The Extent of Indonesian Public Policy in Addressing Factors Influencing Rural Retention of General Practitioners, Cardiologists, and Neurologists as The Critical Actors during The 'Golden Hour' of Cardiovascular Diseases Management

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A thesis submitted in partial fulfillment of the requirement for the degree of
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by

Nur Afidah

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Abstract

Background: Cardiovascular diseases (CVDs) are the leading cause of mortality, morbidity, and disability in Indonesia. Timely treatment within the "golden hour" significantly reduces death and disability. General practitioners (GPs), cardiologists, and neurologists are critical providers of acute CVDs management. However, GPs are underrepresented in rural areas, while most cardiologists and neurologists are concentrated in urban centers of western Indonesia, leaving rural populations underserved in accessing timely, life-saving CVDs care. This study aims to identify the factors influencing the retention of GPs, cardiologists, and neurologists in rural Indonesia and to analyze the extent to which public policies address these factors.

Methodology: This study is a literature and policy review. The Lehmann et al. (2008) framework was used to analyze retention factors, chosen for its focus on retention challenges, policy and governance analysis, and consideration of international influences.

Results: The work environment is the strongest factor influencing long-term retention. Sustained commitment depends on supportive workplaces, adequate infrastructure, and career development opportunities. Although Indonesia implements various initiatives for retaining GPs, cardiologists, and neurologists in rural areas, the most comprehensive and structured policies focus on general practitioners. Specialist-specific measures are fewer, less integrated, and rarely ensure long-term service in underserved districts.

Conclusion: Indonesia's public policies partially address key retention factors but lack cohesive, cadre-specific strategies. A bundled retention approach is recommended, integrating targeted recruitment, compulsory rural service, equitable incentives, supportive living conditions, structured reintegration programs, and continuous professional development tailored to each cadre.

Keywords: rural retention, medical workforce, cardiologists, neurologists, health policy

Word Count: 9,750

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Abbreviation

ADIMAN	*Asosiasi Doktor Indonesia Jerman* (or Indonesian Doctors Association in Germany)
ASEAN	*Association of Southeast Asian Nations*
CVDs	Cardiovascular Diseases
GPs	General Practitioners
JKN	*Jaminan Kesehatan Nasional* (or National Health Insurance)
LMICs	Low-Middle Income Countries
LPDP	*Lembaga Pengelola Daan Pendidikan* (Indonesia Endowment Fund for Education)
MoH	Ministry of Health
MoF	Ministry of Finance
NCDs	Non-communicable Diseases
Puskesmas	*Pusat Kesehatan Masyarakat* (or primary health center)
Pustu	*Puskesmas Pembantu* (Auxilary Puskesmas),
Poskesdes	*Pos Kesehatan Desa* (Village Health Post)
Posyandu	*Pos Pelayanan Terpadu* (Integrated Health Posts)
SEA	South-East Asia
UHC	Universal Health Coverage
WHO	World Health Organization

Key Definition

Medical Doctor refers to a healthcare professional who has completed medical education and is licensed to practice medicine, covering all categories of doctors, including general practitioners and medical specialists(1).

General Practitioner refers to a medical doctor who practices general medicine, providing broad primary care without specialization(1).

Medical Specialist refers to a medical doctor who has completed additional specialist training in a specific field and is authorized to handle more complex conditions(1).

Pull factors refer to circumstances or incentives that attract individuals to move to a new location, such as better job prospects, career advancement, financial and non-financial benefits, improved living or working environments, or a more stimulating professional setting(2).

Rural retention refers to the continued employment of health workers in rural locations over a defined period(2).

Acknowledgement

I would like to express my deepest gratitude to God, for it is by His grace that I have been able to progress this far in my educational journey, culminating in the completion of my master's thesis.

I am sincerely thankful to my family and friends, who have continually offered their unwavering support despite being thousands of kilometers away from Amsterdam. I also wish to honor the memory of my late grandmother, who passed away during the final stage of my master's studies. She was a constant source of encouragement in my pursuit of a master's degree abroad.

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Chapter I: Background

1.1 Indonesia Health System Profile

Indonesia (figure 1), an archipelagic country consisting of 300 ethnic group and more than 280 million inhabitant, with 141.7 million males and 139 million females, is ranked as the fourth most populous country in the world with predominantly young population and an average schooling duration of 9.13 years in 2023(3,4). Indonesia's most urbanized provinces are concentrated in western Indonesia, particularly on Java Island, the Riau Islands, Bali Island, East Kalimantan and North Kalimantan(5,6). In contrast, eastern provinces such as Papua, Maluku, and East Nusa Tenggara remain predominantly rural, reflecting a clear spatial pattern in which the western regions are generally more urbanized, while the eastern regions are more rural(5,7).

As a democratic state, Indonesia has implemented a decentralized governance framework since the late 1990s to enhance responsiveness by devolving authority to regional governments, enabling them to allocate budgets and manage public services based on local needs, including the health budget(8,9). Regional governments have the discretion to plan health workforce needs and request allocations from the Ministry of Health's, facilitating regionally tailored health workforce deployment(4,10).

Figure 1: Map of Indonesia(11).

Along with the government decentralized system, the Indonesian health care system is organized around a decentralized, multi-tiered network of public and private facilities, with primary care facilities such as Puskesmas (primary health center) serving as first contact points, and more specialized care delivered at secondary and tertiary hospitals (**table 1**)(8,9). According to the MoH 2023 report, there are over 10,000 Puskesmas and its complemented by approximately 22,000 Pustu (Auxilary Puskesmas), 24,000 Poskesdes (Village Health Post) and nearly 280,000 Posyandu (Integrated Health Posts) which extend basic maternal, child, and preventive services down to the community level(4). Additionally, for referral and specialized care, the country relies on roughly 2,500 public hospitals and 1,600 private hospitals(4). This decentralized-tiered structure aims to improve health service delivery in a diverse archipelago but continues to face challenges related to workforce distribution and referral systems(12).

Table 1. Health Facility Distribution in Indonesia per 2023(4).

Facility Type	Estimated Number (2023)	Main Functions
Puskesmas (Primary Health Centers)	10000	Primary care, gatekeeping under National Health Insurance (*Jaminan Kesehatan Nasional* or JKN)
Pustu (Auxiliary Puskesmas)	22000	Supportive outreach for Puskesmas
Poskesdes (Village Health Posts)	24000	Basic maternal and child health services
Posyandu (Integrated Health Posts)	280000	Community-based health promotion & NCD screening
Public Hospitals	2500	Secondary and tertiary care (referral centers)
Private Hospitals	1600	Private sector referral and inpatient services

As in 2022, the Indonesian GDP per capita rise from USD 3,288 to USD 4,731, accordingly the health's share in the national budget rose from 6.6% in 2015 to 8.0%(13). This increase aligns with Indonesia's progress toward Universal Health Coverage (UHC) (14,15). By 2023, the National Health Insurance program (*Jaminan Kesehatan Nasional* or JKN) had registered 95.77% of the population (267.3 million people), with 79.89% actively participating(14,15).

Despite achieving a high UHC rate, Indonesia's national health insurance system experienced a deficit of approximately USD 518 million (IDR 7.9 trillion) during 2023, with accumulated deficits estimated at over USD 722 million (IDR 11 trillion)(14). This financial gap is substantially driven by catastrophic health expenditures related to cardiovascular diseases (CVDs), notably heart disease and stroke(4,14). In 2023, expenditure on heart disease cases reportedly reached IDR 17.6 trillion, while stroke-related spending amounted to IDR 5.2 trillion, imposing a significant burden on the health insurance system(4).

1.2 CVDs Burden and the Importance of Retaining Rural Medical Doctors in Indonesia

Currently, Indonesia faces a rapidly growing public health challenge from non-communicable diseases (NCDs)(4). This disease accounted for approximately 73–76% of all deaths nationwide in 2019(16,17). Among NCDs, In 2023, Cardiovascular diseases (CVDs) are the leading contributor to this burden, significantly accounted for 766,000 deaths (figure 2), with 47.4% occurring in individuals aged 70 years and above, 41.6% among those aged 50–69 years, 10.8% in the 15–49 year age group, 0.1% in children aged 5–14 years, and 0.1% (979 deaths) in children under 5 years (figure 3).

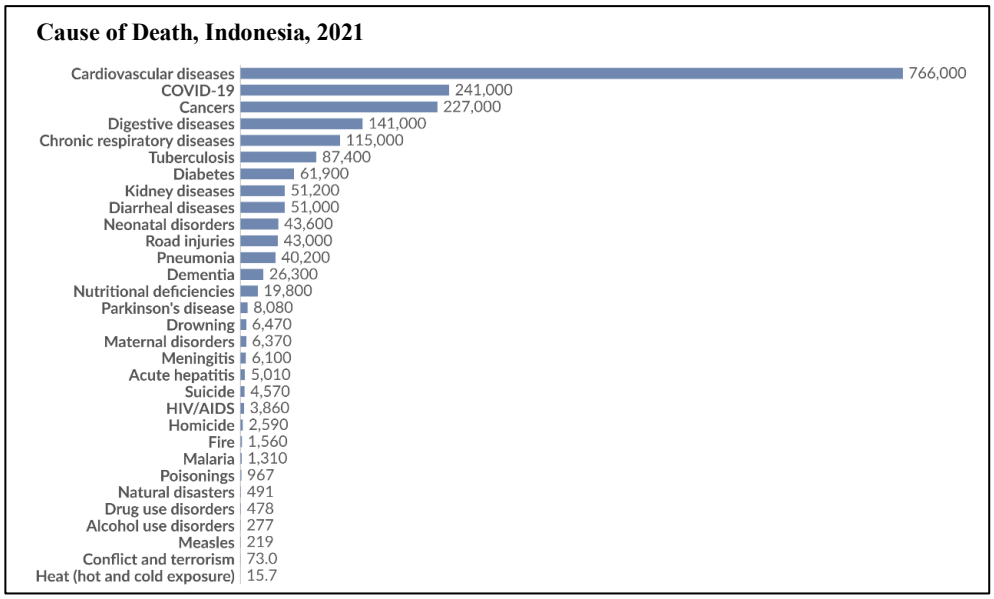

Figure 2: Cause of Death Indonesia 2021(18)

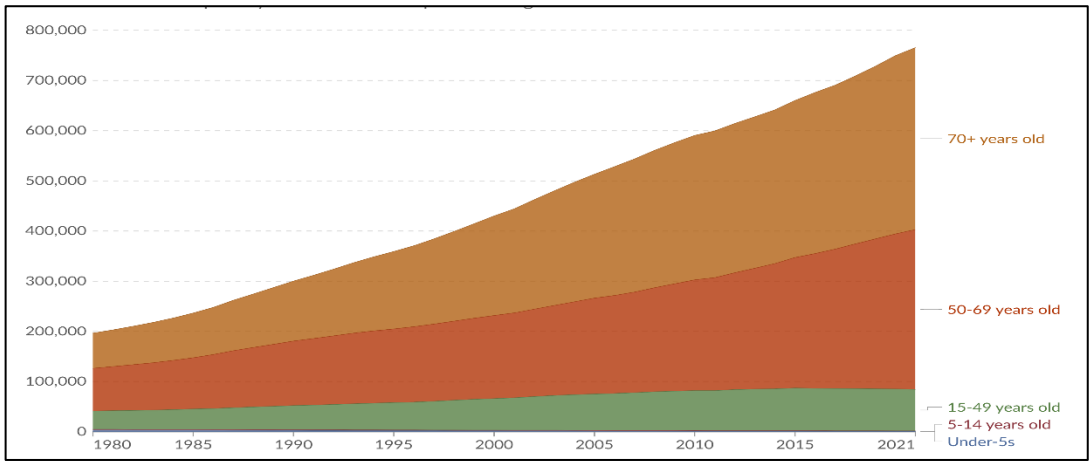

Figure 3: Number of Deaths from CVDs by age 2021(19)

For over 3 decades, Between 1990 and 2019, CVDs prevalence rose by 120% to an estimated 15.3 million cases, and its disability-adjusted life years (DALYs) increased by 86% to an estimated 15.3 million cases(20). During this period, stroke and ischemic heart disease (IHD) consistently emerged as the leading causes of death, accounting for 331,000 and 245,000 deaths(20). Besides representing the health burden, CVDs also presents significant economic cost(21). Study estimated that among CVDs, a coronary heart disease alone is expected to cause approximately USD 33.3 billion in lost productivity (GDP) and USD 139 billion in direct healthcare(21). This calculation is based on the Indonesian 2018 GDP figure(21).

As CVDs burden in Indonesia rises, the urgency for time-sensitive emergency care, particularly in cases of acute ischemic stroke (AIS) and acute myocardial infarction (AMI), has become critical.

AIS and AMI demand immediate intervention within the “golden hour,” typically defined as the first 60 to 90 minutes after symptom onset, during which clinical outcomes can be dramatically improved(22–24). For AIS, intravenous thrombolysis (IVT) administered within 60 minutes of hospital arrival significantly enhances neurological recovery, with a number needed to treat (NNT) as low as 4.5(22,24). Although the therapeutic window for intravenous thrombolysis extends up to 4.5 hours, earlier treatment is strongly associated with better functional recovery and lower disability(22,25). Similarly, in cases of AMI, reperfusion therapy within the first 60 to 90 minutes is critical to minimizing myocardial damage and reducing mortality(23).

Considering the critical window, timely intervention within the golden hour for CVDs emergencies hinges on the coordinated actions of three key professional groups which are general practitioners (GPs), neurologists, and cardiologists(23,26). General practitioners play a potentially critical role in recognizing early symptoms and initiating timely referrals, particularly in rural or primary care settings where delays are more common(24,26). Neurologists are vital in stroke care, confirming diagnosis and delivering time-dependent treatments such as intravenous thrombolysis or mechanical thrombectomy(24). Additionally, for AMI, particularly cases complicated by cardiogenic shock, cardiologists play a central role in early diagnosis and the initiation of reperfusion therapy which dramatically improves cardiac function and survival when administered promptly(23). The collective performance of these cadres within a narrow window of opportunity is foundational to improving patient outcomes during acute cardiovascular events(26).

Chapter II: Problem Statement and Justification

2.1 Problem Statement and Justification

Despite the critical role of general practitioners (GPs), cardiologists, and neurologists as key responders during the "golden hour" window for acute CVDs management, their retention across rural Indonesia remains significant challenges. As of July 2025, Ministry of Health data shows that the national availability of these "golden hour" cadres is 159,635 general practitioners (77.4% of the estimated need, see Figure 1), 2,425 neurologists (88.5%), and 3,740 cardiologists (62%, see Figure 2) (27,28). However, according to national studies, the geographic distribution of these "golden hour" cadres remains significantly uneven(29–31).

The Indonesian Human Resource for Health Country Profile 2019 reports that only 41.8% of GPs are working in rural areas(29). Meanwhile, cardiologists and neurologists are even more disproportionately concentrated, with approximately 85% of cardiologists practicing in western Indonesia, over 65% based in Java alone, and neurologists predominantly located in urban centers on Java Island(30,31). This pronounced urban and Western Indonesia concentration results in significant gaps in specialist care coverage across northern, eastern, and rural regions. Notably, as of 2024, approximately 40.8% of Indonesia's population (116 million people) reside in rural areas, including those categorized as remote, outermost, and underdeveloped regions, which constitute the most underserved segments of the population(32).

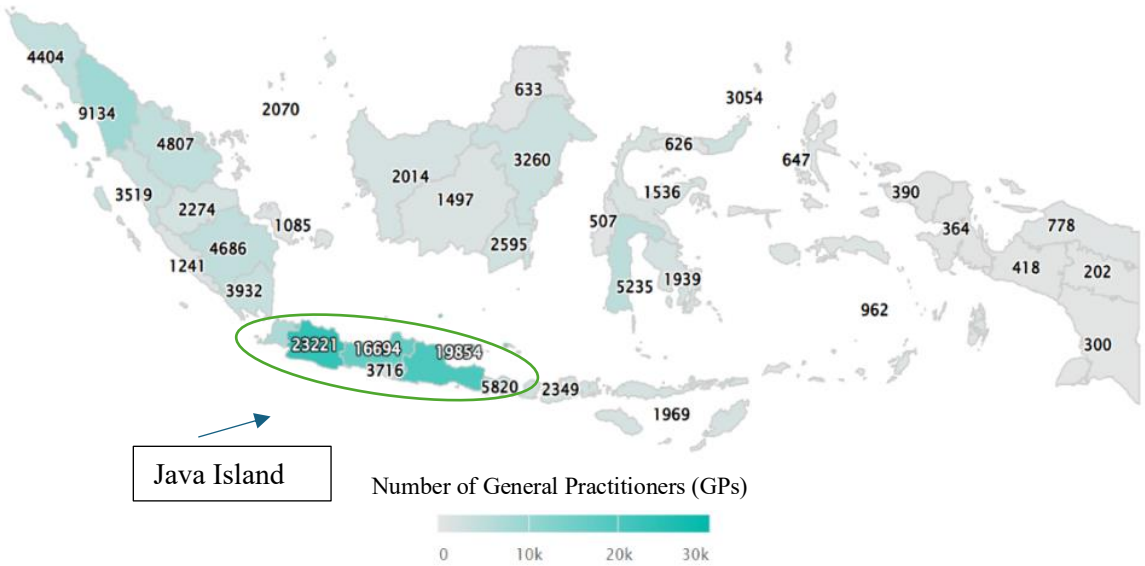

Figure 4 Map of Physician Distribution in Indonesia heavily concentrated in Java Island based on 1 July 2025 data (Source: Indonesian MoH Dashboard(33)

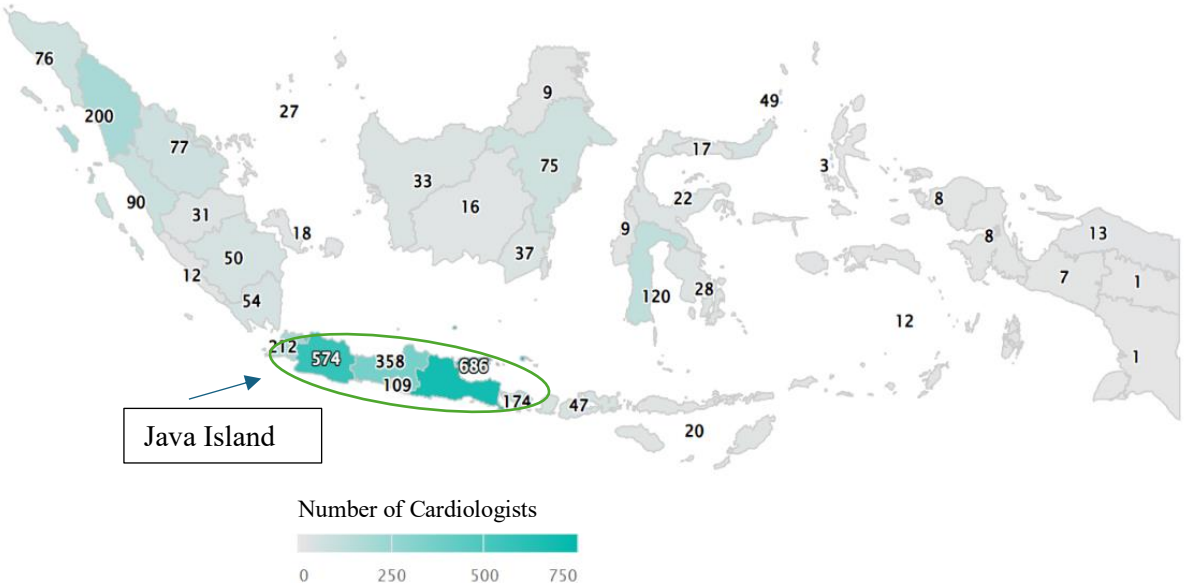

Figure 5 Map of Cardiologists Distribution in Indonesia heavily concentrated in Java Island based on 1 July 2025 data (Source: Indonesian MoH Dashboard(33)

These geographic imbalances translate into limited access to specialist cardiovascular care for rural populations(30,34). Notably, according to the report of The Ministry of Health through the Directorate of Health Workforce Utilization reported that in 2024, of the 514 districts/cities in Indonesia, only 109 hospitals are capable of providing cardiac catheterization services, 19 districts/cities have cardiologists but no equipment(35). In accordance, studies indicate that approximately 70% of patients living in rural or remote areas lack access to appropriate specialist cardiovascular services(30).

Only about one-third of individuals at moderate-to-high cardiovascular risk receive such care, underscoring a substantial unmet need largely driven by the shortage and uneven distribution of medical specialists(30,34). Consequently, rural patients experience longer delays in receiving timely CVDs treatment. For instance, the median prehospital delay for acute ischemic stroke in Indonesia is approximately 12 hours nationwide, far exceeding the critical "golden hour" window with only 2.3% of stroke patients receiving thrombolytic therapy within the recommended timeframe(36). Similarly, rural patients with AMI had a significantly higher mortality rate compared to urban patients(37). These disparities highlight a critical gap in specialist service availability that severely impacts emergency cardiovascular outcomes in rural Indonesia.

Given these challenges, retaining general practitioners, cardiologists, and neurologists in rural Indonesia as the essential "golden hour" cadre for CVDs is paramount. However, there is a significant research gap concerning how Indonesian public policies address these retention challenges. Two key national-level studies led by Kurniati et al. provide valuable insights into rural retention dynamics but focus on distinct aspects(38,39). By using a Discrete Choice Experiment (DCE), these studies quantifies the preferences of medical specialists and GPs regarding retention in remote districts, identifying variables such as security guarantees, access to professional development, and improved medical facilities as major influences on their decisions to remain in rural posts(38,39). Additionally, a 2022 qualitative study by Nurlinawati et al. explores specialists' personal experiences and motivators in the context of government rural placement programs(40). This study identified contextual factors such as geographic familiarity, adequate hospital

infrastructure, competitive regional incentives, and opportunities for career development as major influences on specialists' decisions to complete or extend their rural assignments(40).

These existing studies are primarily shaped by individual preferences and lived experiences, rather than grounded in systematic policy analysis. Specifically, none of the studies apply formal health workforce retention frameworks to deconstruct Indonesia's current policy landscape. Moreover, none explicitly examine how existing policies address the strategic retention of general practitioners, cardiologists, and neurologists as cadres who play a central role in managing the time-sensitive "golden hour" window for CVD patients in rural areas. This gap presents a clear and significant opportunity for further inquiry. Therefore, this research aims to answer the question "To what extent do Indonesian public policies address the factors influencing the rural retention of thef 'golden hour' cadres (GPs, cardiologist, and neurologist) to mitigate healthcare inequity for cardiovascular emergencies?".

By understanding the factors that influence the retention of general practitioners, cardiologists, and neurologists, who play a vital role in the "golden hour" response to cardiovascular emergencies, this study aims to assess whether existing policies effectively address those needs. In doing so, it contributes a much-needed policy-oriented perspective to the current literature. This research will support efforts to strengthen rural health systems in Indonesia. Better-informed policies can lead to improved quality and timeliness of CVDs care, reduced urban–rural medical workforce disparities, and greater job satisfaction among medical workforce through more responsive and supportive working conditions.

2.2 Study Objectives

2.2.1 Overall Objectives

To identify the factors influencing the retention of GPs, cardiologists, and neurologists, as the key actors during the "golden hour" window of CVDs management in rural areas, and to analyze the extent to which Indonesian public policies address these factors

2.2.2 Specific Objectives

1. To analyze which individual-level factors influence retention of golden hour cadres in rural Indonesia.
2. To analyze which local environment conditions influence retention of golden hour cadres in rural Indonesia.
3. To analyze which work environment characteristics influence retention of golden hour cadres in rural Indonesia.
4. To analyze which international factors influence retention of golden hour cadres in rural Indonesia.
5. To analyze which national public policies are present that influence retention of golden hour cadres in rural Indonesia
6. To propose recommendations for policymakers, implementing NGOs and researchers to strengthen the retention of golden our cadres in rural Indonesia

Chapter 3: Method and Analytical Framework

3.1 Study Design

This study employed a literature and policy review through the use of a systematic approach. The literature review synthesized empirical and conceptual evidence from peer-reviewed articles and grey literature to identify factors that influenced the rural retention of general practitioners, cardiologists, and neurologists, which collectively referred to as "golden hour" cadres, in rural areas of Indonesia. These factors were analyzed across five domains as outlined in the Lehmann, Dieleman, and Martineau (2008) retention framework(41). Alongside this, a policy review was conducted by analyzing Indonesian public policy documents, such as national health strategies, Ministry of Health regulations, and legal frameworks. The review aimed to understand how current policies contributed to or fell short in supporting equitable retention of the key actors (GPs, cardiologists, and neurologists) during the golden hour window of cardiovascular disease management in rural areas. Together, these components offered a comprehensive understanding of the retention challenges and policy landscape for CVD-related cadres in rural Indonesia.

3.2 Analytical Framework

The analysis on this study guided by the conceptual framework developed by Lehmann, Dieleman, and Martineau (2008), which comprehensively categorizes the factors influencing health worker retention across five interrelated domains which are individual, local environment, work environment, national environment, and international context(41). This framework was specifically developed through a literature review on staffing remote and rural areas in middle- and low-income countries, and it focuses on understanding the push factors (conditions that encourage health workers to leave a location) and pull factors (incentives that attract them to a new place), as well as the multi-sectoral strategies, required to improve attraction and retention of health workers in these underserved settings(41).

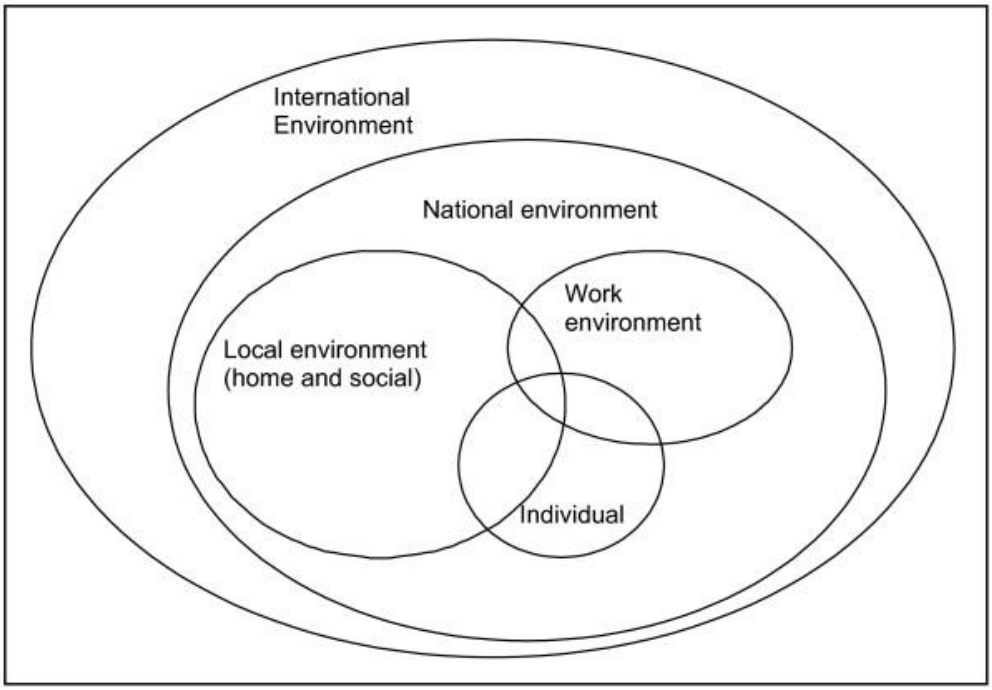

Figure 6: Retention Framework Developed by Lehmann et al. 2008(41).

Each domain of this framework is operationally defined as follows:

a. Individual Factors
   Individual factors represent personal characteristics and circumstances influencing a health worker's decision to remain in or leave rural posts, including demographic traits such gender and marital status, rural or urban origin, which may affect comfort and familiarity with rural settings, intrinsic career motivations and aspirations, and family responsibilities that may affect mobility and stability(41).
b. Local Environment Factors
   These factor refer to the broader community and living conditions surrounding the health worker's place of work, which includes quality and availability of housing; access to basic infrastructure and amenities such as water, electricity, internet connectivity, transportation, and schools; safety and security within the community; the extent of community integration and social networks; and the availability of opportunities and support for family members' wellbeing and social needs(41).
c. Work Environment Factors
   These domain encompasses the immediate professional setting and aspects impacting daily job satisfaction and performance, including the quality and adequacy of facility infrastructure and medical equipment; workload and job demands; quality of management, supervision, and recognition; availability of professional development, training, and career advancement opportunities; remuneration and financial (or non-financial) incentives; and workplace safety(41).
d. National Environment Factors
   These macro-level factors describe systemic policies, regulations, and governance structures shaping health workforce dynamics. Components include health workforce recruitment, deployment policies, and bonding contracts; regulatory frameworks and licensing requirements; standardized national remuneration systems and career progression pathways; governance and resource allocation priorities; as well as broader political and economic stability impacting the health sector(41).
e. International Context Factors
   This domain captures global influences on rural health worker retention, such as international labor markets and overseas migration opportunities; access to international training, fellowships, and education programs; donor and technical assistance; compliance with global health policy frameworks; and cross-border collaborations or agreements that may either incentivize migration or support retention efforts(41).

I selected this framework because its explicit focus on rural and remote health workforce challenges makes it particularly well suited to the context of my study, identifying which issues are covered and which remain unaddressed. Furthermore, the framework's incorporation of national policy and governance components enables a detailed, policy-relevant analysis, allowing me to critically assess the extent to which Indonesian public policies address key retention determinants and identify areas for improvement. Additionally, the inclusion of international factors supports consideration of global labor migration dynamics and bilateral agreements impacting Indonesia, enriching my analysis within a broader international context.

3.3 Data Collection Method

A structured search was conducted using electronic databases and search engines including PubMed, Scopus, Google Scholar, and relevant Indonesian repositories. The sources included peer-reviewed articles, government reports, policy documents, and grey literature focused on the distribution, retention, and roles of general practitioners, neurologists, and cardiologists in rural

Indonesia and comparable low- and middle-income countries (LMICs) contexts due to the limited literature published specific to the Indonesia context. Search terms were adapted for each database using Boolean operators, key terms, and truncation where applicable (see Table 2). In addition, snowballing was employed to identify further relevant materials through the reference lists of selected documents.

For the policy review, a desk-based document search was carried out with a focus on Indonesian public sector sources. This process included national laws, Ministry of Health decrees, strategic health plans, and other regulatory documents available through official government portals and health-related databases. Secondary sources discussing health workforce regulations and implementation experiences were also reviewed to provide context for the policy landscape. The search specifically targeted materials addressing issues related to health workforce distribution, rural deployment, and retention mechanisms relevant to the study's focus on “golden hour” cadres.

Inclusion criteria were applied to ensure that the literature and policy documents reviewed were both contextually relevant and analytically useful. Eligible sources were required to be written in English or Indonesian and published from 2008 onwards, a period which reflects major developments in Indonesia’s health sector, including decentralization and health system transformation. This time frame was chosen due to the limited availability of national studies and updated data prior to 2008. The included content had to address health workforce retention involving general practitioners, cardiologists, or neurologists, particularly in rural or underserved areas in Indonesia or comparable LMICs. Publications included peer-reviewed journal articles, government reports, national regulations, planning documents, and grey literature such as technical reports or NGO documents.

Literature was excluded if it was published before 2008, written in languages other than English or Indonesian, or lacked relevance to the retention of the target cadres. Materials that did not address rural or underserved areas, failed to consider influencing factors or policy contexts, or were inaccessible were also excluded. In addition, non-empirical sources such as editorials, opinion pieces, blogs, or commentaries were omitted from the review.

Table 2 Search Strategy

Objective	Search Keywords/Terms
1. Individual-level factors	"retention" AND ("general practitioner" OR "doctor" OR “medical specialists” OR “Cardiologists” OR “Neurologist” OR “Health Workforce”) AND "rural" AND "Indonesia" AND ("motivation" OR "career preference" OR "personal factors" OR “resilience”) ”) AND "rural" AND ("Indonesia" OR “LMICs” OR “Thailand” OR ‘India”)
2. Local environment conditions	("infrastructure" OR "living conditions" OR "housing" OR "security" OR "community") AND "retention" AND ("general practitioner" OR "doctor" OR “medical specialists” OR “Cardiologists” OR “Neurologist” OR “Health Workforce”) AND "rural" AND ("Indonesia" OR “LMICs” OR “Thailand” OR ‘India”)
3. Work environment characteristics	("workplace satisfaction" OR "facility support" OR "professional development" OR “work load” OR “burn out”) OR ("general practitioner" OR "doctor"

Objective	Search Keywords/Terms
	OR “medical specialists” OR “Cardiologists” OR “Neurologist” OR “Health Workforce”) AND "rural" AND ("Indonesia" OR “LMICs” OR “Thailand” OR ‘India”)
4. International factors	("migration" OR "brain drain" OR "international mobility" OR “fellowship”) AND ("general practitioner" OR "doctor" OR “medical specialists” OR “Cardiologists” OR “Neurologist” OR “Health Workforce”) AND ("Indonesia" OR “LMICs” OR “Thailand” OR ‘India”)
5. National public policies	("health workforce policy" OR “Health Omnibus Law” OR “doctor policy” OR “medical specialist policy” OR “Undang-Undang Keshehatan”) AND “strategy” AND "Indonesia" AND ("rural retention" OR "deployment" OR "bonding program" OR "career development" OR “dual practice” OR “incentive”)

Based on the inclusion and exclusion criteria, a total of 63 sources were reviewed, comprising 42 peer-reviewed journal articles and 21 grey literature sources.

3.4 Study Limitation

As the author, I acknowledge several limitations inherent in this study. First, the availability and quality of data on workforce distribution, retention, and policy implementation in Indonesia, especially focusing on the GPs, neurologist, and cardiologist as the “golden hour” cadres, remain significant challenges, particularly for rural and remote areas where reported data on the MoH dashboard is often inconsistent. This limitation was mitigated by incorporating available quantitative and qualitative research from peer-reviewed journal to validate and enrich data findings.

Additionally, important technical policies (such as Ministerial Joint Decree and Circular Letter from Ministry of Health’s Directorate) or grey literature may not be indexed in major databases was difficult to retrieve. To address this, I broaden my search strategies to systematically include both English and Indonesian language sources from government websites, institutional repositories, and professional associations websites. I further looked through the references of relevant studies to find useful sources that weren’t listed in major databases.

Chapter 4: Result

In this chapter, I present and analyze the findings of this study, following the specific objectives and the Lehmann, Dieleman, and Martineau (2008) retention framework(41).

4.1 Individual-Level Factors

Early rural exposure through rural clerkship or rural upbringing is a key influence for rural retention of GPs, cardiologist and neurologists in Indonesia(42–44). Nurokhmanti et al. (2022) found that Indonesian medical students with prior rural experience displayed stronger interest in general practice careers in rural area, while a national survey of the medical workforce (including doctors of any specialty area) revealed that those from remote backgrounds were 20 times more likely to serve in such areas(42,43). This also aligns with recent studies in Indonesia, which revealed that early rural clinical rotations, family-centered motivations, and collectivist values were linked to longer rural service commitments(43,44). This early exposure build strong socio-cultural connections and a sense of belonging to the rural community, which make doctors more likely to stay in rural areas by mitigating feelings of isolation and providing a fulfilling personal life that complements their professional role(45).

This correlation between rural upbringing and practice preference is echoed in other LMICs context. In Thailand, a large cohort study tracking 7,157 medical graduates reported that 29% of doctors from the rural recruitment track (CPIRD) continued working in rural hospitals years after graduation, compared to just 18% of their urban-trained peers(46). The rural-track group also had a significantly longer median service duration (4.2 vs. 3.4 years)(46). Additionally, a scoping review of strategies to increase rural doctor supply in Asia-Pacific LMICs, found a strong association between rural background and both rural practice preference and actual work in rural areas across most included studies(45).

Personal resilience and a strong sense of calling also influence rural retention, particularly among GPs in Indonesia(47). A multi-province study of 528 rural doctors (comprising interns and general practitioners with varying experience) found that those exhibiting strong resilience traits were more than twice as likely to remain in rural postings for over a decade, particularly when driven by a strong internal sense of life calling(47). However, this study did not examine the resiliencies among cardiologists and neurologists.

Gender also interacts with these retention factors. Data from Human Resource for Health in Indonesia shows that in 2018, the percentage of male GPs and medical specialist are greater than the female, respectively 63.3% and 60.8% (29). This gendered distribution is mirrored in India, where female physicians more frequently cited safety concerns and the challenge of leaving their protective social networks, serving as deterrents to rural practice(48).

Additionally, the "family factor", which is being married or having children, is a commonly cited doctors motivation to stay or leave the rural areas of Indonesia(49).A study found that having family present in a rural setting was a strong motivation to stay, while having family far away could lead to a decision to leave due to high travel costs(49). The study also notes that cultural obligations to extended family could create financial tension, which could influence a doctor's decision to leave(49).

To conclude from these study findings, it is shown that early rural exposure is identified as a key contributing factor for rural retention not only for GPs but also for cardiologists and neurologists(42–44) in Indonesia. Furthermore, personal resilience, the pursuit of self-actualization, gender, and familial factors are also considered influential in the retention of GPs in

rural Indonesia(29,47–49).However, the factors other than “early exposure” are found to be understudied and are only partially captured in national-level data and not under-examined in existing studies.

4.2 Local Environmental Conditions Factors

This sub-result section examines how local environmental conditions influence the retention of general practitioners (GPs), neurologists, and cardiologists as the "golden hour" cadres in rural Indonesia.

4.2.1 Housing and Infrastructure

In rural provinces such as Maluku, general practitioners are frequently posted in districts with inadequate housing, weak infrastructure, and logistical isolation which contribute to low job satisfaction and reduced willingness to remain in rural placements(43). Evidence by Kurniati et al. (2024) confirms that the provision of government housing was among the most valued incentives influencing GPs willingness to stay in rural areas, reinforcing the importance of housing availability in retention efforts(39). These infrastructural deficits create a disconnect between policy targets and the everyday realities experienced by rural GPs(43). Another study emphasize that the lack of essential commodities such as electricity, clean water, and fuel, and school as education for the GPs children influence the willingness to stay or leave the rural area(45,50).

Studies across other LMICs support these patterns. In India, inadequate infrastructure (such as the lack of absence of schools for children and limited healthcare facilities), limited transportation access, and insufficient support for doctors’ (GPs and medical specialist) families remain significant barriers to rural health workforce retention, even when financial incentives are provided(51,52). In Thailand, rural doctors have reported that weak local infrastructure, combined with limited public services and poor community integration, reduces their motivation to continue rural postings(53).

4.2.2 Security and Safety Guarantee

In the context of local environmental factors, security and safety guarantees are crucial elements influencing health worker retention(43,54,55). In Indonesian context, the disruptions to this security often originate from local governance issues, such as political interference and nepotism from the local government in regional placement decisions (54,55). These practices create a perception of insecurity, manifesting as civil unrest, diminished morale, and hostile work environments, which in turn undermine the retention of GPs and medical specialists in rural areas(54). This is further strengthened by a study by Kartika et al., which found that poor governance at the district level, including political interference, contributes to practices like the unmerited appointment of hospital or primary health center leaders, which, in turn, negatively impacts doctor retention in these areas(55).

Furthermore, in remote provinces such as Maluku, unstable security conditions, such as local conflict incidents and weak enforcement of public safety have also been reported to diminish the attractiveness of rural postings among GPs and medical specialist(50,54). A national study further reinforce the importance of these factors, showing that security guarantees, including protection from violence and local political interference, were the most influential retention factor among medical specialists, including neurologist and cardiologist(38).

This study align with finding from Uttar Pradesh, India where poor security conditions and political interference in postings and transfers were consistently identified by both general practitioners and specialists as key deterrents to rural retention(56). Poor security was attributed to under-resourced local infrastructure, while political interference was linked to widespread perceptions of corruption at local, district, and state levels, stemming from weak accountability mechanisms in the implementation of rural health policies(56).

To sum up, Inadequate housing and poor living conditions significantly reduce retention among GPs(39,43). Meanwhile, security and safety guarantees plays as strong factors of rural retention among both GPs and medical specialists, including cardiologist and neurologist in Indonesia (38,54,56). Reliable infrastructure are further key to improving the retention of GPs, particularly early-career professionals(43,45).

4.3 Work Environment Factors

This sub-result section review the work environment characteristics that influence GPs, cardiologists, and neurologists rural retention.

4.3.1 Heavy Workload

In rural provinces such as Maluku, physicians are often responsible for delivering care to disproportionately large populations with limited logistical or institutional support(43). This combination of high demand and weak support systems often leads to elevated levels of burnout, dissatisfaction, and a reduced willingness to remain in rural service(43,57). Notably, a national study shows that not only medical specialists, cardiologists and neurologists, who are unable to deliver the full scope of their training in resource-limited settings, but also general practitioners, particularly those encountering emergency cases(38,39). In many rural health facilities, general practitioners are the first, and sometimes the only providers available to manage stroke or myocardial infarction cases without immediate access to specialists or advanced equipment which results in frustration and moral distress among frontline providers(58).

4.3.2 Continuing Professional Development (CPD)

Improved professional development opportunities, such as priority access to continuing professional development (CPD) or specialist training, also a key to retain GPs and medical specialist (cardiologist and neurologist) in rural area(38–40,59). These findings align with global evidence indicating that participation in professional development correlates with longer employment duration and reduced turnover intention among health-sector workers, especially younger professionals(59).

Notably, there is a transitional nature of rural service among early-career GPs compared to the specialist group, where many of GPs view it as a pathway to specialization rather than a long-term career destination(38–40). Among GPs, access to government-funded specialist training was the most influential retention factor(39). For medical specialists, CPD helps reduce professional isolation and build competence(38,40). Studies further show that training or capacity building can enable neurologists to master endovascular procedures for acute stroke and cardiologists to manage complex cardiovascular care, ultimately reducing mortality and disability(60,61).

This correlation between CPD opportunity and rural retention in Indonesia is aligns with recent global perspective study, where in Latin America and Africa, limited opportunities for academic advancement and subspecialty training in rural areas have been reported as a barrier

for a rural retention and contributed to the migration of cardiologists to urban centers or abroad in search of better career prospects and training(62).

4.3.3 Workplace Leadership and Ethical Issue at Workplace

These factors are further shaped by internal organizational dynamics. Strong workplace leadership, structured mentoring, and transparent feedback mechanisms are associated with higher retention, particularly for specialists such as cardiologists and neurologists who manage complex, high-risk cases(63,64). However, the phenomena of workplace bullying and unresolved ethical issues undermine the work environment for general practitioners and residents in high-stakes specialties such as cardiology and neurology which result in clinical frustration and moral distress among frontline providers(57,65,66).

Bullying is often facilitated by entrenched hierarchical structures within Indonesia's medical training system and compounded by inadequate institutional governance and weak reporting mechanisms(65). Meanwhile, ethical violations, including unsupervised procedures and verbal humiliation, have also been documented in rural clinical settings, where general practitioners in training frequently report powerlessness and fear of reprisal(66).

Notably, workplace bullying significantly contributes to burnout and a desire to leave, particularly among medical resident(67). This aligns with findings that bullying prompts medical residents to consider leaving their profession(65). Furthermore, when medical students encounter ethical dilemmas like exploitation and limited educational support in rural settings, it fosters feelings of powerlessness and fear, ultimately leading them to want to exit such environments(66). Taken together, these factors invariably result in workplace attrition.

4.3.4 Incentive

GPs in government-sponsored rural programs such as Nusantara Sehat often receive higher financial allowances than long-term civil service doctors in the same district, creating perceived inequities that can undermine morale(39,68). his sentiment is echoed by medical students, who report that GPs salaries under capitation-based pay are low and inadequate given their responsibilities in primary care settings(42). Furthermore, uneven implementation of local incentives has been identified as a source of dissatisfaction among GPs in remote regions such as Maluku(43).

For the medical specialists, cardiologist and neurologist, the reliability and adequacy of incentives are similarly recognized as key factors influencing their decision to remain in or leave rural postings.(40). Evidence shows that variations in incentive amounts between regions can shape specialists' preferences, with some participants expressing that higher allowances in other districts make those locations more attractive, and in certain cases, fostering dissatisfaction among peers receiving less(40).

4.3.5 Dual Practice

Dual practice policies further complicate the retention landscape. While originally intended to supplement income and improve retention in underserved areas, in practice, dual practice tends to flourish in areas already served by multiple providers, rather than filling gaps in low-density rural areas(69). The World Bank's Quantitative Service Delivery Survey (QSDS) revealed that over 60% of public-sector puskesmas doctors engage in dual practice, primarily to obtain additional income (52.8%) or gain experience (12.8%), yet this strategy is less viable in isolated districts where private patient demand is low(69).

Meanwhile, in Thailand, a restrictive dual practice policies, together with integrated rural recruitment and local medical training approaches, have helped in retaining doctors in underserved areas(70). By contrast, countries that permit structured dual practice (like the Philippines) tend to maintain higher rural tenure among rural health professionals(70). These findings align with the broader literature showing that regulatory flexibility, combined with adequate financial mechanisms, supports retention in rural and remote postings(45,70).

To conclude, poor working conditions were consistently associated with reduced job satisfaction and a higher intention to leave among general practitioners and specialists in rural Indonesia. Opportunities to continue upgrading knowledge and skills through continuing professional development (CPD) were also identified as key retention factors. However, these opportunities manifest differently depending on cadre. For specialists such as cardiologists and neurologists, CPD typically refers to access to fellowship programs, while for general practitioners it often relates to pathways into medical residency. Furthermore, the uneven distribution of incentives and the legal allowance for dual practice create income disparities between urban and rural postings, which further contribute to rural attrition.

4.4 International Environment Factors

The prominent international environment which plays as determinant of the retention of GPs, cardiologists and neurologists in rural areas is global mobilization either through fellowships or collaborations to utilize medical workers outside Indonesia.

The high global demand for emergency medicine and cardiology specialists in OECD (Organisation for Economic Co-operation and Development) countries, along with access to overseas training, has driven the migration of Indonesian healthcare workers abroad, including to Singapore, Saudi Arabia, and Malaysia (70). Although recent updated data is not available, between 2000 and 2004, a total of 2,773 Indonesian doctors who had completed their training in Indonesia migrated to OECD countries(70). This phenomenon has further exacerbated the unequal distribution and shortage of specialists in rural areas domestically(70).

Although there is no disaggregated public data confirms large-scale migration among neurologist and cardiologist from Indonesia, a comparative study across multiple South-East Asian (SEA) countries, including Indonesia found that only 27–29% of neurology trainees who pursued overseas training returned to practice in their home countries, which highlight a challenge in retaining subspecialist talent following international fellowships(71). For cardiologists, international movement primarily takes the form of short-term fellowships aimed at capacity building, with most Indonesian participants expected to return and contribute to domestic cardiac care services(30,72). Historically, the absence of structured reintegration policies has led to returning fellows being absorbed mainly into urban tertiary hospitals, reinforcing the concentration of specialists in metropolitan areas(30).

In the regional context, Indonesia is part of the Association of Southeast Asian Nations (ASEAN), an intergovernmental organization consisting of ten SEA countries that collaborate politically, economically, and socially, including in the development of health workforce(70). This regional collaboration could facilitate Indonesia’s access to healthcare workers, including GPs and specialists, for rural postings(70). However, implementation remains limited due to differences in education standards, language barriers, and regulatory diversity, resulting in minimal mobility of medical specialists within the region(70).

In summary, international factors influence the retention of general practitioners, cardiologists, and neurologists in rural Indonesia, primarily through global migration and overseas training opportunities(35,70,71). High global demand for cardiologists and neurologists, combined with opportunities for international fellowships, create strong pull factors away from rural service(70). The challenge exist in state that while the fellowships tend to be short-term and designed for capacity-building, return rates among neurologists and cardiologist trained abroad remain low or under-reported(71).

4.5 National Public Policy Relevance to Rural Retention

In response to the retention of key actors (GPs, neurologist, and cardiologist) during the golden hour windrows of CVDs in rural Indonesia, national stakeholders have enacted a series of regulatory and policy instruments designed to influence where health professionals are trained, where they are placed, and under what conditions they remain in service.

4.5.1 Mandatory Internship or Service for GPs

Indonesia's medical licensing system requires all new general practitioners (GPs) to complete a one-year, government-supervised internship (Program Internship) in hospitals and primary care facilities, often prioritized for remote and underserved districts(44,45,73). This internship is compulsory for independent practice and directly managed by the Minister of Health (MoH), under the MoH Regulation Number 7 of 2022 concerning the Implementation of Internship Programs for Doctors and Dentists, ensuring structured clinical supervision and exposure to rural population health needs(44,73). The mandatory internship does not apply to medical specialists, but research shows early-career rural internships shape doctors' confidence and willingness to work in non-urban areas(44,45).

In India, every medical doctor undergraduate degree (MBBS) participant obligate to do a 12 month compulsory rotating medical internship (CRMI) which includes a three-month rural posting(74). However, the result is contradicting with the internship policy in Indonesia. In India, this policy alone has been criticized for hindering young doctors' professional growth, due to supervision gaps and inadequate infrastructure(75). It is noted that many rural postings lack reliable accommodation, necessities such as water and electricity, and adequate security measures to protect inexperienced interns, making them unattractive despite financial incentives. These challenges, combined, are unlikely to solve long-term rural retention(75).
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4.5.2 Mandatory Remote Clerkship (Clinical Placement) in Rural Areas

As part of undergraduate training, medical students are assigned to remote clerkships, rotational placements in rural or remote hospitals, typically spanning one or more semesters (42,45). Unlike internships, these clerkships are required only once during the undergraduate phase and are not repeated by medical specialist residents enter direct clinical residency after registration as GPs with no additional generalist clerkship(76). Findings consistently show that remote clerkship experience significantly increases the odds of graduates working in rural districts, with a "grow your own" strategy being key for rural workforce supply(43,45).

4.5.3 Regulation of Special Assignments Incentive

Programs such as Nusantara Sehat and the earlier *Temporary Employment Schemes* (*pegawai tidak tetap* or PTT) deploy both GPs and specialists to underserved regions on fixed contracts, offering competitive salaries, bundled benefits, and career incentives(68). These placements are voluntary or contract-based (not a universal obligation) and have helped improve staffing in remote districts, though retention beyond contract end is highly variable(68).

The Nusantara Sehat program is regulated by Minister of Health Regulation No. 33 of 2018, which outlines general provisions of income and travel support for participants and expectations regarding local government support for housing and safety for the GPs in rural areas(77). Meanwhile, the temporary placement of medical specialists was previously governed by Presidential Regulation No. 31 of 2019, currently this regulation has been superseded by Law No. 17 of 2023 on Health and its implementing regulation, Government Regulation No. 28 of 2024, which makes the incentive arrangements and technical provisions are now expected to be determined through decentralized regulations at the provincial or district level(1,78) .

Similarly, in Philippines the Doctors to the Barrios (DTTB) program deploys general physicians (GPs) to rural areas, while a related Department of Health (DOH) program deploys medical specialists to hospitals in needed rural area(79,80). The impact evaluation of these policies indicates that despite the doctors are provided by salary, social insurance, other added benefits such as board, lodging, and other allowances, the programs still face a primary challenge of long-term retention due to the perceived low job quality in host Local Government Units (provinces, cities, or municipalities) and doctors' often carry double job, both as significant managerial and clinical duties as municipal health officers(79).

4.5.4 Bonding Scholarships Regulation

Under the Minister of Health Regulation 37 of 2022 concerning Assistance for Medical Education and Fellowship Costs, Indonesian government offer bonding scholarships with rural placement(81), These bonding scholarship includes the Indonesian Endowment Fund (LPDP) scholarship for specialists and a Ministry of Health (MoH) affirmation scholarship for GPs(82,83). While these programs aim to improve the distribution of medical professionals, evaluations suggest the LPDP program's performance falls short of expectations due to a mismatch between recipients and program goals (82).

As of 2024, the Indonesian government has launched a new innovation which is hospital-based medical residency program which is fully funded under the Minister of Health Regulation Number 14 of 2024 concerning hospital as the main medical residency education organizer(84), This bonding program prioritizing medical specialist that contributes to reduce the amount of morbidity and mortality caused by CVDs, includes neurology and cardiology(85). Furthermore, this program enable medical specialist residents to be based in district hospitals through partnerships between universities and local health authorities, aiming to build specialist capacity in situ (84). Additionally, the graduates of this medical residency program will be employed in areas that do not yet have specialist doctors, especially in remote, border and island areas(86).

In Thailand, the bonded service scheme for medical education has shown succeed to retain medical doctors under two key government-funded projects, namely the Collaborative Project to Increase Production of Rural Doctors (CPIRD) and the One District One Doctor (ODOD) program(87). This strategy combines rural-background recruitment, training in MOPH hospitals outside major cities, regulated rural placement, and mandatory service backed by substantial non-adherence penalties, providing friendly work conditions and offers continuous professional development to sustain retention(87). A study examining doctor retention from 2001 to 2015 found that graduates from these special programs had a higher retention rate in Ministry of Public Health (MOPH) health services than those from the normal training track,

specifically, 90.9% of the graduates who remained with the Ministry of Public Health (MoPH) were still working in the provinces to which they were initially assigned(87).

These retention strategy in Thailand is in line with the Global guidance from the WHO to retain medical workforce which highlights that bundled, context-specific strategies are more effective at retaining health workers in rural and underserved areas than standalone interventions(88). These integrated approaches typically combine rural-targeted recruitment and training, compulsory service or bonding, and financial incentives, such as rural hardship allowances(88).

This guidance also emphasize that it if fundamental to provide the working conditions, supportive supervision, infrastructure, and non-monetary supports such as housing and education for health workers' families(88). Furthermore, it highlight the importance of ongoing professional development, rural-tailored career progression, and integration of education and service, particularly through decentralized clinical training and institutional partnerships that align medical education with rural workforce needs(88).

4.5.5 Dual Practice and Renumeration Regulation

Dual practice regulation that allows fully licensed general practitioners and medical specialists, including cardiologist and neurologist to work in up to three healthcare facilities, whether public or private, falls under Law No. 17 of 2023 and its implementing Government Regulation No. 28 of 2024(1,78). In practice, medical specialists derive 65–80% of their income from private practice, and many are reported to exceed the legal limit, particularly in urban areas where financial opportunities are more lucrative(31). These structural conditions create stronger urban retention incentives while weakening the appeal of rural placements, especially for early-career health workers(31,43). Similarly, in Philippines dual practice and private work are legal and common, but this regulation often drawing skilled specialists out of rural government sector positions and back to urban private practice(70).

Meanwhile for the doctors and medical specialist resident during independent hospital practice, specialist trainees may receive service-based payments, but these vary depending on the facility's financial capacity(89). For general practitioners in the internship phase, remuneration typically comes in the form of regionally funded living allowances, without national standardization(73). As interns do not yet possess full practice licenses (SIP), they are not permitted to engage in dual practice, as stipulated in Permenkes No. 7/2022 and reaffirmed by Law No. 17 of 2023 and Government Regulation No. 28 of 2024 (1,78).

4.5.6 Continuous Professional Development (CPD) Regulation

The opportunities for overseas fellowship training as a support for the CPD for Indonesian medical specialists, particularly in neurology and cardiology, have expanded rapidly due to government initiatives and international collaborations. This fellowship program falls under the MoH Regulation No. 37 of 2022 concerning Assistance for Medical Education and Fellowship Costs(81). Accordingly, In 2025, the MoH of the Republic of Indonesia, in cooperation with the Ministry of Finance (MoF) through the Indonesian Endowment Fund for Education scholarship program, officially launched a non-degree fellowship scheme aimed at enhancing clinical capacity in high-burden disease such as heart disease and stroke care(83). This initiative will be held both domestically and internationally, involving 113 domestic and international hospitals, with durations varying from 3 to 24 months(83).

This initiative was accompanied by a coordinated campaign involving the Indonesian MoH, the Indonesian Doctors Association in Germany (*Asosiasi Doktor Indonesia Jerman* or ADIMAN) and the Indonesian Embassy in Berlin in facilitating international fellowship opportunities in interventional cardiology for Indonesian cardiologists, for 12-24 months(72). The program emphasizing cardiologist obligate to carry out 3N service which equals to three times years of fellowship at the Proposing Hospital in accordance with the Fellowship competencies(72). However, under the existing regulatory framework, completion of an international fellowship does not automatically convert subspecialist licensing status in Indonesia (1,35). Graduates are required to undergo post-fellowship validation or adaptation through their respective Specialist Collegium (*Kolegium*), which can delay integration into the national health system and reduce the likelihood of deployment to underserved areas (1,35).

4.5.7 Governance and Systemic Support

Governance and systemic support to address the issue of GPs and medical specialist (particularly neurologist and cardiologist) retention is outlined in the Joint Decree on the Academic Health System program, issued in 2022 by the Minister of Health and Minister of Education (90). The Academic Health System framework is designed to align the output of medical education with the actual service needs of underserved regions through coordinated partnerships between medical faculties, teaching hospitals, and local governments(91,92).

This decree mandates selected academic health consortia, to coordinate the development of decentralized specialist training programs (90). In practice, AHS frameworks allow medical and specialist trainees to be deployed to rural district hospitals under joint governance mechanisms(91,92). Preceptors at these sites receive institutional support and CPD opportunities, enhancing their satisfaction and likelihood to remain in place (91). Thus, the AHS functions as both a distribution strategy and a retention mechanism, particularly for the GPs, neurologist, and cardiologist as it is prioritized by the National Health target to sort of CVDs, by embedding education-service alignment within the national HRH pipeline and mitigating the structural urban bias of Indonesia's previous specialist training model(90).

4.5.8 Workload and Bullying Policy

Due to the report of bullying and excessive work load at the workplace experienced by young GPs and medical residents, including neurologist and cardiologist at the teaching hospitals, Minister of Health release a mandate through Minister of Health Instruction No. HK.02.01/MENKES/1512/2023 to regulate the work load, working hour, and bully reporting(93). From this mandate, it is expected that medical students (co-assistants and residents) provide high-quality care with a focus on patient safety that aligns with community needs(93). To achieve this, the workload of students in teaching hospitals must be regulated to match hospital capacity(93). This regulation will allow working hours to be properly managed, enabling students to deliver optimal health services and prevent exhaustion and burnout that will lead to attrition in hospital, especially in rural area(93).

4.5.9 Temporary Practice License Regulation

In response to the dynamics and persistent domestic shortages, Indonesia has introduced regulatory reforms allowing foreign and overseas-trained medical specialists to serve in rural and remote areas(1). Under the Omnibus Health Law (Health Law No. 17 of 2023) and Government Regulation No. 28 of 2024, medical specialists may practice in Indonesia if they meet stringent competency and licensing criteria, including evaluation exams, adaptation processes, and service agreements in underserved regions(1,78). These reforms aim to supplement the domestic workforce and facilitate knowledge transfer, especially in

underserved provinces, while mitigating the immediate impacts of local shortages(1,78). However, there is still no impact evaluation study related to this new regulation.

To conclude, key national policies that has been implemented to influence the rural retention are internship and remote clerkship mandates aimed at shaping student and early-career placement, incentivized special assignments such as the Nusantara Sehat program, bonding scholarship schemes linked to rural service obligations, integrated intersectoral collaboration through Academic Health System program, MoH mandates to regulate workload and bullying in workplace, dual practice regulation, financial incentives, and continuous professional development (CPD) regulation (table 3) (1,78,81,83,84,90,93). Notably, the Indonesian government also introduce new temporary practice license regulation to attract medical specialists to work in rural post, but the impact evaluation of this regulation towards the rural retention is still not available(1,78).

Table 3 Overview of Indonesian Public Policies Align with Rural Retention Factors

Retention Factors	Indonesian Public Policy
Early-career rural exposure	Mandatory internship for GPs (Minister of Health Regulation No. 7 of 2022)
Undergraduate rural exposure	Remote clerkship in rural areas (undergraduate curriculum requirement)
Temporary rural staffing	Nusantara Sehat & former PTT schemes (Minister of Health Regulation No. 33 of 2018; Presidential Regulation No. 31 of 2019, now superseded by Law No. 17 of 2023 and Government Regulation No. 28 of 2024)
Service bonding and local training	LPDP & MoH scholarships and affirmation scholarship for GP (Minister of Heath Regulation No 37 of 2022), hospital-based residency program (Minister of Health Regulation No. 14 of 2024)
Income disparity between urban and rural	Dual practice regulation & varied remuneration (Law No. 17 of 2023 and Government Regulation No. 28 of 2024)
Access to local or International continuous professional development (CPD)	International/domestic fellowship schemes (Ministry of Health & LPDP 2025 Fellowship Program)
Alignment between education and service needs	Academic Health System (Joint Decree of the Minister of Health and Minister of Education, 2022)
Work environment stress & bullying	Workload and bullying regulation (Minister of Health Instruction No. HK.02.01/MENKES/1512/2023)
International medical specialist mobilization	Temporary Practice Lisence under the Omnibus Health Law (Health Law No. 17 of 2023) and Government Regulation No. 28 of 2024

Chapter 5: Discussion

5.1 Key Factors of Rural Retention

Cardiovascular diseases (CVDs) are a leading cause of death and disability in Indonesia. Timely treatment during the "golden hour" can mean the difference between recovery and permanent disability or death. In rural and remote districts, GPs are often the first and sometimes the only clinicians able to identify symptoms, stabilize patients, and initiate referrals. Cardiologists and neurologists provide the specialized, time-sensitive interventions for heart attacks and strokes that depend on advanced diagnostics and therapeutic equipment. Retaining this combination of providers in rural areas is therefore not only a matter of health workforce distribution, but a determinant of life-saving capacity in places where reaching an urban tertiary hospital can take many hours.

Despite GPs, cardiologists, and neurologists play a vital part in reducing mortality, morbidity, and disability from CVDs, the rural retention factors among them are under-researched in Indonesia. Most studies treat "medical specialists" as a single category, rather than focusing specifically on each specialty, such as neurology and cardiology. Evidence on GPs is more common but often overlooks how individual, local, work-related, national, and international factors interact across different cadres.

According to the results of this study, retention factors differ between these groups. For GPs, early rural exposure, access to specialist training pathways, safety guarantees, and reliable infrastructure are most influential. As frontline providers, these supports help sustain motivation in resource-limited and isolated settings. For cardiologists and neurologists, retention hinges on access to adequate diagnostic and therapeutic tools, opportunities for continuous professional development (CPD), reduced professional isolation, and assurance of personal safety. Both the availability of essential equipment and a safe, stable working environment are critical for enabling specialists to perform their roles effectively in acute CVD care.

For GPs, the most influential lever is access to government-funded specialist training, reflecting the transitional nature of early rural service in their careers. For specialists, CPD is essential to maintaining skills and reducing isolation, whether through domestic programs or structured fellowships. Limited subspecialty training in rural areas has proven to accelerate specialist migration to urban areas. International opportunities add another layer to this complexity. High global demand, lucrative career paths abroad, and international fellowships act as strong pull factors, particularly when domestic reintegration policies are weak and rural career pathways are limited.

Notably, these factors do not operate in isolation. Rural exposure (individual) builds motivation but must be reinforced by supportive living conditions (local), safe and fair workplaces without nepotism or bullying, manageable workloads, access to CPD, and sufficient equipment (work environment), as well as sustained policy support (national). Likewise, international fellowships (international) can enhance retention only if paired with secure, well-resourced rural postings and structured career pathways upon return. This interplay underscores that rural retention is a systems challenge, not simply an individual or policy shortfall.

Considering this interconnection, work environment factors emerge as the most decisive for long-term rural retention in Indonesia. While early exposure, resilience, and national policies may attract doctors initially, it is the daily reality of the workplace that determines whether they stay. If the environment is professionally unrewarding, personally unsafe, or physically exhausting,

even highly motivated individuals will eventually leave. Burnout from understaffing, inadequate infrastructure, bullying, lack of mentorship, and restricted CPD access steadily erodes morale. Improving working conditions, safety, and professional support is therefore not just one component of a retention strategy, but also it is the foundation for sustaining the "golden hour" cadres where they are most needed.

5.2 The Extent of Indonesia's Public Policy Responsiveness to Key Retention Factors

Despite a wide range of initiatives to retain GPs, cardiologists, and neurologists in rural areas, important policy gaps remain, especially for the medical specialists. The strongest, most structured measures still concentrate on the GP pipeline, while specialist-specific provisions are thinner, less integrated, and seldom guarantee long-term service in underserved districts.

Indonesia has invested heavily in early-career rural exposure for new doctors through internships and undergraduate clerkships under the Minister of Health Regulation No. 7 of 2022. These pathways help shape non-urban career intentions at the GPs stage. Early exposure to rural areas through clerkship programs in preclinical medical education has been implemented, but there is no continuation of this policy at the specialist training level, so such early exposure does not maximally contribute to long-term retention. Temporary fulfillment of staffing needs through programs like Nusantara Sehat and the special assignments for ex-PTT, regulated in Minister of Health Regulation No. 33 of 2018 and now reinforced by Law No. 17 of 2023 and Government Regulation No. 28 of 2024, offers interim solutions to workforce shortages but is not sufficient for sustainable specialist retention.

On the other hand, affirmative scholarship policies by Indonesia Endowment Fund for Education (*Lembaga Pengelola Dana Pendidikan* or LPDP) and the Ministry of Health, as well as hospital-based residency programs, provide more targeted approaches to recruiting and retaining students from underdeveloped, frontier, and outermost regions, especially for general practitioners. However, their effectiveness in retaining specialists is still limited. The income gap between urban and rural areas remains a major challenge. Even though regulations on dual practice and remuneration variation have been revised through Law No. 17 of 2023 and Government Regulation No. 28 of 2024, the problem of incentive income disparities remains unresolved. This is because, under a decentralized government system, GPs, cardiologists, and neurologists' incentives rely heavily on each district's fiscal capacity. As a result, resource-poor areas struggle to offer competitive incentives, thus reinforcing the tendency of health workers to choose urban practices that are more financially attractive.

Access to continuing professional development (CPD) is expanding through domestic and international fellowships administered by the Ministry of Health and the LPDP, but reintegrating scholarship participants into rural healthcare remains a challenge. Fellowship participants may be absorbed by urban tertiary hospitals while they navigate additional licensing adaptation steps, reducing the expected rural retention effect for cardiologists and neurologists.

To better align education with service delivery, the Academic Health System (AHS) framework provides an institutional scaffold for decentralized specialist training and supported supervision in district hospitals. As discussed, its retention impact will hinge on implementation, specifically, building rural training capacity, consistent local government commitment, and incentives that make rural teaching sites attractive for both trainers and trainees.

Policy attention has also shifted toward the work environment. National guidance on workload, safety, and anti-bullying signals a commitment to safer, more supportive conditions for learners and early-career doctors. In parallel, a temporary practice license pathway now allows qualified foreign or overseas-trained specialists to serve in underserved regions, with the goal of backfilling shortages and potentially facilitating knowledge transfer. However, these policies' effect on rural retention has yet to be evaluated.

Overall, the progress on retention strategy through national public policies is tangible but uneven. Policies for GPs are generally more structured, detailed, and consistently enforced. In contrast, policies for cardiologists and neurologists are less comprehensive and lack the same level of implementation. To close this gap, Indonesia needs a set of coordinated, enforceable measures, such as extending rural exposure into specialist residency training, ensuring CPD and fellowship programs have predictable rural service obligations, reducing income disparities by providing reliable rural incentives and enforcing fair dual-practice rules, and guaranteeing safe, well-equipped workplaces. Without these combined efforts, specialist retention in rural areas is likely to remain weaker than the gains achieved for GPs.

5.3 What Can Indonesia Learn From Another Countries?

The WHO retention guideline emphasizes that bundled interventions are more effective than single strategies in sustaining a rural health workforce. Findings from this study show that single-intervention approaches in countries such as India and the Philippines have not been sufficient to attract or retain GPs and medical specialists in rural areas. In India, the mandatory internship regulation, which is designed to provide early rural exposure, has often discouraged graduates from pursuing rural work due to inadequate infrastructure, echoing Indonesia's own challenge where early exposure during GP training is not followed through at the specialist level. In the Philippines, financial incentives successfully attracted both GPs and specialists to rural posts but failed to retain them long-term because of low job quality and heavy workloads, similar to the persistent work environment and income disparity issues identified in Indonesia.

In contrast, Thailand has achieved sustained retention of health professionals in rural areas through the Collaborative Project to Increase Production of Rural Doctors (CPIRD) and One District One Doctor (ODOD) programs. While Indonesia's health system differs in structure, governance, and rural dynamics, several core components of the Thai model directly address the gaps identified in Indonesia's current policies. These include targeted rural student recruitment (addressing weak specialist pipelines from underdeveloped, frontier, and outermost regions), compulsory service and bonding (ensuring post-training placement in underserved areas), decentralized training placements (extending rural exposure into medical specialist residency), and comprehensive personal and professional supports such as housing, educational opportunities for families, career development, and regulated dual practice (reducing the impact of income disparities and poor working conditions).

5.4 Strength and Limitation of the Study

This study was able to identify key retention factors at different levels influencing the retention of general practitioners, cardiologists, and neurologists, and how these factors differed for each group. However, the study was limited by its reliance on a literature review, as most available studies focused on medical specialists in general. Only a few specifically addressed the retention of cardiologists and neurologists. To better understand the unique retention factors associated with their roles and their impact on acute CVDs management, the author had to draw on

additional articles that studied each actor's role on CVDs acute management during the "golden hour". Further, primary data collection is needed to deepen this understanding. Moreover, when considering retention factors and strategies from other countries, it was recognized that differences in health system structure, financing, governance, and sociocultural context may limit the direct applicability of international policy examples to Indonesia.

Chapter 6: Conclusion and Recommendations

6.1 Conclusion

The rural retention of general practitioners, cardiologists, and neurologists as essential for managing acute CVDs cases during the golden hour, is shaped by interconnected factors across the individual, local, work environment, international, and national levels. While early rural exposure can build initial motivation, long-term retention is most strongly influenced by the quality of the work environment. Challenges such as poor infrastructure, work burnout, limited access to continuous professional development (CPD), and weak support systems consistently undermine rural commitment.

Indonesia has introduced various interventions, including bonded scholarships, the hospital-based residency program, the Academic Health System framework, the mandatory internship for GPs, rural deployment programs, special rural assignments, and the new temporary practice license pathway for foreign or overseas-trained specialists. However, gaps remain. Some regulations contribute to financial inequities, most overseas-trained specialists are absorbed into urban tertiary hospitals, and many policies are not tailored to the specific needs of medical specialists. These factors further reduce the availability of golden hour cadres in rural areas. Without strategic integration, these efforts fall short of addressing systemic barriers.

Global evidence shows that sustainable retention requires bundled interventions that span education, deployment, and long-term professional development. Strengthening Indonesia's approach through coordinated, context-specific strategies which is tailored to the distinct needs of GPs, cardiologists, and neurologists is critical to improving equitable access to timely, life-saving care in rural and underserved regions.

6.2 Recommendations

Based on the discussion section, in order to strengthen rural retention of the "golden hour" cadres, the following key recommendations are proposed:

1. Develop a bundled rural retention strategy.
   The Ministry of Health (MoH), together with the Ministry of Education and Finance, should coordinate a comprehensive rural health workforce strategy that integrates rural-origin recruitment, bonding, compulsory service, specialist deployment pathways, and continuous professional development (CPD). This strategy should reflect WHO retention strategy guidance and draw lessons from Thailand's CPIRD/ODOD model.

2. Improve rural working and living conditions.
   MoH and local governments should invest in better infrastructure, staff housing, and school access in remote, outermost, and underdeveloped areas. When public funding is limited, collaboration with non-governmental organization (NGOs) and development partners can help fill resource gaps and ensure equitable living standards for rural health workers and their families.

3. Strengthen specialist reintegration and placement.
   MoH should enforce the newly establish structured pathways for returning overseas-trained cardiologists and neurologists, linking them to rural hospitals equipped with the necessary infrastructure, professional networks, and CPD opportunities. The distribution should align with national health equity goals to prevent concentration in urban tertiary facilities.

4. Enhance financial and regulatory equity.
   National policymakers should revise and enforce the dual practice framework and standardize remuneration for interns, residents, and bonded doctors to reduce urban bias and fiscal inequality across districts. Rural-specific financial incentives must be guaranteed, sustainably financed, and protected from the local government budget constraints.

5. Promote research on rural specialist retention.
   Universities and research institutions should prioritize mixed-method studies focusing on the rural retention of neurologists and cardiologists, as Indonesian literature on these cadres remains limited. Deeper understanding of their unique professional needs and contextual barriers is crucial to optimizing their role in acute CVDs care during the golden hour.

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Annex 1 Declaration for Use of AI

KIT Institute (Masters or Short course) Participants
Declaration for Use of Generative AI (GenAI)

Please complete and submit this form as an annex on the last page of your assignment file; and not as a separate document.

Check the box that applies to your completion of this assignment:

☐ I confirm that **I have not used** any generative AI tools to complete this assignment.

☒ I confirm that **I have used** generative AI tool(s) in accordance with the *"**Guidelines for the use of Generative AI for KIT Institute Master's and Short course participants".*** Below, I have listed the GenAI tools used and for what specific purpose:

Generative AI tool used	**Purpose of use**
Perplexity	Brainstorming and search for grey literature