



# Enhancing the Implementation of the Mapping, Outreach, Advocacy, and Registration (PESIAR) Program through a Lean Six Sigma Approach : A Qualitative Study

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## ABSTRACT

*Universal Health Coverage (UHC) remains a major global health policy objective, yet many countries still encounter implementation challenges that hinder equitable service coverage and financial protection at the local level (World Health Organization & World Bank, 2025). In Indonesia, the national health insurance program managed by BPJS Kesehatan has achieved significant expansion; however, disparities across regions and gaps in enrollment and active participation persist within the decentralized governance system (Agustina et al., 2019). To address these challenges, BPJS Kesehatan introduced the PESIAR program (Mapping–Outreach/Sweep–Advocacy–Registration), an outreach-based enrollment strategy emphasizing cross-sector collaboration and operational effectiveness (BPJS Kesehatan, 2023). This qualitative case study examines how Lean Six Sigma (LSS) supports the strengthening of PESIAR implementation at the Bukittinggi Branch, West Sumatra. Data were collected through semi-structured interviews, field observations, and document analysis, and were thematically analyzed using a DMAIC framework (Define–Measure–Analyze–Improve–Control) (Antony et al., 2019). Findings show that LSS enhances program implementation by improving governance processes, clarifying stakeholder responsibilities, and strengthening performance measurement systems. Expanding JKN membership is therefore influenced not only by outreach intensity but also by structured, data-driven management approaches. Continuous improvement emerges as a key requirement for managing complex, multi-stakeholder health programs aimed at achieving UHC. Lean Six Sigma further contributes by fostering an organizational culture that continuously identifies and addresses operational challenges,*



*supporting sustainable health system governance (Purdue University, 2024).*

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## INTRODUCTION

Universal Health Coverage (UHC) represents a global commitment requiring every country to ensure that all citizens have access to quality health services without experiencing financial hardship. The World Health Organization (WHO) emphasizes that achieving UHC depends not only on national policy design but is strongly influenced by implementation capacity at the local level, including governance effectiveness, data management mechanisms, and the engagement of frontline actors in reaching unregistered and inactive population groups (WHO, 2021). In countries with social health insurance-based systems such as Indonesia, the main challenges for UHC lie in sustaining enrollment expansion and active membership, particularly among informal workers and vulnerable populations (Kutzin et al., 2016).

As the administrator of Indonesia's National Health Insurance (JKN), BPJS Kesehatan has developed various operational innovations to accelerate UHC achievement, one of which is the PESIAR program (Mapping, Outreach/Sweep, Advocacy, and Registration). This program is designed as a community-based strategy that optimizes the role of PESIAR agents in mapping uninsured populations, conducting data verification, providing advocacy, and facilitating JKN enrollment. Existing literature suggests that community agent-based approaches can effectively increase coverage when supported by clear role definitions, institutional legitimacy, and robust performance control systems (Doshmangir et al., 2020).

Nevertheless, the implementation of the PESIAR program at BPJS Kesehatan in West Sumatera continues to face various structural and operational challenges. Institutionally, the achievement of Cooperation Agreements with PESIAR agents has not yet reached 100%, with at least one village still lacking a formal Memorandum of Understanding (MoU). This condition reflects gaps in strengthening local partnership networks, which in turn constrain program reach at the community level. Recent evidence suggests that weak institutionalization of community health workers continues to impede the effective implementation of community-based health programs, often resulting in fragmented service delivery and limited impact on population health outcomes (Stansert Katzen et al., 2024). Studies have shown that insufficient formal support structures and lack of integration of frontline actors into health systems significantly undermine the sustainability and performance of community health worker initiatives (JAMA Health Forum, 2024).

From the UHC coverage perspective, one district within BPJS Kesehatan in West Sumatera, Indonesia service area has not yet met the minimum 98% coverage threshold, namely Agam District, which has achieved only 97.29%, leaving a gap of 3,241 individuals. In addition, the "three-column" coverage target of 95% across the BPJS Kesehatan in West Sumatera, Indonesia service area has not



been achieved, with a shortfall of 62,760 individuals from the established target. These conditions indicate that enrollment expansion has not been fully optimized and that a substantial population remains administratively uncovered within the JKN system. This finding aligns with WHO reports indicating that coverage gaps are often driven by weak integration of population data and ineffective outreach to target groups (WHO, 2019).

These figures indicate that *problems are not only limited to coverage but also extend to membership activeness*. Evidence from district-level analysis shows that active JKN membership is crucial for financial stability, expanded coverage, and improved access to health services, yet membership rates vary considerably across regions, posing sustainability challenges for the national health insurance system (Active Membership in Indonesian National Health Insurance, 2025). Furthermore, the operational performance of the PESIAR program at KC Bukittinggi demonstrates a substantial discrepancy between targets and realization. By May 2025, the PESIAR enrollment target of 6,970 individuals had been realized by only 167 individuals (2.40%), resulting in a gap of 6,803 individuals. A similar pattern is observed in revenue performance, where the PESIAR revenue target of IDR 318,389,000 was realized at only IDR 25,620,000, and the agent incentive target of IDR 31,838,900 was realized at merely IDR 52,500. The 2025 Commonwealth Fund Scorecard on State Health System Performance shows that despite some progress, *substantial performance variations and gaps remain*, often linked to systemic issues in governance, accountability, and incentive structures that influence access, quality, and outcomes. Implementation research literature shows that addressing *work process effectiveness, incentive alignment, and program monitoring* is crucial for successful health policy and program implementation, especially in complex multi-stakeholder environments striving for Universal Health Coverage.

From the perspective of actors and service users, survey results indicate that the general public has limited awareness of the existence and role of PESIAR agents, although the understanding score reached 82%. On the other hand, all PESIAR agents (100%) reported serious constraints related to data masking, which hampers the identification and validation of prospective participants. These findings point to governance challenges in data management and policy communication that potentially undermine field-level intervention effectiveness. Previous studies have emphasized that limited data access and low health literacy among communities are key factors contributing to the challenges and reduced effectiveness of community-based health interventions, as low baseline health literacy has been documented in community program settings (Li et al., 2023; Public Health Nursing, 2023) and barriers to digital health literacy have been shown to impede community engagement with health services (Irmayani et al., 2025).

Given these multifaceted challenges, an analytical approach is required that can comprehensively, contextually, and systematically explore the root causes of PESIAR implementation problems. Lean Six Sigma (LSS) has increasingly been applied in the health sector to identify waste, reduce process variation, and strengthen sustainable performance control mechanisms (Improta et al., 2019). Therefore, this qualitative study focuses on analyzing the implementation of the PESIAR program through a Lean Six Sigma approach to support the acceleration of Universal Health Coverage in the service area of BPJS Kesehatan KC Bukittinggi.



This qualitative study aims to examine in depth the implementation of the PESIAR program through a Lean Six Sigma approach at BPJS Kesehatan in West Sumatra using the DMAIC framework as a systematic analytical tool. Specifically, the study seeks to:

1. Identify quick-win improvement opportunities in the Define phase using a Lean Six Sigma approach at BPJS Kesehatan in West Sumatra, Indonesia.
2. Examine data collection planning and practices in the Measure phase of PESIAR implementation at BPJS Kesehatan in West Sumatra, Indonesia.
3. Analyze the Analyze phase of Lean Six Sigma by tracing root causes that influence the low performance of the PESIAR program at BPJS Kesehatan in West Sumatra, Indonesia.
4. Identify and formulate improvement implementation plans in the Improve phase based on empirical findings from previous phases.
5. Evaluate performance changes before and after intervention in the Control phase to assess the effectiveness of the Lean Six Sigma approach in enhancing PESIAR program implementation.

## **METHODS**

This study employed a qualitative research design with a case study approach to obtain an in-depth understanding of the implementation of the PESIAR Program (Mapping, Outreach/Sweep, Advocacy, and Registration) and its integration with the Lean Six Sigma approach within a public-sector health insurance organization. The study was conducted at BPJS Kesehatan in West Sumatra Province, Indonesia, which was selected due to variations in JKN enrollment coverage and membership activeness across districts, making it a relevant setting for examining efforts to improve program performance toward achieving Universal Health Coverage (UHC).

The study informants consisted of the Branch Head, the Head of the Membership Division, and administrative staff responsible for membership management. Informants were selected using purposive sampling based on their direct involvement, experience, and understanding of PESIAR implementation and the application of Lean Six Sigma.

Data were collected through semi-structured in-depth interviews, internal document analysis, and field observations to obtain comprehensive and contextually rich information. Data analysis was conducted using thematic analysis combined with the Lean Six Sigma framework based on the DMAIC cycle (Define, Measure, Analyze, Improve, Control) to systematically map findings across stages of process improvement. Data trustworthiness was ensured through source and method triangulation, member checking, and the maintenance of an audit trail to support the credibility and dependability of the findings. The study was conducted in accordance with qualitative research ethics principles, including informed consent, protection of informant anonymity, and ethical approval from the relevant authorities in compliance with applicable regulations.

Data analysis followed a structured and iterative qualitative process, beginning with verbatim transcription and data anonymization to protect participant confidentiality. The data were analyzed using open coding developed inductively from participant narratives and deductively

based on the research objectives, then grouped into categories and synthesized into key themes reflecting PESIAR implementation and governance dynamics in accelerating UHC. Interpretation of findings was undertaken by integrating thematic results with relevant theoretical and policy perspectives. All research procedures adhered to ethical research principles, including informed consent, anonymity, and secure data storage (Hall et al., 2024; WHO, 2025).

## RESULTS

### 1. Identification of Quick-Win Improvement Opportunities in the Define Phase Using a Lean Six Sigma Approach at BPJS Kesehatan in West Sumatra, Indonesia

During the Define phase, this study identified a primary problem assumption that the implementation of the PESIAR Program had not yet functioned optimally in improving JKN enrollment coverage and membership activeness in a sustainable manner, despite being adopted as an acceleration strategy for Universal Health Coverage (UHC). This problem assumption was characterized by persistent gaps between enrollment targets and actual achievements, variations in performance across service areas, and inconsistencies in the execution of the Mapping, Outreach, Advocacy, Registration stages.

Initial findings also indicated limitations in process standardization, variability in implementer capacity, fragmented use of data, and suboptimal cross-sector governance support, all of which potentially hinder the effectiveness of PESIAR as an instrument for improving JKN membership performance.

**Table 1. Burst the Implementation of the PESIAR Program**

<b>Burst 1: PESIAR Planning</b>	<b>Burst 2: PESIAR Implementation</b>	<b>Burst 3: Monitoring and Evaluation</b>
Memorandum of Understanding with PESIAR Agents has not reached 100%, and there is still one village without a PKS with a PESIAR Agent	Processing of potential participant data by agents has not yet been implemented	There is no manual report at the branch office level related to PESIAR Agent technical guidance (Bimtek)
There is no source of population potential data from each village	Agents have not been involved in the preparation of the PESIAR Plan of Action (POA)	Performance assessment criteria are unclear
Non-active JKN data and non-JKN data are not informative due to data masking	There is no breakdown of participant data distributed by district/city	Periodic performance evaluations are not conducted
There is no recap of monitoring and evaluation (M&E) results conducted by the PESIAR Agent PIC	Data processing of results from Mapping (Sisir), Advocacy, and Registration	There is no follow-up report on PESIAR activities by agents in the Edabu PESIAR



<b>Burst 1: PESiar Planning</b>	<b>Burst 2: PESiar Implementation</b>	<b>Burst 3: Monitoring and Evaluation</b>
	activities by each PESiar Agent is not optimal	application, and agents do not submit manual forms

**Table 2. Quick Win Issues and Resolution Plan**

<b>Issue / Problem (Burst)</b>	<b>Quick Win Action</b>	<b>Completion Timeframe</b>	<b>Person in Charge (PIC)</b>
The PKS (Cooperation Agreement) coverage for PESiar Agents has not yet reached 100%, with one Nagari in Agam Regency still not covered	Conduct the signing of the remaining PKS for PESiar Agents in the one Nagari that has not yet been covered	25–30 June 2025	Head of Membership Division and Head of Agam Regency
There is no detailed breakdown of participant data distributed by Regency/City	Perform a detailed breakdown of participant data for all Regencies/Cities	25–30 June 2025	Head of Membership Division and all Regency/City offices

The suspected issues that have the potential to become quick wins in the implementation of the PESiar Program reflect challenges related to governance and the readiness of the program’s foundational processes. The achievement of Cooperation Agreements (PKS) for PESiar Agents that has not yet reached 100%, along with the existence of one nagari that still lacks an active PKS, indicates that the institutionalization of the program at the local level remains suboptimal. Within the context of public policy implementation, the completeness of formal cooperation frameworks constitutes a critical prerequisite for ensuring role clarity, actor accountability, and the sustainability of program implementation. The absence of PKS in certain areas may lead to variations in implementation, weakened commitment among local actors, and inconsistencies in program performance outcomes at the operational level.

In addition, the absence of a detailed breakdown of participant data by regency/city highlights limitations in the measurement function of program management. The literature emphasizes that the availability of disaggregated data serves as a fundamental basis for problem mapping, territorial performance evaluation, and the design of targeted interventions. The World Health Organization (2021) underscores that progress toward Universal Health Coverage is highly dependent on information systems capable of providing granular data to support evidence-based decision-making. In line with this perspective, the Lean Six Sigma approach positions process clarity and data reliability at the Define phase as key factors in identifying rapid improvement

opportunities (quick wins) that can generate significant impacts on program effectiveness (Antony et al., 2017).

## 2. Reviewing the Planning and Practice of Data Collection (Data Collection Plan) During the Measure Phase in the Implementation of the PESIAR Program at BPJS Kesehatan in West Sumatra, Indonesia

**Table 3. Data Collection Plan (Measure Phase)**

<b>Burst / Suspected Issue</b>	<b>Data Requirements for Verification</b>	<b>Data Type</b>	<b>Definition / Purpose</b>	<b>Data Source</b>	<b>Data Presentation Format</b>
Absence of a Technical Guidance program for PESIAR Agents	Technical guidance materials and activity reports for PESIAR Agents	Continuous	To assess the level of agent understanding in conducting PESIAR activities	Branch Office manual reports on PESIAR Agent technical guidance.	Tabular format of Technical Guidance reports
Lack of processing of potential participant data by agents due to masking of Non-JKN and inactive JKN data	Weekly and monthly reports on the number of PESIAR activities conducted by PESIAR Agents	Continuous	To identify agents who do not perform PESIAR activities	Edabu system and Business Intelligence (BI) reports	Tabular format of PESIAR activity reports
Absence of formal designation of an internal PIC team for PESIAR implementation	Draft documents and official decrees on the designation of internal PICs for PESIAR Agent management	Continuous	To clarify the roles and responsibilities of internal PICs in managing PESIAR Agents	Official approval of the internal PIC designation decree by the Head of the Work Unit	Official Decree (SK) issued by the Head of the Work Unit

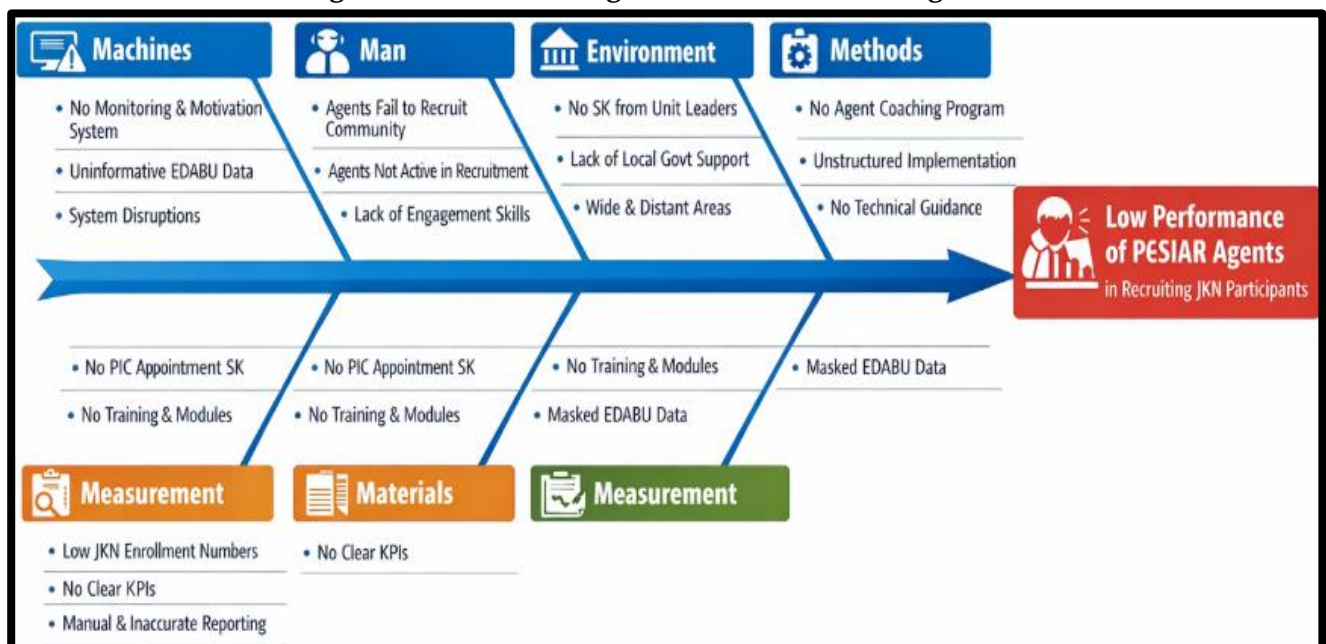
Examining the planning and practice of data collection (data collection plan) during the Measure phase in the implementation of the PESIAR Program at BPJS Kesehatan in West Sumatra reveals that the quality of measurement is highly dependent on the completeness of the data design and the clarity of implementation governance. Within the DMAIC framework, the Measure phase focuses on defining key metrics, developing a systematic data collection plan, and establishing baseline process performance to ensure that improvements designed in subsequent phases are truly evidence-based. Accordingly, an effective data collection plan should include operational

definitions of indicators, data sources, data collection methods or tools, measurement frequency, responsible parties, and data quality assurance mechanisms. This principle is consistent with Lean Six Sigma guidelines, which emphasize measurement discipline and data reliability as fundamental foundations for root cause analysis and process improvement decision-making. (Antony et al. (2017)

Nevertheless, the findings indicating the absence of a technical guidance program for PESIAR Agents and the lack of formal designation of an internal PIC team for PESIAR implementation point to weaknesses in implementation capacity and operational accountability that may undermine data quality during the Measure phase. The absence of technical guidance increases the risk of variations in agents' understanding of variable definitions, recording procedures, and reporting standards, thereby leading to data inconsistencies across regions. Similarly, without clearly designated internal PICs, coordination, verification, and data quality control functions are unlikely to operate optimally, even though the Measure phase requires rigorous data quality management to ensure the accuracy of baseline performance. This condition is aligned with the Lean implementation literature in the healthcare sector, which emphasizes the critical role of leadership, clarity of responsibility structures, and strong governance in maintaining consistency and sustainability of process improvements. (D'Andreanmatteo et al. 2015).

### 3. Analyzing the Analyze Phase of the Lean Six Sigma Approach by Tracing the Root Causes that Influence the Low Performance of the PESIAR Program at BPJS Kesehatan in West Sumatra, Indonesia

Figure 1. Fishbone Diagram of the PESIAR Program



Based on the fishbone analysis, the main root cause in the management of PESIAR Agents was identified as the absence of a structured Technical Guidance program. The lack of a systematic training program reflects weaknesses in people development and process standardization, which are critical elements for the successful implementation of process-based programs. From a Lean Six Sigma perspective, structured training serves to align implementers' understanding of program



objectives, operational definitions of indicators, and standard operating procedures, thereby reducing implementation variability. The literature emphasizes that without formal and continuous training, organizations are exposed to risks such as inconsistent data quality, low compliance with process standards, and limited agent capability to perform operational roles effectively. (Antony et al. 2017).

Furthermore, the fishbone analysis also revealed that the lack of leadership support in issuing a formal Decree for the appointment of an internal Person in Charge (PIC) for PESIAR Agent management constitutes a significant root cause related to governance and leadership aspects. Within the framework of Lean and quality management, leadership commitment and clear accountability structures are key determinants of successful process improvement implementation. The absence of an internal PIC results in weak coordination, supervision, and quality control of program implementation, rendering performance improvement efforts unfocused and difficult to sustain. This finding is consistent with healthcare sector literature, which underscores that strong leadership and formal role designation through internal policies are essential prerequisites for maintaining implementation consistency and the long-term sustainability of quality improvement programs. (ISSI, 2022).

**Table 4. 5-Why Root Cause Analysis**

Level	Why Analysis
Why 1	PESIAR agents were unable to successfully persuade community members to enroll as participants.
Why 2	PESIAR agents lacked adequate understanding of effective engagement and promotional techniques.
Why 3	PESIAR agents had not received sufficient training or guidance regarding their roles and marketing strategies.
Why 4	There was no structured and routine technical guidance (Bimtek) program provided by BPJS Kesehatan.
Why 5	Capacity-building and coaching for PESIAR agents had not been prioritized in the management of the participant recruitment program.

This 5-Why analysis indicates that the low recruitment performance of PESIAR agents is not merely an individual performance issue but is rooted in systemic weaknesses related to training prioritization and capacity development. The absence of structured and routine technical guidance reflects gaps in organizational commitment to human resource development, which ultimately affects agents' effectiveness in executing recruitment strategies. Low realization of PESIAR Agent Incentive Payments, where out of a target of IDR 215,353,950, only IDR 52,500 was realized in the Bukittinggi Branch Office (KC Bukittinggi) service area.



**Table 5. 5-Why Root Cause Analysis**

<b>Level</b>	<b>Why Analysis</b>
<b>Why 1</b>	The number of participants recruited by PESIAR agents remained low.
<b>Why 2</b>	PESIAR agents did not consistently carry out recruitment activities.
<b>Why 3</b>	There was no monitoring and motivation system in place to encourage PESIAR agents to perform optimally.
<b>Why 4</b>	The implementation structure of the PESIAR program (Participant Mobilization by PESIAR Agents) was not functioning optimally at the unit level.
<b>Why 5</b>	There was no formal decree (Surat Keputusan/SK) issued by unit leadership to regulate roles, responsibilities, performance targets, and evaluation mechanisms for PESIAR implementation.

The absence of a structured and routine technical guidance program in the management of the JKN participant recruitment program by PESIAR agents reflects weak implementation capacity at the operational level. From a public program management perspective, technical guidance functions as a key instrument for enhancing implementer competence through the standardization of understanding, strengthening of technical skills, and alignment of work procedures with policy objectives. Without systematically designed and continuously delivered training, PESIAR agents are likely to conduct the processes of mapping, Outreach, advocacy, and registration in a non-uniform manner, relying heavily on individual experience and becoming vulnerable to administrative errors and inconsistencies in service quality. This condition is consistent with findings that failures in health programs are often not attributable to policy design, but rather to weak implementation capacity and insufficient investment in human resource development at the frontline level (WHO, 2010).

Furthermore, within the framework of Lean Six Sigma-based process improvement, the absence of structured technical guidance also constrains the Measure and Control phases, due to the lack of standardized competency benchmarks and formal operating procedures that can serve as references for performance measurement. Irregular and undocumented training practices generate high process variation, making it difficult to establish reliable performance baselines and to ensure the sustainability of improvements. The literature indicates that continuous training is a fundamental prerequisite for institutionalizing improvement initiatives, particularly in public service organizations that rely on frontline actors as the primary drivers of policy implementation (Antony et al., 2017). Therefore, the absence of structured and routine technical guidance can be understood as a fundamental root cause that directly affects the effectiveness of JKN participant recruitment by PESIAR agents and the sustainable achievement of Universal Health Coverage targets.

#### 4. Formulating an Improvement Implementation Plan in the *Improve* Phase Based on Empirical Findings from the Preceding Phases

**Table 6. Implementation Plan**

Task	Duration	Start	Finish	Dependency / Predecessor	Resources	Output
Development of a Standardized Technical Guidance	1 week	June 2025	July 2025	Preparation of modules	Membership Division	Structured, practical, and field-oriented training materials
Scheduling and Implementation of Routine and Tiered	2 weeks	20 June 2025	30 June 2025	Preparation of Plan of Action (POA) and execution	Membership Division and District/City Coordinators	Implementation of PESIAR Agent in west sumatera service area
Issuance of Branch Head Decree on the Appointment and Duties of Internal PESIAR PIC	1 week	July 2025	July 2025	Formal issuance of decree	Branch Head and Head of Membership Division	Designation of Internal PIC along with defined roles and responsibilities
Appointment of Facilitator or Mentor Team for PESIAR Agents	1 week	July 2025	July 2025	Appointment of agent mentors	Membership Division, District Coordinators, and Membership Team	Assignment of experienced staff as PESIAR agent mentors
Cross-Functional Coordination for Branch Head Decree Implementation	1 week	July 2025	July 2025	Internal coordination across divisions	Branch Head and Head of Membership Division	Availability of human resources to support PESIAR Agent PIC
Post-Bimtek Monitoring and Evaluation	1 week	July 2025	July 2025	Implementation of monitoring and evaluation activities	Membership Division, Compliance & Quality Management	Continuous improvement and enhanced motivation of PESIAR agents



Task	Duration	Start	Finish	Dependency / Predecessor	Resources	Output
					Unit, and District Coordinators	
Utilization of Digital Media and Learning Management System (LMS)	2 weeks	July 2025	July 2025	Training on digital media utilization	Membership Division and District Coordinators	Online-based training system (WhatsApp groups)
Routine Evaluation and Adjustment of PIC Duties Based on Implementation Results	6 months	July 2025	December 2025	Periodic PESIAR monitoring and evaluation	Membership Division and District Coordinators	Performance evaluation of PIC in managing PESIAR agents
Integration into Employee Performance Assessment	6 months	July 2025	December 2025	Assessment of PIC performance commitment	Branch Head and Head of Membership Division	Added value in employee performance appraisal for PESIAR Agent PIC

In the Improve phase, the formulation of the improvement implementation plan was developed by referring to empirical findings from the Define, Measure, and Analyze phases, which indicated that the standardization of PESIAR Agent competencies in the recruitment of National Health Insurance (JKN) participants had not yet been optimal. Accordingly, the prioritized improvement action was the development of a standardized and structured technical guidance (bimbingan teknis) curriculum. This curriculum was designed to ensure uniformity in knowledge and skills among PESIAR Agents in implementing the Mapping, Outreach, Advocacy, and Registration stages in accordance with established standard operating procedures. From a quality management and process improvement perspective, standardized training is a critical instrument for reducing process variation, improving the quality of field implementation, and establishing a measurable performance baseline (Antony et al., 2017).

In addition to strengthening technical capacity, the Improve phase also emphasized governance reinforcement through the preparation and issuance of a Branch Head Decree concerning the appointment and designation of Internal PESIAR Persons in Charge (PICs). The formal designation of internal PICs serves to clarify accountability structures, strengthen cross-

functional coordination, and ensure consistent control and monitoring of program implementation. Clear organizational roles and mandates have been shown to play a crucial role in ensuring the sustainability of improvement initiatives, particularly in public sector organizations characterized by multiple actors and complex operational processes. The literature on policy implementation and health service management underscores that structural support and formal legitimacy are key determinants of program success and sustainability (D'Andreamatteo et al., 2015).

Furthermore, the Control phase focuses on evaluating performance changes before and after the intervention in order to assess the effectiveness of the Lean Six Sigma approach in enhancing the implementation of the PESIAR Program.

**Table 7. Performance Improvement Before and After Lean Six Sigma (LSS)**

No.	Description	BeforeLean Six Sigma (LSS)	AfterLean Six Sigma (LSS)	Improvement	Remarks
1	PESIAR Cooperation Agreement Villages	77 Villages	78 Villages	1 Village	100% achievement
2	Outreach Activities	437 Individuals	5,351 Individuals	4,914 Individuals	BI data and manual reports
3	Advocacy Activities	331 Individuals	3,960 Individuals	3,629 Individuals	BI data and manual reports
4	Registration	259 Individuals	482 Individuals	223 Individuals	BI data and manual reports
5	PESIAR Implementation Coverage	3 Districts/Cities	5 Districts/Cities	2 Districts	100% achievement
6	PESIAR Revenue	IDR 25,620,000	IDR 40,565,000	IDR 14,945,000	BI data and manual reports
7	PESIAR Incentive Payment	IDR 52,500	IDR 222,300	IDR 169,800	BI data and manual reports

The implementation of the Lean Six Sigma (LSS) approach within the PESIAR Program in the service area of BPJS Kesehatan in West Sumatera has significantly strengthened the program's governance and institutional dimensions. This is evidenced by the establishment of PESIAR Agent Cooperation Agreements (PKS) covering 100% of villages/nagari (78 nagari), which previously lacked a systematic and structured framework. During the Define and Improve phases of the DMAIC cycle, LSS facilitated the identification of governance gaps, particularly the absence of a structured technical training (bimtek) program as a key instrument for strengthening the capacity of field agents. Following the LSS intervention, priority technical training was successfully implemented across five districts/cities within the service area, serving as a mechanism for competency standardization, role alignment, and enhanced understanding of the integrated



Mapping–Screening–Advocacy–Registration (Petakan–Sisir–Advokasi–Registrasi) processes. These findings are consistent with the literature indicating that the success of community-based health programs is strongly influenced by institutional clarity, human resource capacity building, and the consistency of continuous training (D’Andreamatteo et al., 2015).

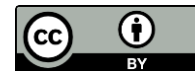
From an operational performance perspective, the implementation of LSS demonstrably increased both the intensity and effectiveness of PESIAR field activities. Screening (sisir) activities increased substantially from 437 participants to 5,351 participants in July 2025, while advocacy activities rose from 331 individuals to 3,960 individuals during the same period. This improvement reflects enhancements in workflow design, reductions in process waste, and stronger performance measurement discipline core principles of Lean Six Sigma. Through the use of data-driven decision-making and clearly defined operational targets, agents were able to optimize time utilization, resource allocation, and advocacy strategies at the village/nagari level. The literature supports that the integration of Lean and Six Sigma in public service sectors can improve productivity, process consistency, and intervention accuracy, particularly in programs characterized by high actor and geographic complexity (Antony et al., 2019).

Improvements in process performance had direct implications for the outputs and outcomes of the PESIAR Program. JKN membership recruitment by PESIAR agents increased from 259 individuals to 482 individuals in July 2025, accompanied by an increase in contribution revenue from IDR 25,620,000 to IDR 40,565,000. Additionally, agent performance-based incentives rose significantly from IDR 52,500 to IDR 222,300 during the same period. These findings indicate that LSS not only enhances process efficiency but also generates economic value and strengthens performance incentives for program implementers. In the context of Universal Health Coverage (UHC), increased recruitment and contribution revenue directly support the sustainability of health insurance financing. This aligns with perspectives suggesting that LSS-based process improvements can simultaneously enhance financial performance and reinforce implementer motivation through fair, performance-based incentive systems (Kutzin et al., 2016).

## DISCUSSION

The application of Lean Six Sigma (LSS) through the DMAIC framework within the PESIAR Program has been shown to strengthen program implementation systemically, particularly through improved process governance, clearer role delineation among actors, and enhanced performance measurement discipline. These findings underscore that the success of expanding JKN membership is not solely determined by the intensity of field activities, but rather by the organization’s ability to manage processes in a structured and data-driven manner. Consequently, continuous improvement approaches emerge as a critical element in managing complex, multi-actor programs oriented toward achieving Universal Health Coverage (UHC) (Antony et al., 2019).

Interpretatively, the DMAIC mechanism functions as an organizational learning framework that enables a transition from reactive practices toward evidence-based and root-cause-driven decision-making. The identification of quick wins during the Define phase acted as a catalyst for change by strengthening stakeholder commitment, while weaknesses in the Measure phase



particularly the absence of a standardized data collection plan help explain the lower effectiveness of previous implementation efforts. These findings are consistent with Lean and LSS literature in the health sector, which emphasizes the importance of process standardization, role clarity, and contextual adaptation, while extending empirical evidence that LSS is applicable not only to clinical services but also to membership expansion programs and public health policy implementation (Laureani & Antony, 2017).

The theoretical implications of this study lie in extending the application of Lean Six Sigma as an analytical framework within qualitative health policy research. Practically, the findings highlight that relatively simple governance-based interventions—such as role clarification and workflow structuring—can generate more substantial impacts than complex technical interventions. The strength of this study lies in the depth of qualitative analysis and the systematic use of DMAIC, although limitations related to regional context and potential informant perception bias constrain the generalizability of the findings. Therefore, future research is encouraged to adopt mixed-methods approaches and cross-regional comparative studies, as well as to further explore the roles of leadership and organizational culture in the successful implementation of LSS to support sustainable UHC achievement (Creswell & Poth, 2018).

## CONCLUSIONS

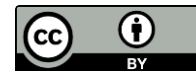
This qualitative study concludes that the application of Lean Six Sigma (LSS) through the DMAIC framework effectively strengthens the implementation of the PESIAR Program within BPJS Kesehatan in West Sumatra Province. All research objectives were achieved, demonstrating that the identification of quick wins in the Define phase, improvements in the data collection plan during the Measure phase, root cause analysis in the Analyze phase, evidence-based solution formulation in the Improve phase, and performance control in the Control phase contributed significantly to improved program governance and effectiveness. The primary contribution of this study lies in reinforcing empirical evidence that Lean Six Sigma is not only relevant for clinical process improvement but is also effective as a managerial framework for complex public health policy programs oriented toward achieving Universal Health Coverage (Antony et al., 2019).

From a policy and practice perspective, the findings emphasize the importance of institutionalizing continuous improvement approaches through process standardization, role clarity, and data-driven monitoring systems in managing the PESIAR Program. The implementation of LSS provides a strong foundation for BPJS Kesehatan and local governments to strengthen the sustainable, efficient, and context-adaptive implementation capacity of JKN membership programs. As a recommendation, the Lean Six Sigma approach should be replicated and further developed in other regions, supported by conducive leadership and organizational culture, to ensure the long-term sustainability of JKN membership coverage and participant activeness (Laureani & Antony, 2017).



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