and efficiency of internal controls, risk management, and governance processes (Kamara, 2023). Lubis et al. (2024) reported that internal control positively and significantly affects fraud prevention in the Provincial Inspectorate. Even in the global private sector, recent research has shown a positive correlation between internal control quality and audit quality, particularly in organizations adopting digital transformation (Liu et al., 2025).

In Indonesia, the latest health standards and policies emphasize the importance of internal control in Community Health Centers (*Pusat Kesehatan Masyarakat/Puskesmas*). The 2023 community health centers Accreditation Instrument stipulates that the organizational governance of community health centers includes document control and data and information management, which are regulated by Minister of Health Decree Number HK.01.07/MENKES/165/2023 concerning Community Health Center Accreditation Standards. The quality of health data as a prerequisite for control is also emphasized in Minister of Health Regulation No. 18 of 2022 concerning Single Health Data, which states that quality data must meet the elements of “completeness, accuracy, timeliness, and consistency (Kemenkes RI, 2022). These regulations emphasize the importance of control, transparency, and data integration as the basis for managing environmental health programs.

Nevertheless, significant research gaps remain. First, previous studies have not explicitly linked internal control to the effectiveness of environmental health programs in community health centers. Second, the mediating role of transparency and data quality has been rarely discussed, even though empirical evidence suggests their importance. Third, recent internal control frameworks such as COSO and INTOSAI highlight the coordination of control, risk management, and the role of internal audit in strengthening integrity and governance in the public sector (OECD, 2020).

Departing from the theoretical map and evidence above, this research is directed to examine how the implementation of the Government Internal Control System (*SPIP*) in the management of environmental health programs at community health centers affects the quality of processes and program outcomes through concrete governance mechanisms, namely budget transparency, quality of health data, and monitoring functions. At the regional level, environmental health issues in Pangkalpinang City, Bangka Belitung Islands Province, present a compelling empirical context. Based on data from the Pangkalpinang City Health Office (2024), cases of Acute Respiratory Infections (ARI) and diarrheal diseases remain among the top five causes of outpatient visits in local community health centers, accounting for approximately 25% of all morbidity cases.

Meanwhile, periodic monitoring reports also highlight challenges in household waste management, water sanitation quality, and vector control in coastal and densely populated areas such as *Puskesmas* Selindung, Pangkalbalam, and Air Itam. These findings indicate that many environmental health programs are still reactive and fragmented, with limited use of accurate and timely data for planning and evaluation. Such conditions underscore the critical need for an effective internal control mechanism (*SPIP*) that ensures preventive, transparent, and accountable program implementation especially given the resource disparities and operational challenges faced by community health centers in semi-urban areas.

Therefore, this study specifically explores how the configuration and quality of *SPIP* implementation in environmental health programs influence the quality of program execution and outcomes, with transparency and data quality serving as mediating variables, and internal audit/supervision as a moderating factor that can either strengthen or weaken control effectiveness in preventing non-compliance and integrity risks.

The purpose of this research is to empirically test the influence of internal control implementation on the quality of environmental health programs in community health centers; to explain the mediating role of budget transparency and data quality; to evaluate the contribution of internal audits/oversight in strengthening controls; and to formulate policy recommendations so that environmental health management becomes more preventive, accountable, and aligned with accreditation standards and the latest integrity/risk management guidelines. In this way, the research is expected to close the conceptual-empirical gap between the norms of internal control and the quality of environmental health program implementation at the primary service level.

2. Literature Review

Pratolo et al. (2022) examined the relationship between internal control implementation and service quality in community health centers during the COVID-19 pandemic. Their findings highlighted that internal control practices were not directly associated with service quality unless accompanied by adequate transparency and accountability mechanisms, suggesting that transparency acts as a full mediator. This study underscores the importance of governance practices beyond formal procedures, showing that internal control must be complemented by information openness to stakeholders in order to improve service delivery. Although the research was conducted in a pandemic context with a cross-sectional design, it provides a strong conceptual basis for understanding the mediating role of transparency in strengthening internal control within community health centers.

Lubis et al. (2024) further reinforced the importance of internal control in the Indonesian public sector by analyzing its role in fraud prevention. Their study, conducted within provincial inspectorates, demonstrated that internal control had a positive and significant effect on preventing fraud, while audit quality did not always yield consistent results. Although the focus was primarily on integrity and fraud-related outcomes, the findings remain highly relevant to public health governance, as strong internal control systems are essential to minimizing maladministration in the management of environmental health programs. The implication for community health centers is clear: effective *SPIP* implementation can reduce risks of inefficiency and ensure accountability in resource utilization for community-based health initiatives.

Complementing these perspectives, Sihombing & Triani (2023) applied the COSO internal control framework to community health centers in Sidoarjo and revealed that specific components such as control activities, information and communication, and monitoring were significantly associated with the performance of health workers. This indicates that strengthening communication channels and monitoring systems directly enhances the operational capacity of health centers in implementing health programs. While limited to a local context and published as proceedings rather than a peer-reviewed journal, the study offers practical evidence that supports program-oriented internal control, emphasizing outcome-based monitoring over purely administrative compliance.

Taken together, these studies provide a coherent empirical foundation for the current research. They demonstrate that internal control significantly influences performance and governance in community health centers, but its effectiveness depends heavily on mediating factors such as transparency and data quality, as well as reinforcing mechanisms like monitoring and audit. This aligns with the research model of this study, which positions transparency and data quality as key mediators and internal audit as a strengthening mechanism for achieving higher effectiveness in environmental health program management at the primary health care level.

Table 1. Summary Table of Literature Review

Author(s) & Year	Context / Focus	Key Findings	Relevance to Current Study
Pratolo, et al. (2022)	Community health centers service quality during COVID-19 (Indonesia)	Internal control had no direct effect on service quality; transparency fully mediated the relationship.	Highlights the mediating role of transparency in linking internal control to program/service outcomes.
Lubis et al. (2024)	Public sector inspectorates in Indonesia	Internal control significantly prevented fraud; audit quality showed inconsistent effects.	Shows that strong <i>SPIP</i> reduces risks of maladministration, relevant for managing environmental health programs in community health centers.
Sihombing & Triani (2023)	Health workers' performance community health centers in Sidoarjo	COSO components (control activities, info & communication, monitoring) had positive effects on staff performance.	Emphasizes that communication and monitoring strengthen operational capacity, supporting program-oriented internal control.

Source: Processed by Researcher, 2025

3. Research Method

This study employs a descriptive qualitative approach with the aim of exploring the implementation of internal control systems in the management of environmental health programs at Community Health Centers (*Pusat Kesehatan Masyarakat/Puskesmas*). This approach was selected to provide an in-depth understanding of processes, experiences, and governance practices occurring in the field, while simultaneously linking them to theoretical frameworks of internal control such as COSO and *SPIP*, as well as public governance principles regulated by the OECD and the Indonesian Ministry of Health.

The study was conducted at five community health centers, namely Pangkalbalam, Pasir Putih, Air Itam, Selindung, and Girimaya in Pangkalpinang City, Bangka Belitung Islands Province. These sites were purposively selected to represent variations in managerial capacity, service coverage, and operational contexts between urban and semi-urban areas. The research involved a total of 12 informants, consisting of five heads of community health centers, three environmental health officers (sanitarians), two program management staff, and two internal auditors or regional inspectorate officers who are directly involved in supervision and control functions. This composition ensures a balanced perspective between managerial, operational, and supervisory roles.

The conceptual framework of this study illustrates the hypothesized relationships between internal control systems (*Sistem Pengendalian Intern Pemerintah/SPIP*), transparency and data quality, and the effectiveness of environmental health program management at Community Health Centers. The model is theoretically grounded in the COSO Internal Control Framework and Indonesia's *SPIP* Regulation (Government Regulation No. 60 of 2008), which emphasize five core components of control: control environment, risk assessment, control activities, information and communication, and monitoring.

In this framework, *SPIP* implementation is positioned as the independent variable influencing transparency and data quality within program management processes. Transparency and high-quality data serve as an intervening variable that mediates the relationship between internal control systems and program effectiveness. Effective internal control mechanisms when supported by accurate, timely, and accessible data are expected to strengthen the planning, execution, and monitoring of environmental health initiatives. Meanwhile, the audit function (conducted by internal auditors or regional inspectorates) acts as a moderating variable, reinforcing the linkage between transparency, data quality, and overall program effectiveness. Through periodic audits and evaluations, this function ensures that control mechanisms are consistently implemented and that deviations are detected early, thereby improving accountability and governance outcomes. The conceptual relationship is

visualized in a diagram depicting the pathways from *SPIP* implementation to transparency and data quality, which in turn influence program effectiveness, moderated by the audit function.

Data collection was carried out using three main techniques. First, in-depth interviews with community health centers heads, sanitarians, and internal auditors to gather insights on internal control practices, challenges, and the role of transparency and data quality. Second, participatory observation was performed to examine operational activities in environmental health programs, such as monitoring drinking water quality, managing medical waste, and conducting promotive and preventive community health activities. Third, a document review was conducted on official records, including Standard Operating Procedures (SOPs), activity reports, *SPIP* documents, *Satu Data Kesehatan* datasets, internal audit reports, and accreditation results of community health centers.

Data analysis employed a thematic approach using the interactive model of Miles, Huberman, & Saldaña (2014), which includes stages of data reduction, data presentation in thematic matrices or coding trees, and conclusion drawing verified against theories of internal control and public governance. To ensure data validity, the study applied source and method triangulation, member checking with key informants, and peer debriefing with health policy experts. The entire research process adhered to ethical principles of social and health research. Informed consent was obtained from each informant, personal data was kept confidential, and the results are presented objectively without causing harm to the institutions or individuals involved.

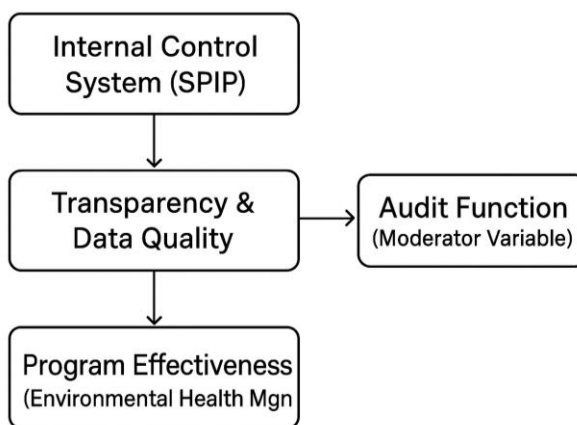


Figure 1. Conceptual Framework of *SPIP* Implementation, Transparency, and Program Effectiveness
Source: Processed by Researcher, 2025

4. Results and Discussion

4.1. Results

The study shows that the implementation of the Government Internal Control System (*SPIP*) in Community Health Centers (*Puskesmas*) operates with varying degrees of effectiveness across service units. Within the control environment component, most community health center heads demonstrate a formal commitment to environmental health programs through the establishment of Standard Operating Procedures (SOPs) and structured activity planning. However, the COSO framework emphasizes that an effective control environment must be internalized at all organizational levels through shared values and awareness. In contrast, this study finds that many staff members have limited understanding of internal control functions, resulting in fragmented implementation that depends heavily on individual initiative rather than institutionalized governance culture. This finding extends previous research by Sihombing & Triani (2023) by identifying that leadership commitment alone is insufficient without capacity building and shared responsibility for internal control compliance.

Regarding risk assessment, the study reveals that systematic mechanisms to identify and map environmental health risks such as water quality, sanitation, and waste management are

largely absent. Risks are generally documented only after problems emerge rather than being anticipated preventively. This contradicts the preventive logic of the *SPIP* Regulation (PP No. 60/2008), which mandates proactive risk identification and control design. Compared to prior studies at the *Jalan Gedang* and *Kedung Badak* Community Health Centers, which found similar reactive tendencies, this study provides empirical reinforcement that weak risk assessment culture is a structural barrier to preventive governance. It further highlights a gap between the COSO component of risk assessment and its operational translation within *Puskesmas*, suggesting that *SPIP* effectiveness remains procedural rather than analytical.

Transparency emerged as a critical mediating mechanism between internal control and program quality. Activity and budget reports for environmental health programs are not fully accessible to the public, and community involvement in evaluation remains limited. This study supports and extends the findings of Prato et al. (2022), confirming that internal control indirectly affects service quality through transparency and accountability mechanisms. From a good governance perspective, this reflects a missing link between compliance-based control and participatory accountability. By identifying transparency as a full mediator, this study strengthens theoretical propositions that open information flows are essential to translate *SPIP* from a bureaucratic tool into a governance enabler for quality improvement.

In terms of information and data quality, the implementation of the One Health Data system has not yet ensured complete, timely, and consistent data reporting. The lack of reliable information constrains evidence-based planning and monitoring, weakening the control system's diagnostic capacity. This finding aligns with OECD (2020) principles emphasizing the integration of risk management with robust health information systems. Unlike prior descriptive studies, this research explicitly demonstrates that data integrity functions as both a technical and governance dimension of internal control. The theoretical implication is that data quality should be treated as an embedded component of the information and communication element in the COSO and *SPIP* frameworks, not merely an administrative function.

The monitoring and internal audit functions were also found to be limited. Most monitoring activities are not followed up with corrective action, and internal audits primarily emphasize financial compliance rather than programmatic performance. This reinforces the argument of Lubis et al. (2024) that while internal control systems can prevent fraud, the quality and scope of audits determine their broader governance value. In contrast to these earlier findings, the present study shows that in the health sector context, *SPIP* effectiveness depends not only on control rigor but also on whether monitoring is outcome-based and integrated with learning mechanisms. This represents an important conceptual expansion of *SPIP*'s function from fraud prevention toward performance assurance.

Overall, the results confirm that internal control enhances accountability, but its contribution to program quality depends on its integration with transparency, data reliability, and evaluative monitoring. Theoretically, this study advances the understanding of *SPIP* by positioning it as a governance mechanism rather than a purely administrative system, bridging internal control theory (COSO, *SPIP*) with public service governance concepts (transparency, participation, data-driven decision-making). Compared with previous literature, the novelty of this study lies in empirically linking *SPIP*'s operational components with the effectiveness of environmental health programs an area that has rarely been explored in Indonesian public health governance research.

4.2. Discussion

This study emphasizes that the effectiveness of implementing the Government Internal Control System (*SPIP*) in managing environmental health programs at community health centers heavily depends on the quality of its application in the field. The finding that risk assessment has not been systematically conducted indicates a weak preventive orientation, resulting in environmental health interventions being more reactive post-event. This aligns

with previous studies at community health centers Jalan Gedang and Kedung Badak, which found that environmental health programs were more frequently implemented as a response to emerging problems rather than based on prevention. Consequently, the strategic role of environmental health programs in reducing environment-based diseases becomes less optimal.

Transparency emerges as a critical mediating factor between internal control and service quality. This finding is consistent with the study by Pratolo et al. (2022), which showed that internal control implementation is not directly associated with service quality; its effect is mediated by transparency and accountability. The study emphasizes that good governance practices are insufficient when limited to formal procedures and must be supported by information openness to stakeholders to enhance health service delivery. Therefore, even though community health centers have control mechanisms in place, without transparent budget reporting and community involvement, accountability for environmental health programs remains difficult to ensure.

Moreover, health data quality proves to be a crucial factor in program optimization. Minister of Health Regulation No. 18/2022 stresses the importance of data completeness, timeliness, and consistency as a basis for program planning. However, this study identified significant weaknesses in these dimensions, such as incomplete data, delayed updates, and inconsistency across periods. This aligns with the OECD governance framework, which emphasizes integrating risk management with reliable health information systems, as effective decision-making requires a valid and accurate data foundation.

The monitoring and internal audit functions also remain weak. Internal audits at community health centers primarily focus on financial accountability, while the effectiveness of environmental health programs is rarely formally assessed. Lubis et al. (2024) highlighted that internal control has a positive and significant effect on preventing fraud in the public sector, even though audit quality does not always yield consistent results. These findings are relevant to public health governance, as a strong *SPIP* can minimize maladministration while ensuring accountability in resource utilization for community-based health programs.

Furthermore, information, communication, and monitoring play an important role in supporting program effectiveness. Sihombing & Triani (2023) applied the COSO framework in community health centers in Sidoarjo and found that components such as control activities, communication, and monitoring are significantly associated with health worker performance. This indicates that strengthening internal communication channels and outcome-based monitoring mechanisms directly enhances the operational capacity of community health centers in implementing health programs. In other words, *SPIP* implementation not only requires administrative compliance but also necessitates strengthening outcome-oriented evaluation mechanisms to ensure successful health interventions.

Overall, this discussion reinforces the main argument of the study that the success of environmental health program management at community health centers is not sufficiently supported by SOPs and resources alone but heavily relies on the effectiveness of internal control integrated with transparency, data quality, and follow-up on monitoring results. This study also provides a conceptual contribution by extending the focus of internal control literature from financial and employee performance to the effectiveness of environmental health programs, which has been rarely studied. By positioning transparency and data quality as mediators and internal audit as a reinforcing mechanism, this study presents a more comprehensive conceptual model to understand the factors determining the effectiveness of internal control in the community health centers context.

Table 2. Comparison of Research Findings Discussion with Literature Review

Research Aspect	Study Findings	Related Literature / Previous Studies	Extended Analysis / Linkage and Novelty
Risk Assessment	Risk assessment in community health centers has not been implemented systematically; interventions remain reactive rather than preventive.	Studies at Community Health Centers <i>Jalan Gedang</i> and <i>Kedung Badak</i> show environmental health programs are often reactive post-event.	This study extends prior findings by explicitly positioning weak risk assessment as a structural failure of <i>SPIP</i> implementation, rather than merely an operational issue. It highlights that preventive control culture is underdeveloped in public health governance, expanding COSO-based analysis to environmental health management.
Transparency	Activity and budget reports are not publicly accessible; accountability remains limited.	Pratolo et al. (2022) found internal control affects service quality indirectly through transparency and accountability.	This research empirically validates and strengthens the mediating role of transparency within <i>SPIP</i> , positioning it as a governance bridge between control systems and service outcomes. It contributes new evidence from the health sector, showing transparency as a full mediator in environmental program quality a dimension underexplored in <i>SPIP</i> literature.
Data Quality	Health data are incomplete, updated slowly, and inconsistent across periods.	MoH Regulation No. 18/2022 mandates complete, timely, and consistent data; OECD (2020) emphasizes integrating risk management with reliable information systems.	The study advances the theoretical scope of <i>SPIP</i> by identifying data quality as a core control component, not merely an administrative tool. It reconceptualizes data management as part of internal control integrity, introducing a novel linkage between technical data reliability and governance effectiveness in primary healthcare.
Monitoring & Internal Audit	Monitoring results are rarely followed up; internal audits focus on financial rather than programmatic effectiveness.	Lubis et al. (2024): Internal control prevents fraud, though audit quality varies; Sihombing & Triani (2023): Monitoring and control affect health worker performance.	Unlike earlier studies emphasizing financial accountability, this research reframes monitoring and audit as strategic enablers of outcome-based governance. It introduces the idea of risk-based and learning-oriented auditing to strengthen <i>SPIP</i> 's preventive function in community health programs.
Internal Information & Communication	Weak internal communication channels limit the impact of follow-up monitoring on program quality.	Sihombing & Triani (2023): Communication and monitoring significantly influence health worker performance.	This study deepens previous analyses by showing that weak communication undermines not only performance but also the coherence of <i>SPIP</i> components. It provides an integrative insight that internal communication is the connective tissue linking control, data, and monitoring into a unified governance system.
Effectiveness of Environmental Health Programs	Program quality improves only when <i>SPIP</i> is supported by transparency, data quality, and monitoring.	Pratolo et al. (2022), Lubis et al. (2024), and Sihombing & Triani (2023) highlight that internal control is effective when complemented by transparency and monitoring mechanisms.	The study confirms and extends these models by empirically testing an integrated <i>SPIP</i> -Transparency-Data Quality framework with internal audit as a moderating mechanism. This configuration is conceptually novel, bridging internal control theory and public health governance through a measurable, multi-path causal model.

Source: Processed by Researcher, 2025

To synthesize these relationships, Figure 2 presents the conceptual model developed in this study. It hypothesizes that the implementation of the Internal Control System (*SPIP*) positively influences Program Effectiveness through two key mediating mechanisms Transparency and Data Quality which enhance accountability and evidence-based decision-making. The Audit Function acts as a moderating variable, strengthening the link between transparency, data quality, and overall program effectiveness by ensuring continuous oversight and compliance. This integrative framework bridges governance theory and health management practice, illustrating how internal control mechanisms translate into tangible outcomes in public service delivery.

5. Conclusion

The study concludes that the effectiveness of environmental health program management at community health centers (*Puskesmas*) is highly dependent on the quality of Government Internal Control System (*SPIP*) implementation. In addressing the first research objective, the findings show that although Standard Operating Procedures (SOPs) and institutional resources form a structural foundation, they are not sufficient to guarantee program success. Risk assessment is frequently carried out reactively rather than preventively, which constrains *SPIP*'s ability to anticipate and mitigate environmental health risks such as acute respiratory infections (ARI), diarrheal diseases, and leptospirosis.

Transparency emerged as a pivotal mediating factor linking internal control systems to program effectiveness. Limited public disclosure of budgets and activity reports weakens accountability and reduces community trust, even when formal control mechanisms are already in place. This condition highlights that internal control alone cannot enhance service outcomes unless it is reinforced by openness, stakeholder participation, and information accessibility in program implementation.

The quality of health data also plays a central role in determining program effectiveness. The research finds that incomplete, delayed, and inconsistent datasets obstruct planning and decision-making for environmental health interventions. In accordance with Minister of Health Regulation No. 18/2022 and OECD governance principles, reliable, timely, and interoperable data are required to ensure that risk management is integrated into operational decisions. Therefore, data governance improvement is essential to strengthen transparency and evidence-based program management.

The moderating role of internal audits and monitoring functions is also confirmed as crucial yet underutilized. Most audit activities remain focused on financial compliance, leaving limited attention to programmatic performance and strategic risks. This narrow orientation limits *SPIP*'s preventive capacity and its role in ensuring program integrity. Shifting audit practices toward performance-based and risk-oriented approaches can significantly increase the overall effectiveness of *SPIP* in promoting accountability and early detection of irregularities.

Overall, the study confirms that environmental health program success depends on a synergistic integration of *SPIP* implementation, transparency, high-quality data, and outcome-oriented monitoring. Internal audit mechanisms strengthen compliance and reinforce preventive control, ensuring that environmental health interventions are sustainable, accountable, and responsive to community needs. These findings collectively demonstrate that control systems in the health sector must evolve from mere administrative formality to adaptive governance tools that foster continuous improvement and integrity.

Theoretically, this study contributes to the development of internal control and public governance literature by extending the application of *SPIP* from financial management domains to the effectiveness of public health programs. It provides an integrated conceptual framework that connects *SPIP*, transparency, and data quality with program performance offering a model of control-based governance relevant for developing countries. Practically, the research offers actionable insights for policymakers and health managers to strengthen *SPIP* implementation

in *Puskesmas*, including institutionalizing preventive risk assessments, enhancing transparency, and improving data governance to align with national and international standards of good governance.

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