Building Rural Community Health Resilience: A Collaborative Governance Model Integrating Primary Healthcare and Local Wisdom

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Abstract

Rural communities in Indonesia continue to face challenges in accessing equitable and sustainable health services due to geographical barriers, uneven health service capacity, institutional fragmentation, and limited integration of health information. This study aims to develop a collaborative governance model for strengthening rural community health resilience through the integration of primary health care and local wisdom. The study employed a qualitative descriptive approach using secondary data, policy documents, national health statistics, and relevant scientific literature covering the Indonesian national context. Data were analyzed through document analysis and thematic synthesis focusing on primary health care accessibility, institutional capacity, collaborative governance, community participation, local wisdom, technology, and health resilience. The findings indicate that health insurance coverage and the availability of health facilities alone are insufficient to ensure equitable rural health access. The proposed model integrates structured community-level health services before Puskesmas, inclusive JKN/BPJS mechanisms, interoperable national health data, technology-based transparency, community participation, and local wisdom within a collaborative governance framework. The study concludes that integrating these components can strengthen accessibility, early response, service continuity, adaptability, and transparency, providing a more integrated and resilient governance approach for rural health development in Indonesia.

Keywords: collaborative governance; health data; local wisdom; primary health care; rural health resilience

I. INTRODUCTION

Rural communities constitute an important component of Indonesia's national health development, yet they face diverse social, economic, geographical, and institutional conditions that influence their ability to access and utilize health services (Mukaddas et al., 2024). Rural life is closely associated with geographical characteristics, infrastructure availability, household economic capacity, mobility patterns, and social relationships within communities (Connor et al., 2023). As an archipelagic country, Indonesia has a substantial population living far from administrative and health service centers, with some communities experiencing limited transportation connectivity and relying heavily on health resources available within their immediate surroundings (Utomo et al., 2025). These conditions indicate that strengthening rural health cannot be addressed merely through the provision of health facilities and health workers. It also requires the capacity of government institutions and communities to ensure that health services are physically reachable, socially accepted, appropriately utilized, and continuously available.

Health is a fundamental right that requires the presence of the state through accessible and equitable public services (Djatmiko et al., 2025). However, the availability of health facilities does not necessarily indicate that health services are effectively accessible to the

population. Petragallo et al. (2024) emphasize that the existence of health facilities alone cannot be used as the sole indicator of effective access to health services. Accessibility also depends on the ability of communities to reach facilities, obtain adequate information, receive appropriate services, and maintain continuity of care when referrals are required (Ofosu et al., 2021). This issue becomes increasingly relevant in rural areas where geographical characteristics may create longer and more complex relationships between communities and formal health service systems (Marpaung et al., 2026). Therefore, health accessibility should be understood through multiple dimensions, including geographical, administrative, financial, social, and institutional dimensions. From this perspective, improving rural health resilience requires not only expanding service coverage but also strengthening the capacity of the health system to connect services with the communities that need them.

Primary health care therefore occupies a strategic position in addressing these challenges because it represents the closest formal health service structure to rural communities and serves as an important entry point to the broader health system. In Indonesia, the strengthening of primary health care is directed toward bringing essential health services closer to communities through Puskesmas, Puskesmas Pembantu, Posyandu, and other community based service networks. However, the effectiveness of these services depends not only on the availability of facilities but also on the connectivity between community level services, Puskesmas, referral facilities, health financing, health workers, and information systems. Rural health development consequently requires a structured service network that enables early prevention, detection, treatment, and referral while reducing geographical and administrative barriers. Such an approach also requires stronger integration between health institutions and communities so that local knowledge, community participation, and available technological resources can support the continuity and responsiveness of primary health care services.

The Indonesian government has developed various policy instruments to expand health access, including the National Health Insurance Program (Jaminan Kesehatan Nasional/JKN) administered by BPJS Kesehatan. JKN provides a financial protection mechanism that enables communities to access health services through health facilities cooperating with BPJS Kesehatan (Pramono et al., 2025). Nevertheless, health insurance coverage does not automatically resolve barriers to actual service utilization. Communities still require physically accessible health facilities, sufficient health workers, appropriate services, and an effective referral system connecting primary and advanced health care (Elungan & Tjenreng, 2025). This distinction is important because access to health insurance and actual access to health services represent related but different dimensions of the health system. JKN can strengthen the financial capacity of communities to seek care, but its effectiveness remains influenced by the availability and distribution of facilities, health workers, and service capacity at the local level.

Primary health care therefore occupies a strategic position in strengthening rural health systems. Primary care represents the initial point of interaction between communities and the formal health system and plays an important role in health promotion, disease prevention, early detection, basic treatment, and referral coordination (Amalia, 2026). In Indonesia, the Ministry of Health has promoted the transformation of primary health care through the Integrasi Layanan Primer (ILP), which seeks to bring health services closer to communities by strengthening Puskesmas, Puskesmas Pembantu, Posyandu, and service networks extending to villages and hamlets. The policy direction also emphasizes strengthening service networks at the village and hamlet levels, supported by digitalization and health information systems for territorial health monitoring. This approach indicates a shift from viewing primary health care merely as a facility located at the subdistrict level toward a more integrated service network capable of reaching communities at the local level.

The need to bring health services closer to communities is particularly significant given Indonesia's geographical diversity (Wenang et al., 2021). Communities are distributed across urban and rural areas, mountainous regions, islands, coastal areas, border regions, and locations characterized by limited connectivity (Attaulloh & Kusumawardani, 2025). Such geographical variation produces differences in travel distance, travel time, and the ability of communities to reach health facilities. The existence of a health facility within a particular administrative area does not necessarily result in equal access for all residents within that area (Tambaip et al., 2023). Consequently, addressing rural health challenges cannot rely solely on constructing additional facilities. It also requires appropriate health service networks, effective referral mechanisms, equitable health workforce distribution, technological support, and the involvement of local actors who possess direct relationships with communities. The national condition illustrates the magnitude of this challenge. In 2026, BPJS Kesehatan recorded 284,514,113 JKN participants, while the number of First-Level Health Facilities (Fasilitas Kesehatan Tingkat Pertama/FKTP) reached 23,812. The current doctor ratio was reported at 0.76 doctors per 1,000 population. These figures provide an initial picture of the relationship between the broad coverage of health insurance and the capacity of the primary health care system.

Table 1. National Overview of Health Insurance Coverage and Primary Health Care Capacity

Indicators	Total
JKN Participants	284.514.113
Primary Health Care Facilities	23.812
Current Doctor to Population Ratio	0,76/1.000

Source: BPJS Kesehatan Republik Indonesia, 2026.

The figures in Table 1 demonstrate that the expansion of health insurance coverage needs to be considered alongside the capacity of primary health care services. With 284,514,113 JKN participants in 2026 and an Indonesian population of approximately 290,125,073, a substantial population remains outside the reported JKN participant coverage. At the same time, the 23,812 FKTPs need to serve a geographically dispersed population across Indonesia. When compared with 7,288 subdistricts, the aggregate number corresponds to approximately 3.27 FKTPs per subdistrict, while comparison with 84,291 villages and urban villages indicates approximately one FKTP for every 3.54 villages or urban villages. These aggregate figures should not be interpreted as evidence of equal distribution because the availability and distribution of facilities vary across regions. Aprilia & Dhafa (2026) indicate that FKTP distribution remains uneven, particularly between urban and rural areas, islands, and geographically difficult regions. The availability of health workers also remains an important concern, as the reported doctor ratio of 0.76 per 1,000 population is below the ratio presented in the existing policy and health-system reference used in this study. Thus, the national challenge is not simply the number of facilities or insurance participants, but how health service capacity can be connected effectively with populations distributed across diverse geographical settings.

These conditions demonstrate that rural health development is a multi-actor governance issue. The central government establishes national policies and financing mechanisms, local governments are responsible for the provision and management of health services, BPJS Kesehatan manages the health insurance mechanism, health facilities deliver services, village governments maintain direct institutional relationships with local communities, while health cadres and community members possess social knowledge and capacities that may not be available within formal institutions (Dea & Simarmata, 2025). Collaboration between the Ministry of Health and the Ministry of Villages and Development of Disadvantaged Regions

also reflects the importance of cross-sectoral cooperation in extending access and improving the quality of primary health services at village and hamlet levels. Such conditions indicate that rural health problems require institutional relationships that are more integrated than isolated sectoral interventions.

The involvement of multiple actors, however, does not automatically result in effective coordination or collective action. Differences in institutional authority, organizational interests, resources, knowledge, and community capacities may create fragmentation when each actor operates according to separate priorities and information systems. Rural health governance therefore requires a mechanism that can connect these actors through shared objectives, coordinated responsibilities, continuous communication, information and knowledge sharing, and meaningful community participation. Such an arrangement is particularly important in rural areas because health needs are closely connected with local social and cultural conditions. Strengthening collaboration should consequently extend beyond formal institutional coordination by incorporating community based resources, local knowledge, and local wisdom into the planning, implementation, and evaluation of primary health services.

The complexity of rural health provision consequently creates a need for a governance approach capable of connecting actors, resources, knowledge, and responsibilities (Carson et al., 2022). Health service delivery involves central and local governments, BPJS Kesehatan, Puskesmas, clinics and FKTPs, village governments, health cadres, community organizations, families, and community members as both recipients and participants in the health system (Nugraheni et al., 2025). Each actor possesses different authority, resources, knowledge, and capacities. Collaborative governance provides a relevant framework for connecting these different resources because it emphasizes coordination, communication, trust, information and knowledge sharing, participation, and joint decision-making among public and non-public actors (Ansell & Gash, 2008). Within this perspective, government is not positioned solely as a service provider but also as a coordinator, facilitator, and connector that enables different actors to contribute to the achievement of shared public goals.

However, collaborative governance in rural health cannot be separated from the social and cultural resources already embedded within communities. Health cadres, community leaders, families, social groups, and community networks can contribute to information dissemination, health promotion, early detection, assistance, and responses to health problems (Jahan, 2023). Rural communities also possess knowledge and practices developed through everyday experiences and interactions with their local environment (Van Assche & Hornidge, 2023). In this study, local wisdom is not positioned as a substitute for formal health services or evidence-based medical practices. Rather, it is understood as a socio-cultural resource that can strengthen communication, community acceptance, participation, and the sustainability of health interventions. Integrating such resources with primary health care can create stronger connections between formal health institutions and communities, particularly in areas where geographical and institutional barriers limit the effectiveness of conventional service delivery.

Although collaborative governance has increasingly been recognized as an important approach to strengthening primary health care, existing studies indicate that the presence of collaborative structures does not necessarily guarantee effective collaboration. Sitienei et al. (2021) found that community participation structures may exist formally but remain limited in their contribution to routine health service management because of unclear roles, unequal influence, inadequate operational mechanisms, and resource constraints. Similarly, research on community health governance emphasizes that the effectiveness of health governance depends not only on institutional arrangements but also on the capacity of actors to establish meaningful relationships at the local level (Madon & Krishna, 2022). Meanwhile, health system resilience research has increasingly highlighted the importance of community-based

capacities, although much of the literature remains focused on formal health systems and institutional responses to disruption (Copeland et al., 2023). These findings indicate that rural health resilience requires an approach that connects formal health institutions with the resources and capacities embedded within local communities.

The socio cultural dimension provides an important but insufficiently integrated component of this discussion. In Indonesia, local wisdom and cultural practices influence how communities understand health, prevention, and the utilization of health services (Damayanti et al., 2023). However, existing studies generally examine local wisdom in relation to specific health behaviors or health problems rather than positioning it as a governance resource that can be systematically connected with primary health care institutions. At the same time, research on rural health planning and community-centred health systems demonstrates that community participation, local relationships, and locally embedded actors can contribute to the continuity and sustainability of health services (Hyett et al., 2024). Nevertheless, these research streams remain relatively fragmented: collaborative governance emphasizes institutional relationships and participation, primary health care focuses on service access and delivery, local wisdom emphasizes socio-cultural influences, while resilience research focuses on the capacity to anticipate, respond, and adapt to disruptions. This fragmentation creates a research gap concerning how these dimensions can be integrated within a single governance framework for rural health resilience.

This study addresses this gap by proposing an integrated model in which collaborative governance serves as the mechanism connecting primary health care, government capacity, community participation, technology, and local wisdom to rural community health resilience. Primary health care functions as the institutional and service-delivery foundation, while local wisdom represents a socio-cultural resource that can strengthen communication, acceptance, participation, and continuity of health interventions. Through coordination, trust, knowledge sharing, participation, and joint decision-making, collaborative governance is expected to connect these resources to strengthen the capacity of communities and institutions to anticipate risks, respond to health challenges, adapt to changing conditions, and maintain essential health services. Therefore, the novelty of this study lies in integrating collaborative governance, primary health care, local wisdom, and rural health resilience within a single governance model. Accordingly, this study aims to develop a collaborative governance model for building rural community health resilience through the integration of primary health care and local wisdom.

II. METHOD

This study employed a qualitative descriptive approach to develop a national collaborative governance model for strengthening rural community health resilience in Indonesia. The study covered the Indonesian national context, with the rural health governance system as the unit of analysis, particularly the interactions among government institutions, primary health care providers, village-level actors, health cadres, community organizations, and rural communities. The study utilized secondary data from authoritative sources, including the Ministry of Health of the Republic of Indonesia, BPJS Kesehatan, the Central Statistics Agency, and other relevant government institutions. The data included national health service coverage, availability of primary health care facilities, health workforce capacity, health insurance coverage, village level health service networks, geographical characteristics, and relevant health policies. These data were complemented by scientific articles from national and international journals addressing collaborative governance, primary health care, community participation, local wisdom, health system resilience, and rural health development.

Data were collected through document analysis and a structured review of relevant scientific literature and policy documents. The analysis focused on five interconnected dimensions: primary health care capacity and accessibility. 1. Primary health care capacity and accessibility, 2. Institutional and governmental capacity, 3. Collaborative governance mechanisms, including coordination, communication, trust, knowledge sharing, participation, and joint decision-making, 4. Community and local socio-cultural resources, including local wisdom, and 5. Health resilience, including the capacity to anticipate risks, prevent disruptions, respond to health problems, adapt to changing conditions, and maintain essential health services. Quantitative national indicators were analyzed descriptively to illustrate the condition and capacity of the health system, while qualitative evidence was synthesized to identify relationships and governance mechanisms among the identified dimensions. Data analysis involved data reduction, data display, and conclusion drawing and verification, with evidence from different sources compared to strengthen the credibility of the findings. The final synthesis was used to formulate an integrated governance model in which collaborative governance connects primary health care, government capacity, community participation, technology, and local wisdom to strengthen rural community health resilience across Indonesia.

III. RESULTS AND DISCUSSIONS

A. Result

The analysis of national secondary data, policy documents, and relevant scientific literature indicates that rural community health resilience in Indonesia is influenced by the interaction of health service capacity, institutional capacity, community resources, technological support, and collaborative governance. The national condition demonstrates that broad health insurance coverage does not automatically translate into equal access to primary health care. In 2026, BPJS Kesehatan recorded 284,514,113 JKN participants and 23,812 First-Level Health Facilities (FKTP), while the reported doctor ratio was 0.76 per 1,000 population. These figures indicate that the expansion of health insurance coverage needs to be accompanied by sufficient and geographically distributed primary health care capacity. The distribution of FKTPs across Indonesia also needs to be considered in relation to the large number of villages and diverse geographical conditions, particularly rural, remote, island, and poorly connected areas. The findings therefore indicate that the main challenge is not merely increasing the number of insured residents or health facilities, but ensuring that available resources can be effectively connected to communities across different geographical and institutional contexts.

The synthesis of policy documents and literature further identifies five interconnected components that are important for strengthening rural community health resilience.

1. Primary health care capacity and accessibility constitute the basic foundation because Puskesmas, Puskesmas Pembantu, Posyandu, and village-level health networks represent the closest formal health service structures to rural communities. The findings indicate that strengthening primary health care requires a service network that extends beyond conventional facility-based arrangements. The availability of health services at the village and community levels is particularly important in addressing geographical barriers and reducing dependence on centralized health facilities. A connected primary health care network enables communities to receive essential health interventions closer to their residential environments while maintaining access to professional health services through established referral pathways.
2. Institutional and governmental capacity determines the ability of different levels of government and health institutions to allocate resources, coordinate programs, and maintain service continuity. The findings suggest that rural health resilience requires

institutional arrangements that connect national, provincial, district, subdistrict, and village-level responsibilities. Each governmental level has different authority and resource capacities, but their respective roles must operate within a coordinated governance framework. Without institutional synchronization, health programs may operate independently, resources may be distributed inefficiently, and service continuity may become vulnerable to administrative fragmentation.

3. Collaborative governance provides the mechanism for connecting actors through coordination, communication, trust, knowledge sharing, participation, and joint decision-making. Rather than treating collaboration as an administrative activity limited to institutional meetings, the proposed framework positions collaboration as an operational process through which stakeholders identify health problems, establish shared priorities, mobilize resources, coordinate interventions, and evaluate service outcomes. This approach recognizes that rural health problems are multidimensional and cannot be addressed exclusively through the authority of health institutions. Effective responses require the involvement of actors who possess different forms of knowledge, resources, and institutional responsibilities.
4. Community and socio cultural resources, including health cadres, community leaders, families, social networks, and local wisdom, provide locally embedded capacities that can support communication, health promotion, early detection, and community acceptance. Local wisdom and sociocultural practices also influence how communities understand health problems, respond to health interventions, and interact with formal health institutions. Integrating these resources into the health governance system can strengthen public acceptance and encourage greater participation in preventive health activities. The findings consequently position rural communities not merely as recipients of government health services but as active contributors to health system capacity. Community participation can strengthen the relationship between formal health institutions and local social structures, particularly in areas where geographical and institutional limitations affect service accessibility.
5. Technology functions as an enabling resource for information exchange, health monitoring, communication, and early response. The availability of accurate and accessible information enables government institutions and health facilities to identify service gaps, monitor population health needs, and coordinate responses more effectively. At the community level, appropriate access to health information can improve public understanding of available services, referral procedures, JKN entitlements, and medicine availability. However, technological development must be accompanied by institutional interoperability, adequate infrastructure, digital capacity, and appropriate data protection mechanisms. Technology cannot independently resolve structural weaknesses when institutions continue to operate through fragmented information systems.

Based on the synthesis, the proposed governance model positions collaborative governance as the central connecting mechanism between primary health care and community resources. Primary health care provides the institutional and professional foundation, while government institutions provide regulatory, administrative, and resource capacities. Communities contribute participation, social networks, local knowledge, and local wisdom, while technology strengthens communication, information exchange, monitoring, and coordination. The interaction of these resources is directed toward five dimensions of rural health resilience: anticipation, prevention, early detection, response and adaptation, and continuity of essential health services. The model consequently moves beyond a facility-centred approach by positioning rural communities as active actors within the health governance system.

The interaction of these resources is directed toward five dimensions of rural health resilience: anticipation, prevention, early detection, response and adaptation, and continuity of essential health services. Anticipation involves identifying potential health risks and service vulnerabilities before they develop into more serious problems. Prevention focuses on reducing exposure to health risks through health promotion and community-based interventions. Early detection enables health institutions and communities to recognize emerging health problems and initiate timely responses. Response and adaptation concern the ability of institutions and communities to mobilize resources and adjust service arrangements when health needs change. Finally, continuity of essential health services ensures that basic health interventions remain accessible despite institutional, geographical, or operational challenges. These findings indicate that rural community health resilience should be understood as a governance capacity rather than merely the availability of health facilities or the ability of individuals to access medical treatment. The proposed model therefore moves beyond a facility-centred approach by positioning rural communities as active actors within an integrated health governance system.

B. Discussion

The findings indicate that strengthening rural community health resilience in Indonesia requires a transformation from a predominantly facility-centred health service system toward a more structured, integrated, transparent, and participatory health governance system. Such transformation is necessary because the challenges of rural health services extend beyond the availability of medical facilities. They also involve geographical accessibility, institutional coordination, health financing, information management, community participation, and the ability of different stakeholders to respond collectively to changing health conditions. The proposed model emphasizes that resilience emerges from the interaction between institutional capacity and community-based resources. This perspective places collaborative governance at the centre of rural health system development because no single institution possesses sufficient authority, information, and resources to address all dimensions of rural health challenges independently.

1. Strengthening the Primary Health Care Network Before and Around Puskesmas

One of the most important implications of the findings is the need to strengthen the health service structure before communities reach the Puskesmas. Puskesmas should not function as the first and only meaningful point of formal health access for rural populations. Instead, the primary health care system needs to be organized through a graduated service network consisting of community-based health services, Posyandu, village-level health posts, Puskesmas Pembantu, mobile health services, and other appropriate primary service points that are systematically connected to Puskesmas. This arrangement is important because geographical distance, transportation limitations, and uneven facility distribution can create practical barriers to accessing health services. For rural populations, the distance between residential areas and formal health facilities may influence the timeliness of health consultations, preventive interventions, and referrals. Therefore, strengthening community-level services represents a strategic approach to reducing the geographical and institutional distance between health providers and communities.

Within this arrangement, community-based services can undertake basic health promotion, preventive activities, preliminary screening, health education, and community health monitoring according to their respective competencies and institutional mandates. Posyandu and village-level health networks can support the identification of population health needs, particularly among vulnerable groups, while Puskesmas maintains its role as the primary institutional hub responsible for professional health services, clinical management, coordination, supervision, and referrals. The strengthening of this network should not, however, result in the creation of isolated service points. Each level needs to

operate within an integrated institutional structure supported by standardized procedures, health information systems, referral mechanisms, human resource support, and regular supervision. Clear functional boundaries are essential to ensure that community-based health services do not undertake responsibilities beyond their competencies. In this model, the community represents the first layer of health resilience, village-level services constitute the second layer, Puskesmas functions as the primary institutional hub, and hospitals and other advanced facilities provide higher-level clinical services. This tiered arrangement can improve the distribution of service responsibilities, reduce unnecessary pressure on Puskesmas, and enable earlier identification of health problems at the community level.

2. Integrating JKN/BPJS Kesehatan with Rural Health Service Accessibility

The second major finding concerns the need for stronger integration between the health service network and Jaminan Kesehatan Nasional (JKN), administered by BPJS Kesehatan. Health insurance coverage should not be viewed separately from the availability, geographical distribution, and organizational capacity of health services. The large number of JKN participants represents an important achievement in expanding financial protection. Nevertheless, administrative membership does not automatically guarantee effective access to health services. Individuals may remain unable to utilize available benefits because of geographical distance, transportation barriers, referral procedures, limited facility capacity, administrative requirements, or insufficient information concerning their entitlements. This distinction is particularly important for rural populations because the practical value of health insurance depends on whether the service infrastructure is sufficiently accessible. Therefore, the proposed governance model emphasizes that JKN integration must be accompanied by the strengthening of primary health care networks and the development of more responsive referral arrangements.

Integration should ensure that different population groups, including rural residents, economically vulnerable households, workers in the informal sector, elderly people, women, children, and communities living in geographically difficult areas, can access health services through transparent and predictable mechanisms. Furthermore, an integrated JKN system requires synchronization between membership information, health facility availability, referral pathways, service utilization, and health financing data. Such synchronization can help policymakers understand where JKN participants are located, what health services they require, where institutional capacity is insufficient, and which geographical areas continue to experience access disparities. The integration of health financing and service delivery information also has implications for local government planning. Resource allocation should be informed by actual population health needs, service utilization patterns, facility capacity, and geographical accessibility rather than relying exclusively on administrative population figures. Within this framework, BPJS Kesehatan, the Ministry of Health, local governments, health facilities, and village-level health networks need to establish coordinated information and operational arrangements. Such collaboration would strengthen the relationship between financial protection and actual service provision.

3. Developing an Integrated National Health Data and Technology Ecosystem

The third major component of the proposed model concerns the development of an integrated national health data and technology ecosystem. Rural health resilience requires accurate, timely, accessible, and interoperable information that can support decision-making across different levels of government and health service institutions. Health information should not be limited to the number of patients, health facilities, or health insurance participants. It should encompass the broader health service ecosystem, including population characteristics, health needs, facility capacity, health worker availability, referral patterns, service utilization, medicine availability, service costs, and health outcomes. The integration of these data categories would enable policymakers to identify discrepancies between population needs and available service capacity. For example, information concerning the

distribution of health facilities and medical personnel can be considered alongside population characteristics, geographical accessibility, and service utilization patterns. Such information provides a stronger basis for identifying areas that require additional resources or alternative service arrangements.

At the institutional level, integrated data can strengthen planning, budgeting, monitoring, and evaluation. Health facilities can use information to identify service demand and resource requirements, while local governments can use aggregated data to determine priority areas for health infrastructure development and human resource allocation. At the national level, an integrated information ecosystem can support the identification of disparities across regions and facilitate the coordination of policies and resource distribution. This is particularly relevant in a decentralized governance environment, where health service responsibilities are distributed across different levels of government. Technology should therefore be developed not merely as an administrative instrument but as a strategic resource for improving institutional responsiveness and public transparency. Digital transformation becomes meaningful when information can be exchanged across institutions, translated into policy decisions, and made accessible to communities in forms that support informed participation. However, the development of such an ecosystem requires more than the introduction of digital applications. Interoperability standards, institutional responsibilities, data quality, human resource competencies, digital infrastructure, and information security must be considered as integral components of technology governance.

4. Big Data Transparency and Public Accountability in Health Governance

An important contribution of the proposed model is the integration of big data transparency into rural health governance. The concept emphasizes that health information should not remain exclusively within administrative and institutional structures but should also provide meaningful information to communities concerning the availability, accessibility, and performance of health services. Technology-enabled transparency can provide standardized information regarding available health services, applicable service costs, JKN coverage, referral procedures, medicine availability, and, where appropriate and legally permissible, medicine and service price information. Such transparency can reduce information asymmetry between health providers, government institutions, and communities. Patients would be better positioned to understand what services they are entitled to receive, which procedures they need to follow, and which costs are covered or not covered by their health insurance. For rural communities, accessible information is particularly important because limited knowledge of service availability and referral procedures may create additional barriers to health service utilization. Providing clear and reliable information can strengthen community confidence in health institutions and encourage more active participation in health service processes. From the government perspective, transparent health information can strengthen public accountability by enabling communities to understand the performance of health service institutions. Aggregated information regarding medicine availability, waiting times, facility capacity, referral options, and service accessibility can provide an important basis for public monitoring and institutional evaluation.

5. Collaborative Governance as an Operational Mechanism for Institutional Integration

The integration of primary health care, JKN, and digital health data consequently changes the position of collaborative governance within the proposed model. Collaborative governance is no longer limited to institutional meetings, coordination forums, or formal agreements. Instead, it becomes an operational governance mechanism supported by shared information, integrated service networks, and transparent institutional processes. The Ministry of Health can utilize national information to establish standards, identify disparities, and coordinate national health priorities. Local governments can translate these priorities

into local resource allocation and service development strategies. BPJS Kesehatan can strengthen the relationship between health financing, membership, and service utilization, while health facilities coordinate referrals, clinical services, and resource requirements. At the village level, village governments, health cadres, community leaders, and local organizations can contribute to health promotion, early detection, community monitoring, and the identification of vulnerable populations. Communities themselves can participate as informed users of health services and contributors to the broader health governance process. The involvement of these actors reflects the importance of distributing governance responsibilities according to their respective institutional capacities and community-based resources. National institutions possess regulatory and strategic authority, local governments possess administrative and territorial responsibilities, health facilities provide professional services, and communities contribute local knowledge and social resources.

6. Integrating Community Participation and Local Wisdom into Health Resilience

Beyond institutional and technological integration, rural community health resilience also requires the systematic recognition of community participation and local wisdom. Rural communities possess social resources that are often embedded in family relationships, community organizations, local leadership, religious and social networks, and established patterns of collective action. These resources can support health communication, preventive activities, the identification of vulnerable populations, and the acceptance of health interventions. Health cadres, for example, can serve as important intermediaries between professional health services and local communities because they operate within the social environments where health needs emerge. The involvement of community actors is particularly relevant when health interventions require behavioral changes, continuous participation, and the integration of formal health recommendations into everyday practices. Health programs that do not consider local sociocultural conditions may encounter difficulties in achieving community acceptance and sustained participation. Consequently, local wisdom should not be treated merely as a cultural complement to formal health services. It can function as a locally embedded governance resource that strengthens communication, social trust, and collective responsibility.

7. Strengthening the Five Dimensions of Rural Community Health Resilience

The interaction of institutional capacity, primary health care, JKN integration, technology, and community resources ultimately contributes to five interconnected dimensions of rural health resilience.

a. Anticipation concerns the capacity of institutions and communities to recognize potential health risks and service vulnerabilities before they develop into more serious problems. Integrated population data, community health monitoring, and coordination between health institutions can strengthen the identification of emerging needs and potential service disruptions.
b. Prevention involves the ability to reduce health risks through continuous health promotion, community participation, preventive services, and locally appropriate interventions. Community-based health networks and health cadres are important because they can facilitate the delivery of preventive activities closer to residential environments.
c. Early detection concerns the ability to identify health problems at an earlier stage and connect individuals with appropriate professional services. This dimension requires effective communication between communities, village-level health services, Puskesmas, and referral facilities.
d. Response and adaptation refer to the ability of institutions and communities to mobilize resources, coordinate interventions, and adjust service arrangements when health needs change. Collaborative governance and integrated information systems are important in supporting timely decision-making and coordinated responses.

e. Continuity of essential health services concerns the capacity to maintain access to basic health interventions despite geographical, institutional, financial, or operational challenges. This dimension requires reliable service networks, sufficient human resources, effective referral mechanisms, and sustainable institutional coordination.

These five dimensions demonstrate that resilience is not a single outcome or an isolated institutional characteristic. It represents a multidimensional capacity that develops through the continuous interaction between health service structures, governmental institutions, community resources, and technological systems.

8. An Integrated Governance Architecture for Rural Community Health Resilience

The proposed model therefore emphasizes four mutually reinforcing layers:

a. Structured health service network before and around Puskesmas
b. Integrated and inclusive JKN/BPJS mechanisms
c. Interoperable national health data ecosystem
d. Transparent technology enabled health information

These four layers are connected through collaborative governance, which functions as the institutional mechanism for coordinating actors, integrating resources, and translating shared information into collective action. The model recognizes that resilience cannot be established by increasing one resource in isolation. Additional health facilities without integrated referral mechanisms may create institutional fragmentation. Broader JKN coverage without sufficient service capacity may produce administrative rather than substantive access. Large volumes of health data without interoperability may create information silos, while digital transparency without privacy protection may introduce new governance risks. Similarly, community participation without institutional support may produce activities that are difficult to sustain, while formal institutional coordination without meaningful community involvement may fail to address local health needs and geographical realities.

Therefore, the strength of the proposed model lies in the integration of these components into a coherent governance architecture. The model positions collaborative governance not simply as an additional element of health service management but as the central mechanism that connects institutional resources, community capacities, financial protection, and technological infrastructure. The principal implication is that rural community health resilience should be developed through a governance system capable of connecting the formal health sector with the social and institutional environments in which communities live. By integrating accessible primary health care, inclusive health financing, interoperable information systems, public transparency, and community participation, the proposed model offers a broader perspective on how rural health systems can become more responsive, adaptive, and sustainable. Ultimately, strengthening rural health resilience requires a shift from a service delivery orientation toward an integrated governance orientation. Under this approach, communities are not positioned merely as beneficiaries of health programs but as active partners in identifying health needs, participating in preventive activities, accessing reliable information, and contributing to the continuity of essential health services. This integration provides the conceptual foundation for developing a more inclusive and sustainable rural community health governance system in Indonesia.

IV. CONCLUSION

This study concludes that strengthening rural community health resilience in Indonesia requires an integrated collaborative governance model that connects structured primary health care networks, inclusive JKN/BPJS mechanisms, interoperable health data, technology based transparency, community participation, and local wisdom. The model positions collaborative governance as the mechanism that coordinates government

institutions, health facilities, BPJS Kesehatan, village governments, health cadres, communities, and other relevant actors across service levels, beginning with community and village based services, continuing through Puskesmas, and extending to referral facilities. By integrating health financing, service capacity, reliable data, transparent information on service and medicine availability and prices, and community based socio cultural resources, the proposed model provides a governance framework for improving accessibility, early response, service continuity, and adaptability in rural health systems. Thus, the study addresses its objective by proposing a national rural health governance model that shifts health service development from a fragmented and facility centred approach toward a more integrated, transparent, participatory, and resilient system.

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