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A Review Manuscript

Pharmaceutical Care, Medicine Access and Antimicrobial Stewardship in Indonesia: Challenges and Opportunities for a Resilient Pharmacy System

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Abstract

Indonesia's large population, geographical fragmentation, decentralized health system and expanding universal health coverage create a complex environment for pharmacy practice and pharmaceutical policy. This manuscript reviews the Indonesian pharmaceutical landscape through the interconnected themes of medicine access, pharmaceutical care, antimicrobial stewardship, workforce capacity, procurement and supply-chain resilience, and pharmacy education. The review synthesizes evidence from the World Health Organization, Indonesia's Ministry of Health, the Indonesian Food and Drug Authority (BPOM), the International Pharmaceutical Federation and peer-reviewed studies. Evidence indicates substantial progress in pharmaceutical-system development, including the expansion of national health insurance, the development of national antimicrobial-resistance strategies, pharmacist-led public education, and growing attention to pharmaceutical care. However, persistent challenges remain. Recent assessments found procurement and pricing problems affecting medicine availability in facilities participating in the national insurance system, while shortages of selected medicines continue to create pressure on service delivery. Antimicrobial stewardship is another major challenge: BPOM surveillance reported high levels of antibiotic dispensing without prescriptions in pharmacies, although the proportion declined between 2021 and 2023. At the practice level, studies indicate that pharmacists in primary care can contribute to medication adherence, patient education and chronic-disease management, but the scope of pharmaceutical care remains uneven. Indonesia's archipelagic geography also produces disparities in workforce distribution, service capacity and access. The manuscript argues that strengthening pharmacy in Indonesia requires an integrated approach that combines regulatory enforcement with professional development, reliable medicine procurement, digital information systems, community engagement and expanded pharmacist participation in patient-centred care. The article concludes with a policy and research agenda focused on rational medicine use, antimicrobial stewardship, equitable access, workforce planning and outcome-oriented pharmaceutical care.

Keywords: Indonesia; pharmacy practice; pharmaceutical care; pharmacists; medicine access; antimicrobial resistance; antimicrobial stewardship; national health insurance; pharmaceutical supply chain; pharmacy education

1. Introduction

Pharmacy in Indonesia occupies a strategically important position at the intersection of medicines, public health and universal health coverage. Indonesia's health system must serve a large and geographically dispersed population across thousands of islands, with substantial differences in infrastructure, socioeconomic conditions and health-service capacity. These characteristics make pharmaceutical access and the delivery of safe, effective and rational medicine use particularly important (Ernawati, Kristianto, & Wijoyo, 2021).

The pharmaceutical sector has also been changing rapidly. Indonesia's national health insurance system (Jaminan Kesehatan Nasional, JKN) has expanded access to health services, but medicine procurement, pricing, reimbursement and availability remain operational challenges. A joint assessment by Indonesia's Ministry of Health, WHO and the ITB School of Pharmacy, covering 25 facilities in four provinces between September 2024 and March 2025, found substantial variation in procurement prices and continuing shortages for several medicines (WHO Indonesia, 2025).

Antimicrobial resistance (AMR) represents a second major challenge. Indonesia has strengthened its national AMR response, including a 2025–2029 National Strategy for Controlling Antimicrobial Resistance in the health sector (Ministry of Health Republic of Indonesia, 2024). Nevertheless, BPOM surveillance has continued to identify non-prescription antibiotic dispensing in pharmacy settings. BPOM reported that pharmacies dispensing antimicrobials, particularly antibiotics, without prescriptions represented 79.57% in 2021, 75.49% in 2022 and 70.75% in 2023 in its monitored facilities (BPOM, 2024). These figures concern surveillance samples rather than all Indonesian pharmacies and therefore should not be interpreted as a national census.

Pharmacists are consequently positioned between regulation and patient care. They are expected to ensure appropriate dispensing, educate patients, monitor medicine use, support adherence and contribute to public-health interventions. Indonesia's GeMa CerMat programme illustrates this expanded role: the Ministry of Health reported more than 9,000 pharmacist Agents of Change involved in public education on rational medicine use and AMR prevention by 2024 (Ministry of Health Republic of Indonesia, 2024).

This manuscript examines the question: What are the principal opportunities and challenges for pharmacy practice and pharmaceutical-system strengthening in contemporary Indonesia? The article focuses on six linked domains: medicine access and procurement; antimicrobial stewardship; pharmaceutical care; pharmacist workforce and professional roles; pharmacy education; and digital and regulatory transformation. The manuscript is a secondary-source review and does not report original patient or pharmacist data.

2. Conceptual Framework

2.1 Pharmaceutical care as patient-centred practice

Pharmaceutical care moves the pharmacist's role beyond product supply toward responsibility for medication-related outcomes. In this model, pharmacists identify drug-related problems, support appropriate therapy, educate patients, monitor outcomes and collaborate with other health professionals. The approach is particularly relevant to Indonesia because chronic diseases, polypharmacy and long-term treatment require repeated patient contact rather than one-time dispensing interactions.

Evidence from Indonesian primary care illustrates the potential of this approach. A study in Surabaya developed a pharmaceutical-care model for patients receiving antituberculosis treatment and found that structured pharmacist training could strengthen the delivery of pharmaceutical care (Priyandani et al., 2022). The significance is broader than tuberculosis: it demonstrates how pharmacists can become active contributors to treatment adherence and medication outcomes when organizational structures support such roles.

2.2 Access to medicines as a health-system issue

Medicine access is determined by more than whether a product exists nationally. Availability at the point of care depends on forecasting, procurement, financing, distribution, storage, prescribing, reimbursement and inventory management. In decentralized systems, these processes can interact in complex ways. WHO's 2025 review of medicine pricing and availability in Indonesia identified procurement-price misalignment and recurring shortages among several medicines, emphasizing the relationship between financial mechanisms and physical availability (WHO Indonesia, 2025).

From a pharmacy perspective, stockouts create clinical as well as administrative consequences. When medicines are unavailable, pharmacists may need to communicate alternatives, manage patient expectations and coordinate with prescribers. Repeated shortages can also undermine adherence if patients must change products or obtain medicines through less predictable channels.

2.3 Antimicrobial stewardship

Antimicrobial stewardship involves coordinated actions to promote appropriate antimicrobial selection, dose, duration and route while protecting patients and limiting resistance. In community pharmacy, stewardship includes appropriate referral, prescription verification, patient education and avoidance of inappropriate non-prescription supply. Indonesia's experience demonstrates that regulation alone is insufficient: stewardship depends on the interaction between enforcement, pharmacist practice, prescriber behaviour, public expectations and access to diagnostic services (BPOM, 2024; WHO, 2024).

3. Methodology

This manuscript uses an integrative narrative-review approach. Sources were selected from official Indonesian government institutions, WHO, FIP and peer-reviewed pharmacy literature. Priority was given to recent sources describing Indonesia's pharmaceutical system, medicine access, AMR, pharmacist roles and workforce development. Official statistics and programme reports were used to establish current system conditions, while peer-reviewed studies were used to interpret professional practice and implementation challenges.

The review does not use a formal systematic-review protocol, meta-analysis or original dataset. Accordingly, the manuscript should be understood as a scholarly narrative synthesis. Quantitative indicators are reported with their source and context, and surveillance results are not generalized beyond the populations or facilities to which the original sources refer.

4. Medicine Access, Procurement and Supply-Chain Resilience

Medicine availability is a central pharmacy-system function. Indonesia's JKN has increased the importance of coordinated procurement and reimbursement because medicines must be available across a large network of health facilities. The 2025 WHO-MoH-ITB assessment found that more than half of the facilities studied purchased medicines above claimable reimbursement rates for medicines included in the assessment, in some cases by large margins. The assessment also reported that 64% of facilities had stock availability above 80% for the medicines reviewed, while shortages were reported for insulin, aspirin, clopidogrel, paracetamol and some chemotherapy medicines (WHO Indonesia, 2025).

These findings illustrate a structural tension between price control and reliable supply. Price ceilings and reimbursement limits can protect purchasers and public budgets, but if procurement prices exceed reimbursable levels, facilities may face financial pressure or delay purchases. Conversely, weak forecasting and fragmented procurement can contribute to stockouts even when products are available elsewhere in the national market.

Pharmacists have an important operational role in this system. Inventory management, demand forecasting, stock monitoring, therapeutic substitution processes and communication with prescribers are all pharmacy functions. Strengthening these capabilities requires not only technical training but also better information systems and coordination between procurement agencies, insurers, wholesalers and health facilities.

Issue	Observed evidence	Pharmacy implication
Procurement-price mismatch	More than half of assessed facilities purchased some medicines above claimable rates.	Pharmacists need stronger procurement, formulary and inventory-management capacity.
Medicine stockouts	Shortages reported for insulin, aspirin, clopidogrel, paracetamol and some chemotherapy medicines.	Therapeutic continuity and patient counselling may be affected.
Fragmented procurement	Multiple pathways operate within a decentralized system.	Coordination and forecasting become essential.
Financial protection	JKN reduces direct financial barriers but medicine availability remains important.	Coverage must be accompanied by reliable medicine supply.

Table 1. Key medicine-access and procurement issues identified in recent Indonesian evidence. Source: WHO Indonesia (2025).

5. Antimicrobial Resistance and the Role of Community Pharmacy

AMR is one of the clearest areas in which pharmacy practice directly intersects with population health. Indonesia has established a National Strategy for Controlling Antimicrobial Resistance for 2025–2029, with a people-centred approach and emphasis on surveillance, prevention and appropriate antimicrobial use (WHO Indonesia, 2024; Ministry of Health Republic of Indonesia, 2024).

Community pharmacy remains particularly important because pharmacists are accessible health professionals and may be the first point of contact for patients seeking treatment. BPOM's surveillance demonstrates the continuing challenge of antibiotic supply without prescriptions. Its reported proportions declined from 79.57% in 2021 to 70.75% in 2023 among monitored pharmacy facilities, but the level remained substantial (BPOM, 2024). Because these figures arise from regulatory surveillance rather than a census, they indicate a compliance problem within the observed facilities rather than a precise prevalence for every pharmacy in Indonesia.

Several factors may contribute to inappropriate antibiotic access: patient demand, misconceptions about antibiotics, prescriber practices, economic incentives, competition among pharmacies and variation in pharmacist presence. BPOM has also reported variation in pharmacist presence at pharmacies, emphasizing the importance of professional availability as part of regulatory compliance (BPOM, 2024).

Indonesia's GeMa CerMat programme offers a complementary educational strategy. Pharmacist Agents of Change provide community education about rational medicine use, including antibiotics. By 2024, the Ministry of Health reported 9,346 pharmacist Agents of Change and 281 pharmacist master's-level Agents of Change participating in the programme (Ministry of Health Republic of Indonesia, 2024). Such programmes can connect antimicrobial stewardship with health literacy rather than relying exclusively on enforcement.

Table 2. BPOM surveillance of antimicrobial dispensing without prescription. Source: BPOM (2024). These are surveillance findings and should not be interpreted as nationally representative prevalence estimates.

Year	Reported monitored pharmacies dispensing antimicrobials without prescription	Interpretation
2021	79.57%	BPOM surveillance finding among monitored facilities.
2022	75.49%	Decrease from 2021, but continued non-compliance.
2023	70.75%	Further decrease, but still substantial within the monitored sample.

6. Pharmaceutical Care and Primary Health Care

The development of primary health care creates opportunities for pharmacists to move toward more direct patient-care functions. Pharmacists can contribute to medication reconciliation, adherence support, chronic-disease counselling, adverse-drug-reaction monitoring and patient education. Evidence from Indonesian public health centres during the COVID-19 pandemic showed that pharmacists adapted their activities under pressure and faced challenges in delivering pharmaceutical care within public-sector settings (Pratiwi et al., 2023).

The Surabaya tuberculosis study provides a more specific example. Priyandani et al. (2022) developed a pharmaceutical-care model involving pharmacist training and patient treatment support. The study highlights a recurring implementation problem: pharmacists may be present in health facilities but remain concentrated on product-oriented tasks. The transition to pharmaceutical care therefore requires organizational redesign, not simply additional knowledge.

For pharmaceutical care to become routine, pharmacists need time for patient consultation, access to clinical information, authority to document interventions and effective collaboration with physicians and nurses. Performance indicators should also move beyond dispensing volume toward measures of medication safety, adherence, treatment outcomes and patient experience.

7. Pharmacy Workforce and Professional Development

Indonesia's geographical scale makes workforce distribution a central issue. Pharmacy workforce capacity is not determined only by the number of pharmacists; distribution, professional availability, competence, workload and access to continuing professional development all matter. Earlier scholarship on Indonesian pharmacy education emphasized substantial geographic and socioeconomic variation and the challenges of preparing the workforce for changing professional roles (Ernawati et al., 2021).

The contemporary direction of pharmacy practice requires competence in clinical pharmacy, public health, antimicrobial stewardship, digital systems, supply-chain management and interprofessional communication. Consequently, workforce planning should align undergraduate and professional education with the needs of primary care, hospitals, community pharmacies, industry and regulatory institutions.

FIP's 2026 country pharmacy profile initiative has highlighted Indonesia's evolving pharmacy landscape, including health-system organization, pharmacy services, workforce capacity, professional development and medicine access (FIP, 2026). This signals growing international attention to the Indonesian pharmacy system and provides a framework for considering workforce planning as part of broader health-system reform.

Table 3. Priority pharmacy workforce domains for Indonesia. Synthesis based on Ernawati et al. (2021), Pratiwi et al. (2023), BPOM (2024) and FIP (2026).

Workforce domain	Current challenge	Strategic response
Geographical distribution	Unequal service capacity across an archipelagic country.	Use needs-based workforce planning and incentives for underserved areas.
Professional role	Product supply may dominate over direct pharmaceutical care.	Expand clinical, counselling and medication-management responsibilities.
Continuing education	Rapid changes in AMR, digital health and medicines require ongoing learning.	Strengthen competency-based continuing professional development.
Interprofessional practice	Pharmacist contributions may not be fully integrated into care teams.	Embed pharmacists in multidisciplinary primary and hospital care.
Regulatory presence	Variation in pharmacist availability affects dispensing oversight.	Strengthen professional presence and compliance monitoring.

8. Pharmacy Education and the Changing Scope of Practice

Pharmacy education must respond to the transformation of the pharmacist's role. Traditional preparation centred heavily on pharmaceutical sciences and medicine products remains essential, but contemporary practice additionally requires clinical reasoning, communication, public health, data literacy and systems thinking. Indonesia's experience during the COVID-19 pandemic demonstrated the importance of adaptability and digital learning while also exposing differences in educational resources (Ernawati et al., 2021).

Curricula can strengthen Indonesia's health-system needs by integrating antimicrobial stewardship, rational medicine use, pharmacovigilance, supply-chain resilience, health technology assessment, digital pharmacy and patient-centred communication. Experiential learning in primary care and community pharmacies is particularly important because it allows students to understand the social and behavioural determinants of medicine use.

Education should also prepare pharmacists to interpret health-system data. The growing use of electronic procurement, e-catalogues, electronic prescriptions and health-information platforms creates opportunities for pharmacists to use data for forecasting, medication-safety surveillance and quality improvement. These developments require training that combines pharmaceutical knowledge with information technology and health-system management.

9. Digital Transformation and Pharmacy Services

Digital transformation offers opportunities to improve medicine procurement, inventory monitoring, dispensing documentation and patient communication. Indonesia's health-system digitalization agenda can support pharmacy by improving visibility of medicine stocks and reducing information gaps between facilities and central institutions. However, digital systems can create new inequalities if infrastructure, connectivity and digital literacy vary across regions.

A resilient digital pharmacy system should therefore be designed around interoperability, data quality, privacy, usability and continuity of care. Pharmacists should be involved in the design of digital medication-management systems because they understand dispensing workflows, formulary constraints, medication errors and patient counselling needs.

10. Pharmaceutical Regulation and Quality Assurance

BPOM has a central role in regulating medicine quality and monitoring pharmaceutical facilities. Effective regulation must balance product quality, patient safety, accessibility and enforceability. The continuing problem

of non-prescription antibiotic dispensing demonstrates that written rules require consistent implementation at the point of service (BPOM, 2024).

Quality assurance should therefore combine inspection, professional accountability, education and data-driven surveillance. A purely punitive model may identify violations without changing the conditions that generate them. Conversely, education without enforcement may fail to address persistent commercial or behavioural incentives. An integrated approach can use risk-based inspection alongside pharmacist development and public awareness.

11. Discussion

The Indonesian pharmacy system can be understood as a transition from a product-centred model toward a more integrated pharmaceutical-care and public-health model. This transition is incomplete. Medicine supply remains a major responsibility, but the growing burden of chronic disease, AMR and medication-related problems requires pharmacists to contribute directly to health outcomes.

Three structural tensions emerge from the evidence. First is access versus sustainability: medicines must be affordable to patients and health systems while procurement systems must remain financially viable. Second is regulation versus accessibility: strict antibiotic controls protect public health, but patients also need convenient access to legitimate diagnosis and treatment. Third is professional capacity versus workload: expanding pharmacist responsibilities without adequate staffing, training and organizational support may produce role overload rather than better care.

These tensions suggest that pharmaceutical reform should be coordinated rather than fragmented. Procurement reform without pharmacy workforce development may improve stock availability without improving medication use. AMR regulation without public education may shift demand rather than eliminate inappropriate use. Digitalization without workflow redesign may simply digitize existing inefficiencies. A systems approach is therefore necessary.

Table 4. Integrated framework for strengthening pharmacy in Indonesia.

System component	Problem	Integrated intervention	Expected pharmacy contribution
Access	Price and stock instability	Better forecasting, procurement alignment and supply monitoring	Inventory management and continuity planning
AMR	Non-prescription antibiotic dispensing	Stewardship, enforcement, education and referral	Prescription verification and patient counselling
Care	Product-focused services	Patient-centred pharmaceutical care	Medication review and adherence support
Workforce	Uneven capacity and distribution	Needs-based planning and continuing development	Expanded clinical and public-health roles
Education	Changing professional requirements	Competency-based curriculum and experiential training	Clinical, digital and stewardship competence
Digital health	Fragmented information	Interoperable medication and procurement systems	Data-informed medication management

12. Recommendations

1. Strengthen medicine forecasting and procurement coordination. Pharmacy departments should use consumption data, disease patterns and procurement information to improve demand forecasting and reduce avoidable stockouts.

2. Expand pharmacist-led antimicrobial stewardship. Community and primary-care pharmacists should be integrated into local AMR programmes, with clear referral and prescription-verification pathways.

3. Increase pharmacist presence and professional accountability in community pharmacies. Regulatory systems should combine inspection with professional development and public education.

4. Institutionalize pharmaceutical care. Health facilities should create protected time, documentation systems and performance indicators for medication review, adherence support and patient counselling.

5. Align pharmacy education with health-system needs. Curricula should strengthen clinical pharmacy, public health, AMR, digital health, pharmacovigilance and supply-chain management.

6. Use digital systems to improve—not merely record—pharmaceutical processes. Interoperability and real-time information should support stock monitoring, medication safety and continuity of care.

7. Prioritize underserved regions. Workforce policies should account for Indonesia's geographical diversity and use incentives, training and telepharmacy where appropriate to strengthen access.

8. Develop outcome-oriented research. Indonesian pharmacy research should increasingly measure medication adherence, treatment outcomes, adverse events, antimicrobial use, patient experience and economic consequences rather than focusing only on process indicators.

13. Limitations

This article is a narrative review rather than a systematic review or original empirical study. The evidence comes from sources with different designs, geographic coverage and reporting periods. Some official surveillance findings are based on monitored facilities and cannot be interpreted as nationally representative prevalence estimates. In addition, medicine availability studies conducted in selected facilities cannot be generalized to every Indonesian province. Future systematic reviews and nationally representative studies should examine regional differences, pharmacist workforce density, antimicrobial dispensing practices and patient-level pharmaceutical-care outcomes.

14. Conclusion

Indonesia's pharmacy system is central to the country's pursuit of equitable health care because pharmacists connect medicines, patients and health-system institutions. The principal challenges—medicine availability, procurement efficiency, antimicrobial resistance, workforce distribution and the transition toward pharmaceutical care—are interconnected. Evidence from recent Indonesian and international sources shows progress in policy development, public education and professional engagement, but also demonstrates persistent implementation gaps.

The future of pharmacy in Indonesia will depend on whether the profession can combine reliable medicine supply with patient-centred care. Pharmacists are well positioned to contribute to antimicrobial stewardship, medication adherence, chronic-disease management, health literacy and pharmaceutical-system resilience. Achieving these goals requires coordinated investment in workforce capacity, regulation, procurement, digital infrastructure and research. Strengthening these components together can support a pharmacy system that is not

only focused on medicines as products but also on medicines as interventions whose value is realized through safe, effective and equitable use.

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