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Research Article

The impact of supply-side and demand-side cost-containment strategies on universal health coverage outcomes in Southeast Asian National Health Insurance Schemes: A systematic review

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ABSTRACT

Southeast Asia's rapid growth of Universal Health Coverage (UHC) is increasingly hampered by growing healthcare costs and financial constraints. Although cost-containment instruments are widely implemented, their systemic trade-offs—particularly regarding health equity and service quality—remain poorly understood across the region's diverse health systems. This systematic review synthesizes empirical evidence on the effectiveness of supply-side and demand-side cost-containment instruments across five UHC outcome domains (financial protection, access, equity, quality, and efficiency) in Southeast Asian National Health Insurance schemes. Following PRISMA 2020 guidelines, we systematically searched Scopus and PubMed from inception to December 2025. Of 362 records, 21 empirical studies from five countries (Thailand, Indonesia, Vietnam, Philippines, Lao PDR) met inclusion criteria. Study quality was assessed using the Mixed Methods Appraisal Tool (MMAT). Evidence reveals a sharp divergence in policy performance. Synergistic strategic purchasing—exemplified by Thailand's integrated capitation, global budgets, and central procurement—achieved significant pro-poor equity (27–30% of subsidies concentrated in the poorest quintile) and 25% savings in pharmaceutical expenditures. Conversely, fragmented instruments in other settings triggered adverse provider behaviors, including cost-shifting to patients, induced utilization, and potential quality concerns. Even in relatively high-performing schemes, persistent inequities related to geography, gender, and chronic disease management remain unresolved. Cost-containment effectiveness depends fundamentally on governance maturity and policy integration, not technical design alone. To safeguard UHC sustainability, Southeast Asian policymakers should transition from fragmented cost-cutting toward data-driven, quality-linked strategic purchasing frameworks that actively monitor equity and outcomes.

Keywords:
Cost control; Universal Health Coverage; Health equity; Health financing; Southeast Asia

1. INTRODUCTION

Universal Health Coverage (UHC) has emerged as a cornerstone of global health equity, with Southeast Asian nations demonstrating unprecedented commitment to expanding mandatory National Health Insurance (NHI) schemes[1,2]. Thailand's Universal Coverage Scheme (UCS), Indonesia's JKN, and the Philippines' PhilHealth have successfully transitioned millions from out-of-pocket (OOP) payments toward pooled financing, now covering over 70 percent of their respective populations[2,3]. However, these aggregate improvements obscure underlying financial disparities: in Indonesia, JKN expansion reduced OOP spending for

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the poorest by 39 percent, but simultaneously increased aggregate population-level OOP by 26 percent [3,4]. This contradiction signals that expanding coverage does not automatically translate into financial protection—and in fragmented systems, it may inadvertently exacerbate financial risk.

The region's hard-won gains now face an imminent threat. Rapid UHC expansion is colliding with a "fiscal cliff"—a critical juncture where rising healthcare demands inexorably outpace revenue growth—driven by dual pressures: an accelerating epidemiological transition toward non-communicable diseases and relentless medical inflation [4,5]. Projections indicate medical inflation reaching 19.4% in Indonesia and 21.0% in the Philippines [6,7], while high-cost mandates, such as Thailand's 'Peritoneal Dialysis First' policy, continue to strain national budgets [8,9]. Consequently, the long-term viability of UHC across Southeast Asia depends fundamentally on the strategic implementation of cost-containment instruments [9,10].

Cost-containment strategies are broadly categorized into supply-side and demand-side interventions [11,12]. Supply-side instruments—including capitation, Diagnosis-Related Groups (DRGs), and global budgets—seek to shift financial risk to providers to curb over-utilization [10,12]. Demand-side strategies—such as co-payments and gatekeeping—aim to modulate patient behavior and mitigate moral hazard [13,14]. However, these are not neutral technical tools; each carries inherent systemic risks. Capitation may incentivize under-treatment, DRGs can trigger premature discharge, and co-payments frequently deter the most vulnerable from seeking essential care [12,15]. The primary challenge for policymakers lies not in selecting these instruments, but in anticipating their unintended consequences.

This challenge is most evident in the heterogeneous—and often paradoxical—outcomes documented across the region [12,15]. Thailand's UCS demonstrates that synergistic strategic purchasing can achieve both cost control and pro-poor equity [4,10]. Yet even this success story reveals gaps: the 'PD First' policy left the poorest patients exposed to catastrophic non-medical costs [8]. In Indonesia, performance-based capitation achieved minimal gains in primary care contact rates and failed to curb unnecessary referrals, suggesting that financial incentives cannot compensate for weak supply-side capacity [12]. Similarly, Vietnam's Circular 35/50 inadvertently increased patient OOP payments and created institutional barriers at lower-level facilities [16]. This heterogeneity in outcomes indicates that technical design alone is insufficient; institutional context and governance maturity are the true determinants of policy effectiveness.

Despite this, the current literature remains predominantly Eurocentric, leaving a significant void in understanding how cost-containment instruments perform within the pluralistic, resource-constrained health systems of Southeast Asia [5,14]. Previous reviews have mapped broad financing challenges [5] or described UHC progress [15], but they lack a granular, comparative synthesis of how specific instruments differentially influence the five core UHC outcome domains: financial protection, access, equity, quality, and efficiency [4,16]. This evidence gap has profound consequences; without a comparative framework, policymakers risk implementing "blunt" austerity measures that achieve short-term fiscal savings at the expense of clinical integrity and health equity [5,17].

This systematic review addresses this gap by synthesizing empirical evidence from five Southeast Asian nations. We ask: How do supply-side and demand-side cost-containment instruments influence UHC outcomes within the region's NHI schemes? By analyzing the systemic trade-offs and unintended consequences across 21 studies, we provide a framework for strategic purchasing that aligns fiscal discipline with the fundamental UHC goal of leaving no one behind [1,5].

2. MATERIALS AND METHODS

2.1. Study design

This review was conducted in accordance with the PRISMA 2020 guidelines [18]. While the protocol was not registered in PROSPERO, we adhered to a rigorous a priori protocol developed by the research team, which is detailed in the Methods section and available from the corresponding author upon request. The study selection, data extraction, and quality appraisal processes were conducted with dual verification to ensure methodological rigor and minimize bias, aligning with best practices for transparent systematic reviews [18].

2.2. Search strategy

A systematic literature search was performed in Scopus and PubMed from database inception to December 2025. These databases were selected based on their complementary coverage of health policy and biomedical literature, respectively, as recommended for systematic reviews in health financing [19,20]. No publication date restrictions were applied to capture the full evolution of cost-containment policies in the region. Boolean operators were used to combine keywords from four conceptual domains with filters applied for English language. The complete search strategies for both databases, including the exact strings and search dates, are provided in Supplemental Material.

Table 1. Summary of Eligibility Criteria

PICOS Element	Inclusion Criteria	Exclusion Criteria
Population (P)	Patients, healthcare providers, or policy participants within National Health Insurance (NHI) schemes in Southeast Asia (e.g., JKN Indonesia, UCS Thailand, PhilHealth, VSS Vietnam).	Populations or providers exclusively under private-commercial insurance or voluntary schemes not integrated into the national public health framework.
Intervention (I)	**Supply-Side**: Prospective payments (Capitation, DRGs/INA-CBGs), and P4P. **Demand-Side**: Co-payments, deductibles, and gatekeeping/referral systems.	General health financing or revenue-raising policies that do not explicitly evaluate the mechanics of cost-containment instruments.
Comparator (C)	Comparisons between different instruments, pre- vs. post-intervention, or comparison against a baseline (no instrument).	Studies without a clear comparative framework or baseline data to measure the impact of the instrument.
Outcomes (O)	Impact on UHC Outcomes: Financial protection (OOP, CHE), accessibility, service utilization, equity, and cost-efficiency.	Purely clinical or pharmacological outcomes (e.g., drug efficacy, lab results) without policy or economic analysis.
Study Design (S)	Primary empirical research (qualitative, quantitative, or mixed-methods) published in peer-reviewed journals.	Editorials, opinion pieces, technical reports, conference abstracts, and purely descriptive/theoretical studies without empirical evidence.

2.3. Eligibility criteria

Eligibility criteria were established a priori using the PICOS (Population, Intervention, Comparison, Outcomes, Study Design) framework, as summarized in Table 1. Studies were included if they: (1) were primary empirical research published in English in peer-reviewed journals; (2) were conducted within mandatory National Health Insurance (NHI) schemes in Southeast Asia (e.g., JKN Indonesia, UCS Thailand, PhilHealth Philippines, VSS Vietnam); and (3) evaluated supply-side or demand-side cost-containment instruments (e.g., capitation, DRG, pay-for-performance, copayments, gatekeeping) and their impact on at least one UHC outcome domain (financial protection, access, equity, quality, or efficiency).

Studies were excluded if they: (1) focused on private or voluntary insurance schemes not integrated into national public health frameworks; (2) examined general health financing policies without explicit evaluation of cost-containment instruments; (3) lacked a clear comparative framework or baseline data; (4) reported purely clinical or pharmacological outcomes without policy or economic analysis; or (5) were editorials, opinion pieces, conference abstracts, technical reports, or purely descriptive studies without empirical evidence.

2.4. Study selection process

The study selection process followed PRISMA 2020 guidelines (Figure 2). After removing 144 duplicates from 362 records (Scopus: 210; PubMed: 152), 218 unique records were independently screened by two reviewers (NVU, DE). Database complementarity was quantified during deduplication: 66 records (30.3%) were unique to Scopus and 8 (3.7%) were unique to PubMed, with the remainder (66.0%) indexed in both databases (detailed in Supplemental Material). Disagreements were resolved through discussion or consultation with a third reviewer (SAK). Of the 218 unique records, 178 were excluded during title and abstract screening as they did not address National Health Insurance (NHI) schemes or cost-containment instruments in Southeast Asia. The remaining 40 full-text reports were sought and all were successfully accessed. Two reviewers (NVU, DE) independently assessed the full-text reports for eligibility, with disagreements resolved through discussion or consultation with a third reviewer (SAK). A total of 19 reports were excluded after full-text reading because they did not meet the eligibility criteria (reasons: not within NHI frameworks, no explicit cost-containment evaluation, lack of UHC outcome data, or ineligible study design). The remaining 21 studies met all criteria and were included in the synthesis. All exclusion decisions were documented, and the final list of excluded studies with reasons is provided in Supplemental Material, Table S4.

2.5. Data extraction

Data from the 21 included studies were extracted using a standardized, pilot-tested form (Supplemental Material). The form captured: bibliographic details, NHI scheme context, cost-containment instrument characteristics (type, design, implementation), comparator and population details, and outcomes across five UHC domains: financial protection, access, equity, quality, and efficiency [21,22].

Two reviewers (NVU, DE) independently extracted data from all included studies. Discrepancies were resolved through discussion or consultation with a third reviewer (SAK). A verification protocol was implemented to ensure accuracy, with all extracted data cross-checked against original articles [23].

2.6. Quality assessment

The methodological quality of the 21 included studies was appraised using the Mixed Methods Appraisal Tool (MMAT) version 2018 [24,25], which is appropriate for the diverse study designs (RCTs, quasi-experimental, observational, and mixed-methods). Each study was assessed against five criteria specific to its design, evaluating internal validity, measurement validity, and statistical rigor. Two reviewers (NVU, DE) independently appraised all included studies. Disagreements were resolved through discussion or consultation with a third reviewer (SAK). In line with best practice, appraisal results were not used as exclusion criteria but to contextualize evidence strength and guide interpretation of findings [5,26]. Full appraisal results are presented in Supplemental Material.

2.7. Data synthesis

A narrative synthesis was conducted to integrate findings from the 21 included studies, as heterogeneity in country contexts, NHI schemes, and outcome measures precluded meta-analysis. Following the framework adapted from Lim et al. (2023), the synthesis followed a thematic approach (Figure 1) involving three phases: (1) categorization by methodology, (2) thematic coding of cost-containment instruments (supply-side vs demand-side), and (3) evaluative mapping against UHC goals. The synthesis evaluated five core UHC outcome domains: (1) financial protection, (2) healthcare access and utilization, (3) equity in service delivery, (4) quality of care, and (5) health system efficiency. Within each domain, comparative analysis identified cross-country patterns and trade-offs between fiscal sustainability and equitable access[5,27].

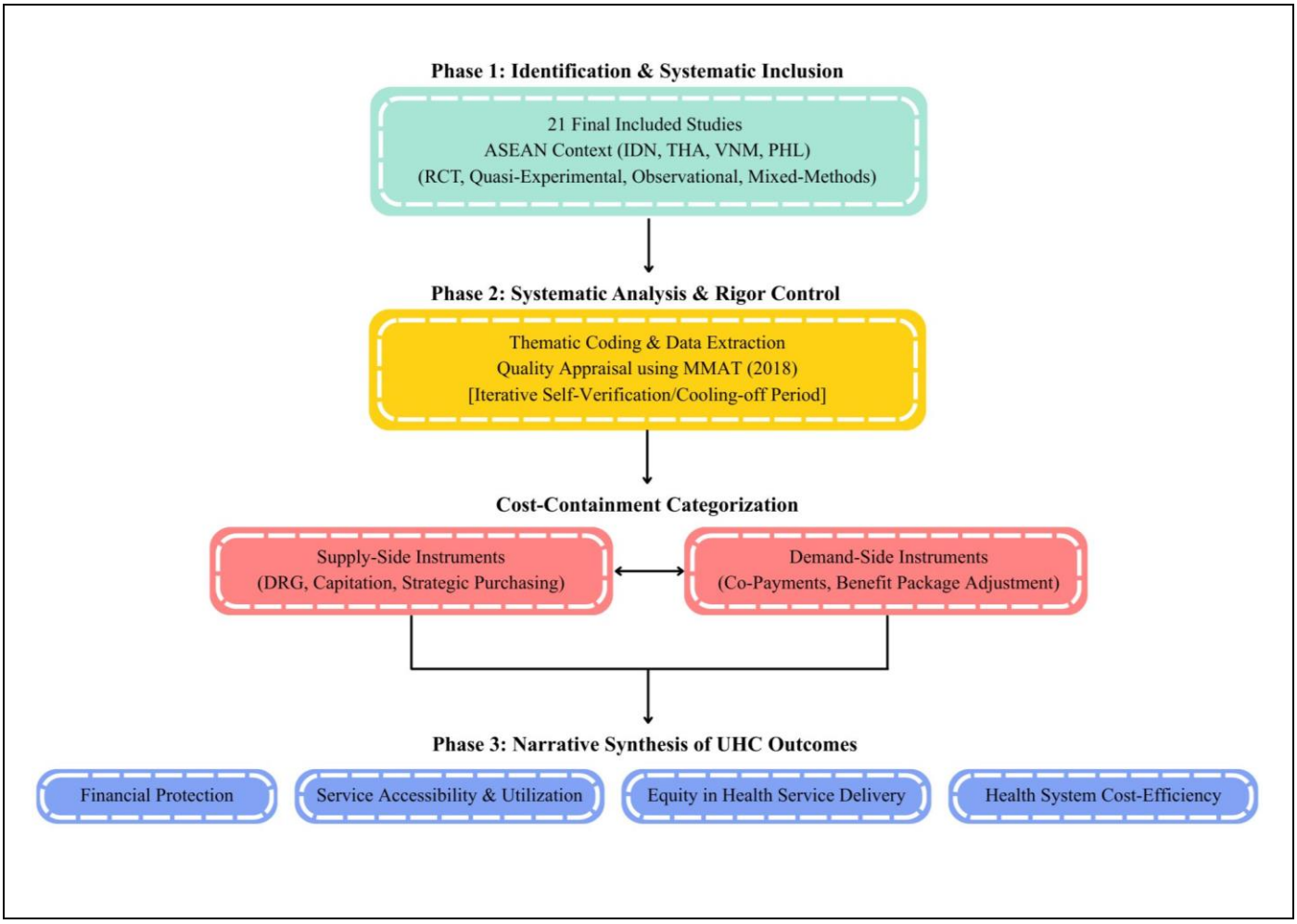

Figure 1. Summary of the Data Synthesis Process.
The figure illustrates the three-phase thematic synthesis approach adapted from Lim et al. (2023): (1) categorization of studies by methodology, (2) thematic coding of cost-containment instruments (supply-side vs demand-side), and (3) evaluative mapping against five UHC outcome domains.

3. RESULTS

The five countries included in this review represent a spectrum of UHC maturity, although geographic coverage is uneven. Notably, no empirical studies from Malaysia, Singapore, Brunei, Cambodia, Myanmar, or Timor-Leste met our inclusion criteria (discussed in Limitation). Among included countries, Thailand's UCS, established in 2002, is characterized by integrated strategic purchasing: a global budget for inpatient care, capitation for outpatient care, and central procurement for pharmaceuticals. This governance structure enabled 25% savings on medicine prices [2,28] and pro-poor equity (27–30% of subsidies concentrated in the poorest quintile) [10]. However, even in this relatively high-performing scheme, informal copayments for emergency services (requested from 40–80% of total charges) [14] and catastrophic non-medical costs for chronic care (14.2% of dialysis patients facing CHE) [8] remain unresolved.

Indonesia's JKN, despite achieving approximately 85% population coverage and reducing OOP by 39% for the poorest households [3], operates with fragmented purchasing – capitation for primary care and Ina-CBGs for referrals. This has perpetuated urban bias (67% of health spending in Java-Bali despite only 57% of the population) [29] and contributed to a 26% aggregate increase in out-of-pocket spending [4]. Although JKN has no formal co-payment, 20% of patients reported positive OOPE, with medicines as the most prevalent reason (61%) [30], and 28% of insured outpatients did not use their insurance due to waiting times and information gaps [4,12]. The modest impact of performance-based capitation (KBK), which increased primary care contact rates by only 0.58 percentage points [12], further illustrates that financial incentives cannot compensate for structural capacity gaps.

The Philippines' PhilHealth, transitioning from case-based rates to pay-for-performance trials, has shown mixed results: P4P improved child health outcomes and reduced out-of-pocket payments by 24% [13,31], but benefit ceilings and cost-sharing remain barriers for the poor. Vietnam's social health insurance, historically fee-for-service with hospital autonomy, inadvertently increased patient out-of-pocket payments under Circular 35/50, with OOP-to-reimbursement ratios reaching 3.57:1 for conditional services [16]. Statutory exemptions exist for vulnerable groups but do not fully protect against catastrophic costs. Lao PDR's NHI, primarily tax-funded, reduced out-of-pocket payments for some services but left rural patients facing catastrophic transport costs (3.8-fold higher risk of CHE outside provincial capitals) [32].

The sharp divergence in policy performance—such as Thailand's 25% pharmaceutical savings versus Vietnam's 3.57:1 OOP ratio—is inherently tied to the UHC maturity levels identified in Table 2. This pattern confirms that integrated governance and purchasing coherence, rather than technical instrument design alone, determine whether cost-containment strategies advance or undermine UHC goals. These contextual differences are essential for interpreting the heterogeneous outcomes reported in the following sections.

3.1. Characteristics and methodological quality of included studies

The systematic search yielded 362 records, of which 21 studies met the inclusion criteria and were included in the synthesis. The PRISMA flow diagram (Figure 2) details the selection process. The 21 synthesized studies, published between 2012 and 2025, reflect a rising research focus on UHC sustainability in Southeast Asia, with over half (52.4%) emerging in the last five years (Table 3). Evidence is concentrated in Thailand (n=6) and Indonesia (n=6), followed by Vietnam (n=4), the Philippines (n=3), and Lao PDR (n=2). Although randomized controlled trials (n=2) and quasi-experimental studies (n=3) offered higher evidentiary rigor regarding policy impact, the literature is dominated by cross-sectional surveys (61.9%), limiting longitudinal insights into policy trajectories.

Supply-side mechanisms—particularly capitation and Diagnosis-Related Groups (DRGs)—constitute the most frequently evaluated strategies, primarily within high-coverage schemes (Thailand's UCS, Indonesia's JKN). Demand-side instruments (co-payments, gatekeeping) appear less often as isolated interventions and more commonly as components of broader purchasing frameworks. Notably, 81.0% of studies assess financial protection outcomes, whereas only 23.8% examine impacts on clinical quality—a critical evidence gap given potential trade-offs between cost containment and care quality.

Methodological quality, appraised using the Mixed Methods Appraisal Tool (MMAT), revealed critical evidentiary trade-offs; detailed MMAT results are provided in Supplemental Material. Large-scale experimental studies lack blinding due to public treatment allocation [13,31], while cross-sectional surveys exhibit bias risks from non-validated instruments and inadequate non-response reporting [3,30,32]. To enhance robustness, subsequent synthesis weights administrative claims-based studies (n=5) [29,33–36] more heavily, with cautious interpretation of unvalidated survey findings.

3.2. Impact on Universal Health Coverage outcomes

The synthesis of 21 studies reveals that the impact of cost-containment instruments on UHC outcomes is not automatic but highly contingent on policy design,

Table 2. UHC Landscape of Included Southeast Asian Countries

Country	NHI Scheme (Year)	Financing Model	Population Coverage	Key Supply-Side Mechanisms	Key Demand-Side Mechanisms	Governance Structure	Key Contextual Challenges (from synthesis)
Thailand	UCS (2002)	Tax-based	~75% (UCS); ~99% national UHC coverage	Capitation (OP) [2]; Global budget + DRG (IP) [28]; Central procurement [28]	Formal: zero co-payment [2]; Informal: copayment requested (40–80% of emergency charges) [14]	NHSO (autonomous strategic purchaser) [28]	Catastrophic non-medical costs (14.2% CHE for dialysis) persist despite comprehensive coverage [8];
Indonesia	JKN (2014)	Social health insurance (premiums + subsidies)	~85% (regional variation)	Capitation (primary); Ina-CBGs (referral); Performance-based capitation (KBK, 2023) [12]	No formal co-payment; but informal payments & uncovered services common (20% report OOPE; medicines 61% of OOPE) [29]	BPJS Kesehatan (fragmented purchasing) [30]	Geographic inequity (Java-Bali bias) (Sambodo et al., 2021); informal payments; primary care capacity gaps [4,12]
Philippines	PhilHealth (1995, expanded 2019)	Social health insurance	~80–96% (regional)	Case-based rates (DRG); P4P trials [13,31]	Cost-sharing for non-indigent; fixed benefit ceilings; premium subsidies for indigent [32]	PhilHealth Corp (decentralized)	Quality gaps; benefit ceilings; decentralization challenges
Vietnam	VSS (1992, reformed 2015)	Social health insurance	~90–95%	Fee-for-service (historical); DRG pilots; hospital autonomy	Co-insurance (20% standard); exemptions for poor, elderly, children <6, ethnic minorities [16,33]; Circular 35/50 regulation [16]	VSS (fragmented purchasing)	High OOP despite coverage (OOP:reimbursement up to 3.57:1) [16]; fragmented purchasing
Lao PDR	NHI (2016)	Tax-based + donor support	~60–94% (varies)	Capitation (primary); FFS (hospital)	Flat-rate co-payment per visit/admission [34,35]	Ministry of Health (donor-dependent)	Limited fiscal space; rural transport costs (3.8× CHE risk outside capitals) [34]

Notes:

- *UHC Maturity Level* classified using WHO UHC monitoring benchmarks [1] and regional governance criteria [5]: Mature (Thailand) meets ≥4/5 criteria (coverage >90%, strategic purchasing, CHE <5%, autonomous purchaser, comprehensive benefits); Transitioning (Indonesia, Philippines) meets 2–3 criteria; Emerging (Vietnam, Lao PDR) meets ≤2 criteria.
- *UCS* covers non-civil servants and informal sector; overall UHC coverage includes complementary public schemes.
- *Geographic Gaps:* No empirical studies from Malaysia, Singapore, Brunei, Cambodia, Myanmar, or Timor-Leste met inclusion criteria. Malaysia & Singapore utilize non-NHI models (tax-funded public/Medisave); others lack peer-reviewed outcome evaluations of cost-containment instruments within mandatory NHI frameworks. Discussed in Limitation.
- *Abbreviations:* CHE=catastrophic health expenditure; OP=inpatient/outpatient; OOPE=out-of-pocket expenditure.

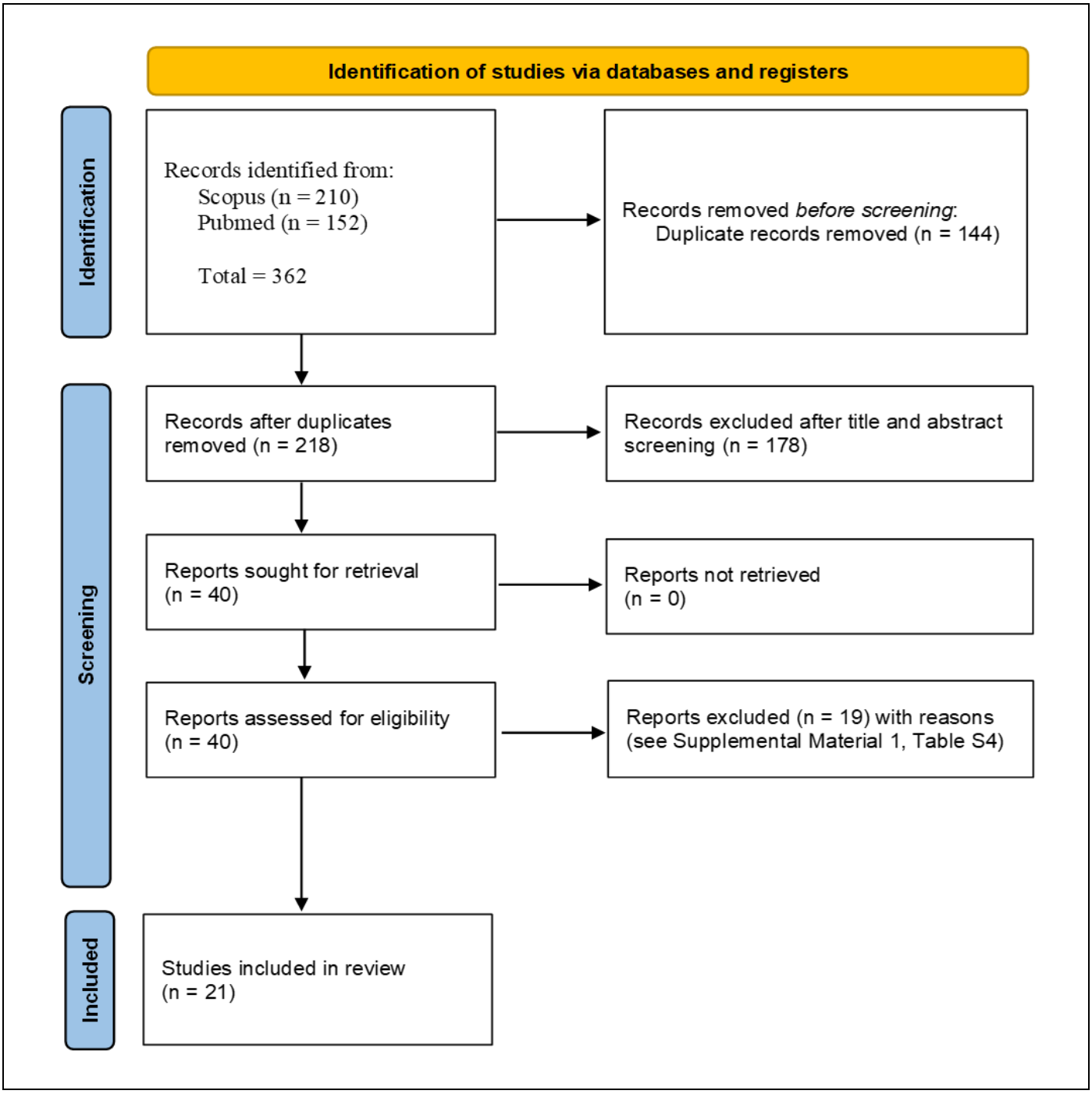

Figure 2. PRISMA Flow Diagram
The diagram details the identification, screening, eligibility, and inclusion stages, resulting in 21 studies included in the systematic review.

governance maturity, and the synergy between supply-side controls and demand-side protections. The following sections detail thematic findings across five UHC domains, as summarized in Table 4.

3.2.1. Financial protection

Financial protection was assessed in 81% of studies (17 of 21). Effectiveness in reducing OOP payments and preventing catastrophic health expenditure (CHE) varied by design. Thailand's UCS combined capitation, DRGs with global budgets, and central procurement, reducing OOP from 33% to 18% of total health expenditure and lowering CHE to 2.8–3.8% [2,10]. Central procurement achieved 25% savings on medicine prices [28]. In the Philippines, P4P and insurance expansion reduced OOP by 21–24% [13,31].

Conversely, Vietnam's Circular 35/50 increased patient payments; OOP-to-reimbursement ratios reached 3.57:1 for conditional services [16]. In Indonesia, JKN expansion reduced OOP by 39% for the poorest households but increased aggregate population-level OOP

Table 3. Detailed characteristics and quality appraisal of included studies (n=21)

Author (Year)	Country	Study Design	Instrument(s) Evaluated	UHC Domain(s)	Quality (MMAT)
Limwattananon et al., 2012	Thailand	CS (BIA)	Capitation, DRG	Fin. Prot, Access, Equity	High
Tobe et al., 2013	Philippines	CS (Admin)	Case-based rates (DRG)	Fin. Prot, Access	High
Tangcharoensathien et al., 2015	Thailand	CS (Admin)	Capitation, DRG, Global Budget	Fin. Prot, Access, Equity, Efficiency	High
Suriyawongpaisal et al., 2016	Thailand	MM	Fee schedule, DRG	Fin. Prot, Access, Equity, Quality, Efficiency	High
Peabody et al., 2017	Philippines	RCT	P4P, Capitation	Quality, Access	High
Johns et al., 2017	Vietnam	CS	Co-payment	Fin. Prot, Equity	High
Wagner et al., 2018	Philippines	RCT	Quality bonus, P4P	Fin. Prot, Access, Equity	High
Suriyawongpaisal et al., 2018	Thailand	CS (Admin)	Fee-schedule, Pre-authorization	Access, Equity	High
Patcharanarumol et al., 2018	Thailand	MM	Capitation, DRG, Global Budget	Fin. Prot, Efficiency, Equity, Access	High
Bodhisane & Pongpanich, 2019	Laos PDR	CS	Flat-rate co-payment	Access, Fin. Prot, Equity	High
Sambodo et al., 2021	Indonesia	CS (BIA)	Capitation, DRG (InaCBGs)	Access, Fin. Prot, Equity	High
Ha et al., 2021	Vietnam	MM	Benefit package regulation	Efficiency, Fin. Prot	High
Vu et al., 2021	Vietnam	CS	Co-payment	Access, Fin. Prot	High
Maulana et al., 2022	Indonesia	CS	JKN benefit package	Fin. Prot, Equity	High
Couturier et al., 2022	Indonesia	CS	JKN cost-sharing	Fin. Prot, Quality, Equity	Moderate
Sangthawan et al., 2022	Thailand	CS	"PD First" Policy	Fin. Prot, Equity	High
Bodhisane & Pongpanich, 2022	Laos PDR	CS	Fixed co-payment	Access, Fin. Prot	Moderate
Sambodo et al., 2023	Indonesia	QExp	Performance-based Capitation (KBK)	Access, Efficiency	High
Arviana et al., 2024	Indonesia	CS	JKN insurance coverage	Access, Fin. Prot, Equity	High
Wijayati & Handayani, 2025	Indonesia	QExp	JKN Implementation (DRG/Global Budget)	Fin. Prot, Access, Equity	High
Nguyena & Hong, 2025	Vietnam	QExp	Co-insurance	Access, Fin. Prot	High

Notes: Study Design: RCT (Randomized Controlled Trial), QExp (Quasi-experimental), CS (Cross-sectional/Quantitative Descriptive), MM (Mixed-methods). UHC Domain(s): Fin. Prot (Financial Protection), Acc (Access), Eq (Equity), Qual (Quality), Eff (Efficiency). Quality (MMAT) is categorized as 'High' for studies adhering to 4–5 criteria and 'Moderate' for those with limited reporting (2+ 'Cannot tell' ratings in Supplemental Material).

by 26% due to induced demand for uncovered services and informal payments [3,4]. Hidden costs persisted across schemes. Thailand's 'PD First' policy left 14.2% of patients facing CHE from non-medical costs [8]. In Laos, transport costs remained catastrophic for rural patients despite NHI coverage [32]. Vietnam's student insurance reduced outpatient OOP by 38–66% but increased inpatient OOP by 91–173% [37].

3.2.2. Access to care and service utilization

Access outcomes were reported in 16 studies. Insurance coverage expansion consistently improved utilization. In Indonesia, JKN enrollment associated with 2.1-fold higher outpatient and 3.2-fold higher inpatient use [38]. Thailand's UCS achieved pro-poor utilization, with the poorest quintile receiving 27–30% of subsidies [10].

Gatekeeping results diverged. In Thailand, gatekeeping succeeded due to assured primary care quality [2,28]. In Indonesia, patients bypassed primary care due to perceived poor quality; 28% of insured outpatients did not use insurance due to waiting times and information gaps [4,12]. Performance-based incentives yielded modest gains. Indonesia's KBK reform increased primary care contact rates by only 0.58 percentage points, failing to meet the 15% target or reduce unnecessary hospital referrals [12].

3.2.3. Equity

Equity was examined in 12 studies. Thailand's UCS demonstrated pro-poor subsidy distribution: the poorest quintile received 27–30% of subsidies versus 6–11% for the richest [10]. Indonesia's JKN showed pro-poor patterns in OOP avoidance [3]. However, passive benefit design perpetuated disparities. Indonesia's INA-CBG case payments concentrated subsidies among urban wealthy populations; Java-Bali received 67% of health spending despite having 57% of the population [29].

Table 4. Synthesis of Cost-containment and Effects

Instrument/Policy Package	Financial Protection	Access to Care	Equity	Quality	Efficiency	Key Studies
Supply-side Mechanisms						
1. Capitation (standalone)	+/-	+	+/-	0	+/-	2,10,12,30
2. DRG with global budget	+	+	+	0	+	2,37
3. DRG without global budget	-	-	-	-	-	16,28,37
4. Pay-for-Performance (P4P)	+	+	+	+	+	13,31
5. Performance-based capitation	0	+	0	0	0	12
6. Central procurement	+	+	+	+	+	2,37
Demand-side Mechanisms						
1. Co-payments/Cost-sharing	-	-	-	0	-	34–36,38
2. Benefit Package (comprehensive)	+	+	+	0	+	2,3,10
3. Benefit Package (negative list)	-	-	-	-	-	16
4. Gatekeeping	+/-	+/-	+/-	0	+/-	2,12,30,37
5. Insurance coverage expansion	+/-	+	+	0	-	3,4,39
6. Premium subsidies (PBI)	+	+	+	0	0	3,28,31–33
Systemic / Mixed						
1. Coherent strategic purchasing	+	+	+	+/-	+	2,10,37
2. Fragmented purchasing	-	-	-	-	-	28,38
3. JKN Indonesia	+/-	+	+/-	+/-	-	3,4,12,30,39

Notes: (+) Positive impact; (-) Negative impact; (0) Neutral/No impact; (+/-) Mixed or inconsistent results. The effects of instruments may vary depending on the implementation context, governance, and health system capacity. See the discussion for an in-depth analysis.

Geographic inequities persisted: rural OOP was 6.8% higher in Indonesia [4], and patients outside provincial capitals in Laos faced 3.8-fold higher CHE risk [32]. Chronic illness and gender remained axes of inequity. Households with chronic conditions faced 8.7-fold higher CHE risk under Laos' NHI [39]. In Indonesia, females had a higher probability of incurring OOP but paid less when they did [30].

3.2.4. Quality of care

Quality was reported in only seven studies (23.8%). Filipino P4P trials linked provider payments to clinical quality, improving vignette assessments and reducing OOP by 24% [13,31]. In Thailand, fee-for-service arrangements with weak National List of Essential Medicines (NLEM) enforcement associated with poor prescribing quality; hospitals with high drug expenditure had only 19.5% NLEM compliance [28]. Patient experience measures from Indonesia showed positive ratings (mean 11.7/14), but waiting time satisfaction was lowest at 54% [30]. Vietnam's Circular 35/50 created workforce barriers at lower-level facilities [16]. No studies directly measured clinical outcomes such as morbidity or mortality.

3.2.5. Health system efficiency

Efficiency was assessed in 11 studies. Thailand's UCS achieved per capita expenditure of US$97 compared to CSMBS's US$366, attributable to coherent strategic purchasing [28]. Filipino P4P proved more cost-effective than insurance expansion, averting 1.52 DALYs per US$ versus 0.50 [13]. However, efficiency was not automatic. Indonesia's INA-CBG perpetuated allocative inefficiency [12]. KBK failed to improve referral efficiency [12], and Vietnam's FFS with hospital autonomy created perverse overprovision incentives [16]. Administrative inefficiency emerged where 28% of Indonesian outpatients with JKN did not use their insurance due to waiting times [4].

4. DISCUSSION

This review synthesizes evidence from 21 studies across five Southeast Asian countries. Findings indicate a paradigm shift from passive purchasing to strategic purchasing, contingent on health system maturity and governance integration. Success is conditional on policy design and implementation context.

Supply-side instruments, particularly DRGs and capitation, dominate regional cost-containment efforts. Thailand's UCS exemplifies coherent strategic purchasing, integrating capitation, DRGs with global budgets, and central procurement within an autonomous governance structure. This approach contained costs, improved access, and achieved pro-poor equity [2,10,28]. The 3.8-fold expenditure differential between UCS and the passively managed CSMBS confirms that payment mechanisms alone are insufficient; institutional capacity is decisive [28]. Thailand's success highlights that DRG savings require functional medical audit systems and equitable health infrastructure—conditions challenging for Indonesia's JKN and Philippines' PhilHealth [5,17,40].

Isolated instruments often produced unintended consequences. Vietnam's Circular 35/50 increased OOP payments and burdened lower-level facilities [16]. Indonesia's performance-based capitation achieved modest gains in contact rates but failed to reduce unnecessary referrals, indicating financial incentives cannot compensate for supply-side capacity constraints [12]. Purchasing reforms must integrate with broader health system strengthening [9,15].

The use of demand-side instruments such as copayments proves more problematic for equity and financial protection dimensions. Empirical evidence from Vietnam and Laos indicates that although user fees can theoretically curb moral hazard, these policies are often regressive and actually widen access gaps for poor populations who choose to delay treatment to avoid financial burden at the point of service. A recent study in Vietnam shows that although student health insurance successfully reduced outpatient OOP by 38–66%, inpatient OOP actually increased by 91–173%, confirming that cost-sharing alone cannot compensate for supply-side inefficiencies [37]. This contrasts with Thailand's zero-copay policy, proven effective for vulnerable groups via Benefit Incidence Analysis [2,10]. For lower-middle income countries, demand-side restrictions risk eroding financial protection achievements. Financial protection outcomes exhibit heterogeneity; successful interventions share characteristics like comprehensive benefit packages and minimal point-of-service charges. However, residual risks persist. Thailand's 'PD First' policy exposed patients to catastrophic non-medical costs [8], and Laos' NHI left transport costs catastrophic for rural populations [32]. Financial protection must encompass indirect and non-medical expenses [1,41]

The paradoxical finding that Indonesia's JKN reduced OOP by 39% for the poorest [3] yet increased population-level OOP by 26% [4] warrants particular attention. This contradiction reflects induced demand: coverage expansion stimulated healthcare utilization, which in turn generated new out-of-pocket expenditures for uncovered services, transportation, and informal payments. Financial protection gains from insurance expansion may be offset without supply-side investments to ensure services are available within the covered package. Access and equity show successes yet persistent gaps. Thailand's UCS achieved pro-poor access at scale [10], while Indonesia's JKN increased utilization but concentrated subsidies among urban wealthy populations [29]. Geographic inequity mirrors patterns in decentralized systems where resource allocation favors better-resourced regions [5,15]. Gatekeeping succeeded in Thailand due to primary care quality but failed in Indonesia due to perceived poor quality [12,30]. Investments in primary care quality are prerequisites for successful gatekeeping [14,36].

Gender and chronic illness remain axes of inequity. Females in Indonesia face higher OOP probability [30]. Households with chronic conditions face elevated CHE risk under Laos' NHI [39]. Chronic illness amplifies financial vulnerability even under universal coverage [8,34]. Quality of care remains under-researched. Filipino P4P trials demonstrate linking payments to quality improves practices and reduces OOP [13,31]. However, weak formulary enforcement associates with poor prescribing quality [16]. Pharmaceutical management is critical for strategic purchasing. Fiscal efficiency depends on centralized drug price negotiations and strict formulary enforcement. Provider-level cost containment is unsustainable without control over drug prices [2,16,28]. System efficiency illustrates the value of coherent governance. Thailand's UCS achieved significant per capita expenditure savings compared to passive schemes [28], and central procurement delivered substantial medicine price savings [2]. However, inefficiencies persisted in Indonesia's INA-CBG and Vietnam's FFS models [13]. Administrative inefficiency, where insured patients bypass systems due to waiting times, highlights that coverage does not guarantee effective utilization [4].

The absence of included studies from Malaysia and Singapore does not reflect a gap in cost-containment policy implementation, but rather a fundamental divergence in health financing architecture. Singapore relies on mandatory individual medical savings accounts (Medisave) complemented by catastrophic insurance (MediShield Life), where cost-containment functions primarily through individual account management rather than collective third-party purchasing. Meanwhile, Malaysia operates a predominantly tax-funded public system with fragmented employment-based components, lacking a unified, mandatory NHI framework comparable to Thailand's UCS or Indonesia's JKN. Neither aligns with the mandatory risk-pooling National Health Insurance frameworks that define this review's scope. Consequently, the synthesized evidence on supply- and demand-side instruments is most directly generalizable

to countries with established mandatory NHI schemes (Thailand, Indonesia, Philippines, Vietnam, Lao PDR). For health systems operating under alternative financing logics or those with limited peer-reviewed empirical evaluations within formal NHI frameworks, the transferability of these findings requires careful contextual adaptation. Future comparative research should explicitly evaluate how cost-containment mechanisms perform across divergent financing architectures to inform cross-country policy learning.

4.1. Temporal evolution and contextual calibration of cost-containment strategies

Cost-containment instruments in Southeast Asian NHI schemes are not static technical fixes but adaptive mechanisms that evolve through iterative policy learning, fiscal feedback, and shifting epidemiological burdens. Evidence across the included studies reveals distinct evolutionary trajectories shaped by institutional capacity and health system maturity. Thailand's UCS has undergone multiple refinements since its 2002 launch: capitation rates were progressively adjusted for age and morbidity, DRG weights were revised, and the National Health Security Office's purchasing autonomy was strengthened over time [28]. Indonesia's JKN, initiated in 2014, introduced performance-based capitation (KBK) only in 2023—nine years after launch—reflecting a policy response to persistently low primary care contact rates and unnecessary referrals [12]. Vietnam's Circular 35/50, issued in 2016 and amended as Circular 50/2017, aimed to tighten conditional reimbursement, but its unintended consequences—increased out-of-pocket payments and workforce barriers at lower-level facilities—emerged only after several years of operation [16]. The Philippines' PhilHealth transitioned from case-based rates to piloting pay-for-performance schemes, with evidence showing that P4P improved child health outcomes and reduced out-of-pocket payments [13,31]. Laos' NHI, established in 2016, introduced flat-rate copayments and has since been evaluated for its impact on catastrophic costs for chronic diseases, though policy refinements remain ongoing [32,35].

These trajectories underscore that cost-containment measures are not static technical fixes but adaptive responses that evolve through iterative policy learning and fiscal feedback. Evidence suggests that supply-side payment reforms rarely operate in isolation; they interact dynamically with demand-side controls (e.g., gatekeeping and benefit package design) to create synergistic effects or, if misaligned, unintended consequences such as cost-shifting. Consequently, cross-country policy learning must move beyond identifying a "best instrument" toward understanding how to calibrate policy mixes according to governance maturity. Mature systems (e.g., Thailand) leverage integrated purchasing and robust audit capacities to optimize efficiency, whereas emerging systems (e.g., Vietnam, Lao PDR) often face implementation gaps where financial incentives cannot compensate for structural capacity constraints. Recognizing these contextual developments prevents the misinterpretation of early-stage adaptation as policy failure and highlights that sustainable UHC requires continuous calibration rather than one-off technical design [5,17].

4.2. Integrating supply and demand for UHC: A regional synthesis

The fragmented analysis of supply- and demand-side instruments across studies obscures a critical reality: UHC outcomes are not driven by isolated mechanisms, but by their policy configuration. Our synthesis reveals that achieving all five UHC domains simultaneously requires deliberate alignment between financial risk allocation (supply-side) and utilization modulation (demand-side). When supply-side controls (e.g., capitation, DRGs, global budgets) are decoupled from demand-side safeguards (e.g., comprehensive benefit packages, targeted subsidies, quality-linked gatekeeping), predictable trade-offs emerge. Strict cost-containment without equity protections triggers regressive out-of-pocket burdens and care avoidance, particularly among rural and chronically ill populations. Conversely, demand-side expansion without supply-side capacity building induces overutilization, administrative bottlenecks, and quality dilution.

Successful approaches—exemplified by Thailand's UCS—combine supply-side payment reforms (capitation, DRG with global budget, central procurement) with demand-side protections (zero copayment, gatekeeping, comprehensive benefit packages). This synergy simultaneously advances financial protection (OOP reduced from 33% to 18% of total health expenditure; catastrophic health expenditure declined to 2.8-3.8%), access (pro-poor utilization), equity (poorest quintile receives 27-30% of subsidies), and efficiency (3.8-fold lower per capita expenditure than passive schemes) [2,10,28].

Conversely, fragmented implementation triggers adverse consequences. Vietnam's Circular 35/50—implemented without adequate supply-side capacity—resulted in OOP-to-reimbursement ratios up to 3.57:1, workforce barriers at lower-level facilities, and reduced trust in the system [16]. Indonesia's JKN, despite reducing OOP by 39% for the poorest households, experienced a 26% aggregate population-level OOP increase due to induced demand and informal payments [3,4]. The Philippines' PhilHealth, transitioning from case-based rates to P4P trials, reduced OOP by 21-

24% but benefit ceilings and cost-sharing remain barriers for the poor [13,31]. Laos' NHI reduced some OOP burdens but left rural patients facing catastrophic transport costs (3.8-fold higher risk outside provincial capitals) [32,35].

The region's path toward sustainable UHC therefore demands a phased, integrated strategic purchasing framework. Optimal configurations prioritize: (1) supply-side payment reforms tied to explicit quality and equity metrics rather than volume alone; (2) demand-side designs that eliminate point-of-service financial barriers for essential and chronic care while preserving gatekeeping functionality through primary care investment; and (3) dynamic benefit package adjustments informed by health technology assessment and real-world utilization data. Failure to integrate these components risks systemic consequences: cost-shifting to patients, provider-induced demand or rationing, geographic subsidy concentration, and erosion of public trust in NHI schemes. For emerging and transitioning NHI systems (Indonesia, Philippines, Vietnam, Lao PDR), the priority is not instrument selection, but sequencing: establishing data infrastructure, purchaser autonomy, and primary care readiness before scaling complex payment reforms [5,40,42,43].

4.3. Governance maturity as the critical moderator of policy effectiveness

The divergent policy outcomes across Southeast Asia cannot be attributed to technical instrument design alone; they are fundamentally moderated by institutional context and governance maturity. Drawing on the WHO health systems governance framework and recent regional evidence, we identify five maturity indicators that determine whether cost-containment strategies advance or undermine UHC goals: (1) strategic purchaser autonomy and accountability, (2) health technology assessment and medical audit capacity, (3) data interoperability and real-time claims monitoring, (4) flexibility in benefit package design and price negotiation, and (5) multi-stakeholder coordination across public, private, and civil society actors [42–44].

Thailand's UCS exemplifies mature governance: the National Health Security Office (NHSO) operates with statutory purchasing autonomy, rigorous DRG/capitation audit systems, centralized drug procurement (achieving 25% savings on medicine prices), and transparent benefit incidence monitoring. This institutional architecture enabled the translation of technical payment mechanisms into pro-poor equity and systemic efficiency [2,28].

In contrast, Indonesia's JKN operates under fragmented purchasing arrangements where BPJS Kesehatan lacks similar administrative capacity, resulting in geographic inequity (67% of spending in Java-Bali despite 57% of population), delayed claims payments, and provider dissatisfaction that undermines cost-containment effectiveness [4,29]. Vietnam's SHI suffers from weak inter-agency coordination between the Ministry of Health and Vietnam Social Security, limited audit enforcement, and rigid benefit categorization; without functional medical review, DRG and capitation implementations trigger upcoding and supply-induced demand [16]. The Philippines' PhilHealth, despite achieving high population coverage, struggles with benefit ceilings, quality gaps, and decentralization challenges that limit the impact of pay-for-performance pilots [13,31]. Lao PDR's NHI, heavily donor-dependent, faces limited fiscal space and lacks autonomous purchasing capacity, rendering it vulnerable to supply-side constraints [32,40].

These patterns confirm that governance maturity acts as a threshold condition. Technical instruments are necessary but insufficient; without institutional capacity to monitor provider behavior, negotiate prices, adjust capitation/DRG weights, and enforce formulary compliance, cost-containment policies default to blunt austerity. For lower-middle-income settings, premature adoption of complex payment models without parallel investments in stewardship, data systems, and workforce capacity will likely reproduce the unintended consequences documented in this review. Sustainable UHC expansion therefore requires governance-first sequencing: strengthening purchaser autonomy, embedding quality-equity metrics into payment contracts, and institutionalizing continuous policy calibration before scaling advanced financing instruments [45,46].

4.4. Policy implication

Evidence yields seven priority recommendations for Southeast Asian policymakers. First, strengthen institutional capacity for strategic purchasing by investing in health technology assessment and audit systems before introducing complex payment reforms [2,12,28]. Second, design benefit packages to cover indirect costs, incorporating transport subsidies for rural and chronic care patients [8,32]. Third, ensure gatekeeping effectiveness through primary care quality improvements rather than administrative rules alone [2]. Fourth, embed active equity monitoring into routine governance via benefit incidence analysis stratified by wealth and region [29]. Fifth, integrate pharmaceutical management into strategic purchasing through centralized price negotiation [2,16]. Sixth, incorporate quality metrics into cost-containment evaluations to prevent undetected trade-offs [13,31]. Finally, strengthen regional collaboration to harmonize

measurement and share implementation experience across ASEAN [17,40].

4.5. Limitation

This review has several limitations. First, restriction to English-language publications may exclude relevant evidence in local languages, introducing potential language bias. Second, heterogeneity in outcome definitions and measurement approaches across studies precluded formal meta-analysis. Third, the predominance of observational designs constrains causal inference; although quasi-experimental studies strengthen validity, unmeasured confounding cannot be ruled out. Fourth, potential publication bias may overestimate instrument effectiveness, as studies with null findings are less likely to be published.

Fifth, geographic coverage is uneven. No empirical studies from Brunei, Cambodia, Malaysia, Myanmar, Singapore, or Timor-Leste met our inclusion criteria. This absence reflects structural differences in health financing models rather than search omission: Singapore operates a mandatory medical savings account system (Medisave/MediShield Life) that differs fundamentally from risk-pooling NHI frameworks; Malaysia's system is primarily tax-funded with employment-based components lacking a unified mandatory NHI scheme. For Brunei, Cambodia, Myanmar, and Timor-Leste, no peer-reviewed empirical evaluations of cost-containment instruments within formal NHI schemes were identified; relevant implementation data likely reside in grey literature or national policy documents not indexed in Scopus/PubMed. Future reviews incorporating regional databases (e.g., ASEAN Citation Index) and government technical reports may address this evidence gap.

Sixth, evidence on quality outcomes remains extremely limited, with only seven studies reporting quality-related measures. Seventh, reliance on administrative claims data introduces potential coding errors. Eighth, database coverage exhibited expected complementarity but reflects indexing concentration: only 8 records (3.7% of unique hits) were exclusive to PubMed, while 66 (30.3%) were exclusive to Scopus. The substantial overlap (66.0%) between the two databases confirms a robust core of health policy literature indexed by both sources, while the higher number of Scopus-unique records highlights the value of including a multidisciplinary database to capture a broader range of policy and health economics studies not indexed in PubMed. This pattern is consistent with established guidance on search strategy design for complex health system topics [20]. Future reviews may incorporate additional multidisciplinary or regional indices to capture locally published evaluations.

Ninth, while our synthesis highlights policy trajectories, the predominance of cross-sectional designs (n=13, 61.9%) limits longitudinal causal inference. Claims of iterative adaptation are derived from policy document analysis and quasi-experimental subsets; future research should employ interrupted time-series or panel data to capture dynamic policy impacts.

5. CONCLUSIONS

Cost-containment effectiveness hinges on design, context, and coherent governance rather than technical design alone. Thailand's UCS exemplifies successful strategic purchasing, achieving cost containment, access improvement, and pro-poor equity through integrated instruments. Its expenditure advantage over passive schemes confirms institutional capacity is decisive. Conversely, isolated instruments backfired in Vietnam and Indonesia, reinforcing that reforms must embed within broader health system strengthening. Challenges persist: financial gains offset by induced utilization, geographic and gender inequities, and under-researched quality outcomes. Achieving UHC 2030 in Southeast Asia demands sustainability, equity, and quality. Success requires context-sensitive design, sustained commitment, and integrated frameworks that contain costs without compromising UHC goals. Policymakers must prioritize institutional investment, comprehensive benefit packages, quality primary care, active equity monitoring, and integrated pharmaceutical management to safeguard UHC sustainability.

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Author contribution

Nila Vidila Utami contributed to conceptualization, data curation, formal analysis, investigation, methodology, visualization, writing the original draft, and review and editing of the manuscript. Dwi Endarti contributed to conceptualization, formal analysis, methodology, resources, supervision, validation, and review and editing of the manuscript. Susi Ari Kristina contributed to conceptualization, formal analysis, methodology, resources, supervision, validation, and review and editing of the manuscript. All authors have read and approved the final version of the manuscript.

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Supplemental Material

This document contains:

1. Full search strategies (Scopus and PubMed)
2. Data extraction matrix of included studies
3. MMAT quality appraisal results
4. List of Domains and Keywords for The Search

Part 1 – Full Search Strategy

Supplementary material relating to systematic literature review and quality assessment

SEARCH 1

Database Scopus

Date of search: December 2025

Search string – Supply-side instruments:

(TITLE-ABS-KEY ("national health insurance" OR "social health insurance" OR "universal health coverage" OR "health financing") AND TITLE-ABS-KEY ("Southeast Asia" OR "Brunei" OR "Myanmar" OR "Cambodia" OR "Indonesia" OR "Laos" OR "Malaysia" OR "Philippines" OR "Singapore" OR "Thailand" OR "Timor-Leste" OR "Vietnam") AND TITLE-ABS-KEY ("capitation" OR "diagnosis related group" OR "DRG" OR "prospective payment" OR "pay for performance" OR "P4P" OR "provider payment" OR "performance based financing" OR "case based payment"))

Results: 39

Search string – Demand-side instruments:

(TITLE-ABS-KEY ("national health insurance" OR "social health insurance" OR "universal health coverage" OR "health financing") AND TITLE-ABS-KEY ("Southeast Asia" OR "Brunei" OR "Myanmar" OR "Cambodia" OR "Indonesia" OR "Laos" OR "Malaysia" OR "Philippines" OR "Singapore" OR "Thailand" OR "Timor-Leste" OR "Vietnam") AND TITLE-ABS-KEY ("copayment" OR "co-payment" OR "deductible" OR "coinsurance" OR "gatekeeping" OR "referral system" OR "primary care gatekeeper" OR "user fee" OR "out of pocket" OR "cost sharing"))

Results: 171

SEARCH 2

Database PubMed

Date of search: December 2025

Search string – Supply-side instruments:

(("national health insurance"[tiab] OR "social health insurance"[tiab] OR "universal health coverage"[tiab] OR "health financing"[tiab] OR "Universal Health Coverage"[Mesh] OR "National Health Programs"[Mesh]) AND ("Indonesia"[tiab] OR "Thailand"[tiab] OR "Philippines"[tiab] OR "Vietnam"[tiab] OR "Malaysia"[tiab] OR "Cambodia"[tiab] OR "Laos"[tiab] OR "Myanmar"[tiab] OR "Timor Leste"[tiab] OR "Singapore"[tiab] OR "Brunei"[tiab]) AND ("capitation"[tiab] OR "diagnosis related group"[tiab] OR "DRG"[tiab] OR "prospective payment"[tiab] OR "pay for performance"[tiab] OR "P4P"[tiab] OR "provider payment"[tiab] OR "Capitation Fee"[Mesh] OR "Diagnosis-Related Groups"[Mesh] OR "Cost Control"[Mesh]))

Results: 27

Search string – Demand-side instruments:

(("national health insurance"[tiab] OR "social health insurance"[tiab] OR "universal health coverage"[tiab] OR "health financing"[tiab] OR "Universal Health Coverage"[Mesh] OR "National Health Programs"[Mesh]) AND ("Indonesia"[tiab] OR "Thailand"[tiab] OR "Philippines"[tiab] OR "Vietnam"[tiab] OR "Malaysia"[tiab] OR "Cambodia"[tiab] OR "Laos"[tiab] OR "Myanmar"[tiab] OR "Timor Leste"[tiab] OR "Singapore"[tiab] OR "Brunei"[tiab]) AND ("copayment"[tiab] OR "co-payment"[tiab] OR "deductible"[tiab] OR "coinsurance"[tiab] OR "gatekeeping"[tiab] OR "referral system"[tiab] OR "primary care gatekeeper"[tiab] OR "user fee"[tiab] OR "cost sharing"[tiab] OR "out of pocket"[tiab] OR "Cost Sharing"[Mesh] OR "User Fees"[Mesh] OR "Cost Control"[Mesh]))

Results: 125

SUMMARY OF SEARCH RESULTS:

Database	Search component	Results
Scopus	Supply-side	39
Scopus	Demand-side	171
PubMed	Supply-side	27
PubMed	Demand-side	125
Total		**362**
Duplicates removed		144
Records after duplicate removal		**218**

Database Complementarity & Unique Hit Distribution:

Following standard deduplication procedures, 218 unique records remained. Of these, 66 records (30.3%) were exclusive to Scopus, 8 records (3.7%) were exclusive to PubMed, and 144 records (66.0%) were indexed in both databases. This distribution reflects the complementary coverage of biomedical (PubMed) and multidisciplinary health policy/economics (Scopus) literature, supporting the decision to search both databases.

Notes on search strategy:

- The search was intentionally constructed without a comparator (C) component to maximize sensitivity, as recommended in systematic review methodology. Comparator information was assessed during full-text screening and data extraction.
- Boolean operators: OR was used to combine synonyms within each conceptual domain; AND was used to combine the Population, Intervention, and Outcome domains.
- Truncation (*) was not applied as the keywords were sufficiently comprehensive.
- MeSH terms were utilized in PubMed searches to enhance accuracy and comprehensiveness.
- The search was restricted to English language publications; no date restrictions were applied to ensure comprehensive historical and contemporary coverage.

Part 2 – Data Extraction Matrix

Table S1. Characteristics of included studies

No.	Author, year	Country	NHI Scheme	Study aim	Study design	Population	Intervention (Instruments)	Comparator	Outcome measures	Key findings (UHC outcomes)
1	Limwattananon et al., 2012	Thailand	Universal Coverage Scheme (UCS)	Assess magnitude and trend of government health budget benefting poor vs. rich UCS members.	Benefit incidence analysis using nationally representative household surveys (Health and Welfare Surveys, 2003-2009).	47 million UCS members (75% of population) who were neither private sector employees nor government employees, grouped into five wealth quintiles.	**Supply-side:** District health system network with capitation payment; comprehensive benefit package; zero copayment at point of service. **Demand-side:** Universal coverage with no copayment.	Comparison across wealth quintiles within UCS members.	• Government subsidy distribution by wealth quintile for OP and IP services. • Utilization rates by wealth quintile. • Out-of-pocket payments.	**Financial Protection**: Out-of-pocket payment reduced from 33% (2001) to 18% (2008); copayment for IP reduced from 3% (2003-2006) to <2% (2007-2009). **Access**: Poorest quintile received 27-30% of subsidies vs. 23-24% population share; richest quintile received 6-11% vs. 12-13% population share. **Equity:** Consistently pro-poor pattern for both OP and IP services across all years.
2	Tobe et al., 2013	Philippines	National Health Insurance Program (NHIP)	Quantify extent of out-of-pocket expenses for inpatient care among NHIP beneficiaries and examine characteristics of beneficiaries making these payments.	Analysis of insurance claims data (94,531 claims from January 2007 to December 2009).	NHIP beneficiaries in Baguio city and Benguet province: formally employed members (56%), sponsored indigent members (8%), individually-paying/overseas worker members (28%), lifetime members (8%).	**Supply-side**: Fee-for-service payment up to fixed benefit ceilings based on disease severity and hospital level. **Demand-side**: Social health insurance with partial tax-based subsidy.	Comparison across membership types and hospital ownership/levels.	• Out-of-pocket payment amounts and frequency. • Support value per claim. • Catastrophic health expenditure (>10% annual household income).	**Financial Protection**: 86% of claims involved out-of-pocket payments; median PHP 3,016 (US$67); 13% had catastrophic payments >PHP 19,213 (US$428, equivalent to 10% average annual household income). **Access:** Sponsored indigent members used lower-level public hospitals more (17% primary, 13% secondary) vs. all beneficiaries; only 14% used tertiary private hospitals vs. 45% for all beneficiaries. **Equity**: Poorest had lowest out-of-pocket costs but primarily due to using lower-quality public hospitals, not true financial protection.
3	Tangcharoensathien et al., 2015	Thailand	Universal Coverage Scheme (UCS) managed by National Health Security Office (NHSO)	Synthesize strategic purchasing experiences in NHSO contributing to achieving UHC goals.	Document review of NHSO archives, published literature, and administrative data.	48 million UCS beneficiaries (75% of population).	**Supply-side**: Age-adjusted capitation for OP/prevention to District Health System networks; DRG with global budget for IP; monopsonistic purchasing for medicines/supplies; central procurement. **Demand-side**: Comprehensive benefit package; registration with provider network; gate-keeping function.	Comparison with Civil Servant Medical Benefit Scheme (CSMBS) which uses fee-for-service.	• Catastrophic health spending incidence. • Cost per capita. • Cost savings from negotiation. • Utilization patterns.	**Financial Protection**: Catastrophic health expenditure declined from 6-7% (pre-2002) to 2.8-3.8% (2002-2009); comprehensive benefit package with low catastrophic spending. **Access**: Pro-poor utilization due to geographical proximity of District Health System; gate-keeping promoted appropriate referrals. **Equity:** District health system achieved pro-poor access with minimal travel costs. **Efficiency:** Cost savings up to US$188 million from monopsonistic purchasing power.
4	Suriyawongpaisal et al., 2016	Thailand	Universal Health Coverage Scheme (UCS), Social Security Scheme (SSS), Civil Servant Medical Benefit Scheme (CSMBS)	Document prevalence of copayment under unified EMS policy and identify main drivers of copayments.	Mixed-methods: administrative dataset analysis (43,588 patient records), telephone survey (128 users), in-depth interviews, documentary review.	Patients using emergency medical services at 225 private hospitals (April 2012-December 2013).	**Supply-side:** Unified EMS policy with fee schedule for ED visits (up to 1,000 Baht) and DRG for hospitalization (10,500 Baht/admission) to private hospitals. **Demand-side**: Policy proclaiming free access and payment for emergency care.	Comparison across three insurance schemes (UCS, SSS, CSMBS).	• Copayment prevalence and amounts. • Paid-charge ratios. • Health outcomes at discharge by insurance type.	**Financial Protection**: Despite free-access policy, hospitals requested copayment from 40-80% of total charges for substantial proportion of patients. **Access:** CSMBS beneficiaries constituted 59.8% of inpatient claims despite being only 9% of total beneficiaries. **Equity**: UCS and SSS beneficiaries had 1.7-2.1 times higher likelihood of not-improved status and 1.2-1.9 times higher mortality at discharge vs. CSMBS beneficiaries.

5	Peabody et al., 2017	Philippines	Philippine Health Insurance Corporation (PhilHealth)	Compare impact and cost-effectiveness of universal health coverage vs. pay-for-performance on childhood wasting.	Randomized controlled trial across 30 districts with baseline (2003) and follow-up (2007) data collection.	Children under 5 years: 1,011 control, 985 UHC sites, 992 P4P sites at baseline; 1,031 control, 1,042 UHC, 1,036 P4P at follow-up.	**Demand-side (UHC):** Universal insurance enrollment through policy navigators; raised benefit ceilings for children ≤5 years; cost US$4.08 per capita. **Supply-side (P4P):** Quality-based bonuses (70% clinical quality, 20% patient satisfaction, 10% workload); cost US$1.98 per capita.	Three-arm comparison: UHC vs. P4P vs. control (standard policy).	• DALYs averted from wasting. • Cost per DALY averted. • Wasting reduction. • Insurance utilization rates.	**Financial Protection**: Both interventions reduced wasting (9-12% for UHC, 9.25% for P4P). **Access**: UHC impact limited to 32% who utilized insurance; P4P affected 100% of patients regardless of insurance status. **Equity**: UHC targeted indigent households through enrollment support. **Cost-effectiveness:** P4P yielded 1.52 DALYs averted per US$ vs. 0.50 for UHC; similar DALYs per dollar (1.56 UHC, 1.58 P4P) but P4P had broader impact.
6	Johns et al., 2017	Vietnam	Social Health Insurance (SHI)	Assess out-of-pocket payments and catastrophic health expenditures among ART patients; model catastrophic payments under different copayment scenarios when financing transitions to SHI.	Cross-sectional facility-based survey at 42 health facilities representative of 87% of ART patients in 2015.	843 ART patients; ~32% eligible for SHI without copayments.	**Demand-side**: SHI with 20% copayment requirement (government pays premium/copayments for poor, elderly, minorities); current donor/government funding provides free ARVs. **Supply-side**: Not specified.	Modeled scenarios: current free ART vs. 20% copayment vs. full cost payment for uninsured.	• Out-of-pocket payments per person per year. • Catastrophic payment rates (>40% non-subsistence expenditure). • Catastrophic payments under different copayment scenarios.	**Financial Protection**: Current: ~$66/year total health expenditure, ~$15 for HIV services; 4.9% catastrophic payment rate overall, 2.5% for HIV services. **Modeled scenarios**: 20% copayment for ART would increase catastrophic rate to 8%; full cost for uninsured would increase to 24% (41% among uninsured only). **Equity**: Patients below poverty line had 9.0% catastrophic payment rate vs. 2.6% above poverty line.
7	Wagner et al., 2018	Philippines	Philippine Health Insurance Corporation (PhilHealth)	Explore whether health insurance coverage or improved quality protects better against out-of-pocket payments.	Randomized policy experiment with baseline (2003/04) and follow-up (2007/08) data; linear fixed effects model.	3,121 child-patient observations across 30 hospitals hospitalized for pneumonia/diarrhea.	**Demand-side (Access/Intervention A):** Increased PhilHealth enrollment through policy navigators; automatic classification as 'intensive' cases; premium subsidies for indigent. **Supply-side (Bonus/Intervention B):** Quality monitoring via clinical vignettes; bonuses based on 70% quality, 10% caseload, 20% patient satisfaction.	Three-arm comparison: Intervention A vs. Intervention B vs. control.	• Out-of-pocket payments (inside vs. outside hospital). • Total household health expenditures. • Disease prevention spending (hygiene, water, sanitation).	**Financial Protection**: Intervention A reduced out-of-pocket payments by 558 pesos ($12.7, 21% decline); Intervention B by 638 pesos ($14.5, 24% decline); both similarly effective (p=0.797). **Access:** Reductions driven by lower expenditures outside hospital; spending inside hospital not significantly affected. **Equity:** Overall household health expenditures lower in intervention sites. **Spillover effects**: Increased spending on personal hygiene by $0.9 (A) and $0.6 (B), representing 40-60% increase.
8	Suriyawongpaisal et al., 2018	Thailand	Universal Coverage for Emergency Patients (UCEP); three schemes: UCS, SSS, CSMBS	Assess whether 2017 strategic policies closed equity gap of access to private hospital emergency departments.	Analysis of administrative dataset (20,206 patients, April-October 2017) with logistic regression.	Patients requesting preauthorization for emergency care at private hospital EDs; adjusted for age, access mode, vital signs.	**Supply-side:** Fee-schedule payment to private hospitals through negotiation. **Demand-side**: Legal requirement for free first 72 hours of ED services; preauthorization system for critical conditions. **Regulatory**: Legal enforcement with complaint system and case-by-case investigation.	Comparison with 2012 policy implementation where CSMBS had 59.8% of ED visits despite being 8.6% of beneficiaries.	• ED visit payer mix by insurance type. • Preauthorization approval rates. • Gender distribution of authorized vs. unauthorized patient	**Access**: Reversed payer mix—UCS (most disadvantaged) now had ~60% of ED visits vs. CSMBS previously having 59.8%. **Equity**: Successfully closed equity gap; UCS members (largest, most disadvantaged group) gained majority access. **Gender disparity:** Higher proportion of males authorized for emergency care, suggesting possible delay in care-seeking among critical female patients.

9	Patcharanarumol et al., 2018	Thailand	Universal Coverage Scheme (UCS) vs. Civil Servant Medical Benefit Scheme (CSMBS)	Compare strategic purchasing practices of UCS and CSMBS; identify factors contributing to successful UHC outcomes.	Cross-sectional mixed-methods: document review and interviews with 56 key informants (13 senior managers, 18 hospital managers, 25 beneficiaries).	UCS: 48 million (75% population); CSMBS: 5 million (8% population, civil servants/pensioners/ dependents).	**UCS Supply-side**: Age-adjusted capitation for OP; DRG with global budget for IP; single base rate for all hospitals; central procurement; gate-keeping via District Health System. **CSMBS Supply-side**: Fee-for-service for OP; DRG without global budget for IP; multiple base rates; no gate-keeping; atomized hospital procurement. **Demand-side**: UCS requires registration with provider network; CSMBS allows free choice of public hospitals.	Direct comparison between UCS and CSMBS purchasing functions.	• Expenditure per capita. • Cost savings from central procurement. • Catastrophic health spending. • Equitable access and unmet need.	**Efficiency**: CSMBS expenditure US$366 per capita (2011) vs. UCS US$97—3.8 times higher; central procurement by UCS saved ~25% on high-cost medicines. **Financial Protection:** UCS achieved low catastrophic spending and financial risk protection; CSMBS had limited performance. **Equity**: UCS members: 50% from poorest/poor quintiles; CSMBS: 51.5% from richest quintile, mostly urban. **Access**: UCS gate-keeping promoted appropriate utilization; CSMBS lacked gate-keeping, direct specialist access. **Institutional capacity**: NHSO had 820 staff (1/3 health background); CGD had 32 staff with no health background managing CSMBS as one of 16 mandates.
10	Bodhisane & Pongpanich, 2019	Lao People's Democratic Republic	National Health Insurance (NHI), replacing Community-Based Health Insurance (CBHI)	Assess effectiveness of NHI in providing accessibility and financial protection from catastrophic health expenditure compared to preceding CBHI.	Cross-sectional study (September-November 2018) using structured questionnaires; comparison with previous CBHI studies (2013, 2016) using Andersen Behavioral Model.	342 households equally divided between Savannakhet Provincial Hospital and Champhone District Hospital; heads of household as representatives.	**Demand-side**: Flat copayment at point of service: 5,000-15,000 LAK ($0.60-$1.80) for OPD depending on facility level; 30,000 LAK ($3.60) for IPD; 25% copayment for costs >5 million LAK ($600); no monthly/annual premiums. **Supply-side:** Not specified	Comparison with previous CBHI scheme (voluntary enrollment with premiums) from 2013 and 2016 studies.	• Hospital admission rates (accessibility). • Catastrophic health expenditure (>40% of income). • Probability of financial catastrophe by income level and chronic conditions.	**Access**: Married respondents (OR 3.610), large households (OR 5.128), and low-income households (1.937 times higher vs. medium-income) had significantly higher hospital admission rates; NHI significantly improved accessibility for poorest income quantile. **Financial Protection:** Under NHI, only chronic condition presence (OR 8.695) significantly predicted catastrophic expenditure, not income level—indicating equity in financial protection; improved vs. CBHI where income level was significant predictor. **Equity**: NHI removed need for poor to pay monthly/annual contributions, enhancing access for poorest households.
11	Sambodo et al., 2021	Indonesia	Jaminan Kesehatan Nasional (JKN)	To assess the benefit incidence of healthcare funding in the JKN era and its distribution by socio-economic status considering regional variation in unit costs; evaluate whether benefit incidence is skewed towards urban and wealthier households; investigate whether standard BIA	Benefit Incidence Analysis (BIA) combining cross-sectional survey data with administrative claims data, 2015-2017.	National population represented in Susenas survey: 1,097,719 individuals (2015), 1,109,749 (2016), 1,132,749 (2017); combined with BPJS-Kesehatan administrative data for 466 of 514 districts.	**Supply-side**: JKN provider payment system including prospective payments (InaCBGs) for secondary care and capitation-based payments for primary care; regional variation in unit costs reflecting healthcare supply and treatment intensity.	Standard BIA using constant national unit costs vs. district-specific unit costs; comparisons across wealth quintiles, urban/rural, and geographic regions (Java/Bali vs. other islands).	• Access/Utilization: Hospital inpatient/outpatient contact rates, primary care contact rates per 100 individuals. • Financial Protection: Benefit incidence shares of healthcare spending by quintile. • Equity: Concentration indices, distribution by wealth quintile, urban/rural, geographic location.	**Access**: Hospital utilization highly skewed toward wealthier groups (richest quintile hospital inpatient contact rate 3x poorest; outpatient 4x); primary care showed more equal distribution **Financial Protection**: Benefit incidence favors wealthier groups—richest quintile received 37% of inpatient spending, 43% of outpatient hospital spending (2017) vs. poorest 10% and 8% respectively. **Equity**: Urban dwellers and Java/Bali residents enjoy greater healthcare benefits than rural areas and other islands (Java/Bali 67% of spending with 57% population); standard BIA underestimates inequality—concentration index 0.178 (national unit costs) vs. 0.211 (district-specific); JKN maintained but did not exacerbate initial disparities over time (2015-2017)

				using national unit costs underestimates regional disparities; examine whether JKN provider payment system exacerbates regional inequalities.						
12	Ha et al., 2021	Vietnam	Social Health Insurance (SHI)	To analyze the implementation results of Circular No. 35/2016/TT-BYT (and its amendment Circular No. 50/2017/TT-BYT) from an economical perspective and to identify implementation challenges. The initial goal of Circular 35/50 was to control reimbursement expenditure for expensive and overused medical services and improve healthcare quality to ensure efficient use of the SHI fund.	A mixed-methods approach was employed, combining desk study, quantitative, and qualitative components. Quantitative Component: Used to understand policy implementation results. Qualitative Component: Used to summarize challenges through interviews and discussions.	Quantitative: 100 medical services with the highest requested reimbursement amount in 2018 nationwide, collected from the Vietnam Social Security (VSS) and 6 provincial Social Security Offices (SSO). Also, data from 146 hospitals in 49/63 provinces via questionnaire. Qualitative: Key informants experienced in developing and implementing Circular 35/50 at central and provincial levels. This included 2 in-depth interviews (IDIs) with Ministry of Health (MOH) staff and 6 focus group discussions (FGDs) with provincial social security offices and Departments of Health (DOH). Additionally, 23 FGDs and 31 IDIs were conducted with key informants from 23 selected hospitals.	Circular No. 35/2016/TT-BYT (and Circular No. 50/2017/TT-BYT) which promulgates a list of conditional reimbursed and non-reimbursed medical services. These circulars categorize services into: Category 1 (15 expensive medical services with detailed reimbursement conditions), Category 2 (109 medical services with detailed reimbursement conditions), and Category 3 (16 non-covered medical services).	The study implicitly compares the current implementation of Circular 35/50 against its stated goals of mitigating the use of high-technology services and controlling reimbursement expenditure, as well as against the broader policy environment and other existing policy documents	• Economical perspective: Reimbursement amounts for medical services, proportion of reimbursement requested for different categories of services, and out-of-pocket (OOP) payments by patients. • Implementation challenges: Analyzed using the World Health Organization's 6 building blocks of health system, focusing on governance, service delivery, health workforce, and health information system.	**Ineffective in mitigating high-technology service reimbursement:** Circular 35/50 has not effectively mitigated the reimbursement of high-technology and expensive services in higher-level providers. **Increased Out-of-Pocket (OOP) Payments:** There is an increasing trend of OOP payments for regulated services, particularly for Category 1 and 2 services in higher-level hospitals. For every VND 1 reimbursed, patients paid OOP of VND 1.37 in one provincial hospital, with rates as high as VND 2.15 and VND 3.57 for Category 1 and 2 services respectively. **Greater influence on lower-level providers:** The circular has a greater impact on lower-level providers (e.g., commune healthcare centers) in terms of the total reimbursement amount requested, rather than on higher-level hospitals. **Challenges for lower-level facilities:** The requirements of Circular 35/50 pose challenges for lower-level providers in meeting healthcare workforce qualifications and may lead to a reduction in service delivery rather than improvement. **Policy conflicts and inconsistencies:** Circular 35/50 conflicts with other policy documents due to a large number of fragmented and inconsistent regulatory documents from MOH and VSS. This study highlights that while Circular 35/50 aimed to make the Social Health Insurance benefit package more explicit and control costs, it has led to unintended consequences such as increased out-of-pocket payments and challenges for lower-level healthcare providers, indicating a need for a more coherent policy environment and improved health information systems.
13	Vu et al., 2021	Vietnam	Social Health Insurance (SHI)	To estimate out-of-pocket payments for	Cross-sectional facility-based survey, 2019.	582 ART clients aged ≥18 years across 18 ART	**Demand-side**: SHI copayment requirements (20% copayment for non-	Comparison between clients with	• Financial Protection: Out-of-pocket expenditures	**Access:** 13.4% (95% CI: 5.7%, 28.2%) of clients incurred payment for outpatient

			for ART services	ART clients and percentage incurring catastrophic payments during transition from donor funding to domestic SHI in Vietnam.		facilities in 9 provinces, representing all facilities where SHI-financed ART was implemented; 96.3% response rate.	exempt groups; free for poor, minorities, special groups); copayment threshold of 200,000 VND ($8.70).	government-paid copayments (12.2% eligible for free services) vs. those required to pay copayments; historical comparison to 2015 donor-financed period.	(OOPE) for outpatient/inpatient ART services; catastrophic health expenditure at 10%, 25%, 40% thresholds. • Access/Utilization: Percentage incurring payments for outpatient/inpatient services	ART care; 2.7% (95% CI: 0.8%, 9.1%) for HIV-related inpatient care. **Financial Protection**: Average annual OOPE: $8 for HIV-related outpatient visits, $1.6 for HIV-related inpatient admission; only 0.1% experienced HIV-related catastrophic payment at 25% threshold; 1.5% at 10% threshold; transition from donor to SHI financing not causing financial hardship; low copayment rates due to: staff reducing payments below threshold, mobilization of alternative funding sources, Global Fund still covering CD4/Viral Load tests.
14	Maulana et al., 2022	Indonesia	Jaminan Kesehatan Nasional (JKN)	To understand how JKN influences out-of-pocket payments, especially among the poor and rural, at different health facilities.	Cross-sectional analysis using national survey data, 2018-2019.	National population from SUSENAS: 266,705,582 individuals/71,280,887 households (2018); 263,666,217 individuals/69,954,912 households (2019) with sampling weights; 141,043,416 households accessing modern healthcare after exclusions.	**Demand-side**: JKN membership coverage vs. uninsured status; analyzed by facility type (public/private PHC and hospitals), wealth quintiles, geographic regions.	Comparison between JKN-insured households vs. uninsured households; also compared to private/mixed insurance holders.	Financial Protection: Probability of incurring any OOP payment; conditional OOP amount (among those who paid); unconditional OOP amount (population average).	**Financial Protection**: JKN members 34% probability of no OOP vs. 27% uninsured; JKN households pay 39% less OOP than uninsured overall; conditional effect: JKN incurs 37% less OOP than uninsured. **Equity**: Pro-poor benefit—poorest quintiles (Q1: 37%, Q2: 35%) have higher probability of no OOP vs. wealthier (Q4: 32%, Q5: 30%); middle-income (Q3) saved most (41%) compared to uninsured; poorer JKN households in eastern Indonesia (less urbanized) experienced most cost-savings, though partly due to supply constraints; JKN members save more at public PHC than private (private PHC often don't contract with JKN); save >50% at both public/private hospitals vs. uninsured.
15	Couturier et al., 2022	Indonesia	Jaminan Kesehatan Nasional (JKN)	To assess OOPE persistence, amounts, and drivers; examine factors associated with OOPE; evaluate patient experiences with JKN services.	Cross-sectional patient exit interview survey, March-May 2015 (15-17 months post-JKN launch).	2,526 JKN beneficiaries across multiple provinces and facility types; average age 44.6 years, 42% male, 58% female; 17% subsidized membership.	**Demand-side**: JKN benefit package with no explicit user fees/cost-sharing by legislation; differentiation between subsidized (poor/near-poor) vs. non-subsidized JKN members.	Subsidized vs. non-subsidized JKN members; facility types (provincial, central, local government, non-governmental); facility class (A, B, C, D); hospitalized vs. outpatient.	• Financial Protection: Probability and amount of OOPE; OOPE components (medicines most prevalent at 61%). • Patient Experience: Composite measure from 14 items (communication, privacy, respect, waiting time, cleanliness, treatment equality) scored 0-14.	**Financial Protection**: 20% of patients reported positive OOPE; mean $40 (median $15) among those with OOPE; medicines most prevalent reason (61%); subsidized members paid half as much ($24 vs. $46) but same likelihood of incurring OOPE; hospitalized patients 4x higher OOPE than outpatients ($60 vs. $16); smaller C/D facilities most likely to charge (29%) vs. largest A facilities (13%). **Patient Experience:** Mean 11.7/14 points; highest ratings: understanding providers' language (97%), communication/respect (91-95%); lowest: waiting time (54%), privacy (65%); variations by province (11.2-12.2 points) and facility type. **Equity**: Gender differential—females higher probability of OOPE but pay less; older age and higher education associated with higher OOPE.
16	Sangthawan et al., 2022	Thailand	Universal Coverage Scheme (UCS)	Evaluate financial burden and catastrophic expenditure under "PD First" policy.	Multicenter, nationwide cross-sectional study.	Patients with CKD (stages 3–5 and dialysis) from 11 centers across Thailand.	**Supply side:** "Peritoneal Dialysis (PD) First" policy under the UCS.	Not explicitly applicable (within-group comparison of CKD stages and dialysis types).	Catastrophic Health Expenditure (CHE), non-medical costs, and impoverishment rates.	**Catastrophic Health Expenditure (CHE):** While the UCS covers dialysis treatment, 14.2% of dialysis patients still experienced CHE. The primary drivers were non-medical costs (transportation, food) and loss of income.

									PD vs. HD: Hemodialysis (HD) was associated with higher CHE than Peritoneal Dialysis (PD) because HD requires frequent hospital visits, leading to higher indirect costs. **UHC Outcome**: Universal coverage is necessary but not sufficient; financial "catastrophe" remains "hidden" in the non-medical costs that insurance does not cover.
17	Bodhisane & Pongpanich, 2022	Lao PDR	National Health Insurance (NHI)	To analyze effects of Lao NHI on accessibility and likelihood of catastrophic health expenditure for chronic kidney disease (CKD) patients; provide policy recommendations for organ transplantation coverage.	Cross-sectional comparative survey, single time point.	CKD patients under NHI coverage receiving hemodialysis (HD) at Savannakhet Provincial Hospital.	**Demand-side**: NHI coverage with modified policy—unlimited HD sessions at flat rate of 30,000 LAK ($3) per session vs. standard NHI covering only 5 sessions then $55-60 OOP per session.	Comparison by income quantiles, district of residence (Kaysone Phomvihane vs. other districts), presence of additional chronic conditions.	• Access/Utilization: Likelihood of hospitalization. • Financial Protection: Catastrophic health expenditure (≥40% of non-subsistence household income); nonmedical expenditure (transportation, food).	**Access**: Only respondent age statistically significant for hospitalization; NHI increased healthcare usage similarly across all predictors except age. **Financial Protection**: NHI effectively protects households from catastrophic expenditure; lowest income quantile (<1 million LAK/$100 monthly) ~200x more likely to face catastrophic expenditure vs. wealthiest; patients from districts outside Kaysone Phomvihane 3.77x more likely to face catastrophic expenditure (due to nonmedical costs); households with additional chronic conditions ~108x more likely to incur catastrophic costs; nonmedical spending (transportation) main factor creating poverty.
18	Sambodo et al., 2023	Indonesia	Jaminan Kesehatan Nasional (JKN) - Kapitasi Berbasis Komitmen (KBK)	To evaluate effects of KBK (performance-based capitation) on three incentivized outcomes: JKN insured visits to puskesmas, chronically ill visits to puskesmas, hospital referral rate for non-specialistic conditions.	Quasi-experimental Difference-in-Differences (DID) with Coarsened Exact Matching (CEM), 2015-2016.	Stratified 1% sample of JKN household members: 817,552 enrolees across 327 districts (27 province capitals as intervention, 300 matched control districts); monthly district averages over 24 months.	**Supply-side**: KBK performance-based capitation payment system for puskesmas (primary health centers) with three performance indicators and payment tiers (excellent/sufficient thresholds); targets: contact rate >15%, chronic disease contact rate >50%, non-specialistic referral rate <5%.	Province capital districts (intervention, staggered rollout Aug 2015-May 2016) vs. matched non-capital control districts	Access/Utilization: Monthly percentage of enrolees contacting puskesmas per 100; chronic disease contact rate per 100; hospital referral rate for non-specialistic conditions per 100.	**Access**: KBK increased monthly contact percentage by 0.578 percentage points (48% increase from 1.2% baseline) but still far below 'sufficient' threshold of 15%; small increase of 1.15 percentage points for chronically ill, leaving rate far below 50% target; no statistically significant effect on non-specialist referral rates. **Overall**: KBK showed positive effects on 2/3 outcomes but effect sizes left actual rates far below program targets; reform not very successful in substituting secondary care with primary care; targets set unrealistically high given capacity constraints.
19	Arviana et al., 2024	Indonesia (Yogyakarta Special Region)	National Health Insurance (JKN)	To determine relationship between health insurance ownership and utilization of health services, out-of-pocket expenses, and catastrophic health expenditures.	Cross-sectional study using national survey data, March 2023.	13,095 household members in Yogyakarta Special Region (5 districts: Kulon Progo, Bantul, Gunungkidul, Sleman, Yogyakarta City); 40 samples excluded due to incomplete data.	Demand-side: Health insurance ownership (primarily JKN) vs. no insurance.	Household members with health insurance vs. without health insurance; analyzed by wealth quintiles.	• Access/Utilization: Inpatient visits (past year), outpatient visits (past month). • Financial Protection: Per capita OOP expenditure; catastrophic health expenditure at 10%, 25%, 40% thresholds.	**Access:** Insurance ownership associated with 2.08x (95% CI: 1.66-2.61) higher outpatient utilization and 3.20x (95% CI: 2.16-4.75) higher inpatient utilization vs. uninsured. **Financial Protection**: Insurance ownership reduces OOP by 12.27% (p=0.00); 1% increase in proportion with insurance reduces household OOP by 12.27%; significant effect on OOP (p<0.05). **Equity**: At 25% threshold, insurance ownership significantly associated with

									0.80x lower chance of catastrophic expenditure (p=0.00); no significant relationship at 10% and 40% thresholds; higher wealth quintiles incur higher OOP (Q5: 1251% increase vs. Q1).
20	Wijayati & Handayani, 2025	Indonesia	BPJS Kesehatan (JKN)	To examine impact of BPJS Kesehatan implementation as NHI on household out-of-pocket expenses.	Difference-in-Differences (DID) with Propensity Score Matching (PSM), repeated cross-sections 2013-2014 (pre) and 2019-2020 (post).	Indonesian households from National Socio-Economic Survey (Susenas); unit of analysis is households.	**Demand-side:** BPJS Kesehatan (JKN) implementation; treated group: households without insurance pre-JKN who gained non-PBI BPJS post-JKN; control group: households with insurance pre-JKN who maintained insurance post-JKN (including PBI BPJS, considered continuation of previous schemes).	Treated group (gained non-PBI BPJS Kesehatan) vs. control group (maintained insurance coverage throughout).	Financial Protection: Monthly household OOP health expenditure (medical and non-medical); hospitalization rates.	**Financial Protection**: BPJS implementation caused 26.0% increase in OOP expenses (p<0.01); increase driven by increased public health awareness and health facility visits; treated group showed increased hospitalization in 2019-2020 post-BPJS. **Regional Disparities**: OOP 8.5% higher in regions outside Java-Bali (due to fewer facilities, greater distances); rural OOP 6.81% higher than urban (contrary to some literature). **Other Insurance Effect**: Additional private/corporate insurance reduces OOP by 13% vs. BPJS-only; reasons for not using BPJS: lack of knowledge, long waiting times, inactive cards, no transportation coverage. **Overall**: Increase suggests BPJS usage not optimal; improvements needed in mechanism and system policies.
21	Nguyena & Hong, 2025	Vietnam	Social Health Insurance (SHI) - Student SHI program	To analyze impact of revised healthcare law implemented in 2014 on healthcare utilization and OOP expenditure among students aged 6-21 years.	Propensity Score Matching - Difference-in-Differences (PSM-DID), four cross-sectional waves 2012, 2014, 2016, 2018.	Students aged 6-21 years from Vietnam Household Living Standards Survey (VHLSS); four age groups: Primary, Secondary, High School, University/College.	**Demand-side:** Student SHI coverage under revised law 2014 (implemented early 2015); introduction of coinsurance for upper-level hospitals.	Treatment group: students with student health insurance who use their health card; control group: students without student insurance + students with insurance who don't use it.	• Access/Utilization: Number of outpatient/inpatient visits; proportion visiting different facility types (central, province, district, public, private). • Financial Protection: OOP expenditure (outpatient, inpatient, total) in 12 months.	**Access**: Significant negative effect on outpatient visits post-revised law (decreased 20-26% for three youngest groups; 13.3% for secondary students); no significant effect on inpatient visits. **Financial Protection**: Significant reductions in outpatient OOP across all groups: Primary (45.2%), Secondary (38.2%), High School (54.2%), University/College (66%); outpatient OOP per visit also dropped (39.8%, 31.1%, 51.5%, 66.2% respectively); **However**, inpatient OOP increased dramatically: Secondary students spent nearly double (91.6%), High School nearly triple (173%) post-law; inpatient OOP per visit jumped >2x for these groups; total OOP decreased only for oldest group (44.6%); inpatient OOP did not decrease despite coinsurance introduction—attributed to inefficient/unequal healthcare system, over-provision, informal payments, high drug prices, uncovered services, bypassing of lower-tier facilities.

Part 3 – MMAT Quality Appraisal Results

Table S2. Methodological quality assessment using MMAT (2018 version)

Author, year	Screening questions		Qualitative					Quantitative RCT					Quantitative non-randomized					Quantitative descriptive					Mixed-methods				
	S1	S2	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	3.4	3.5	4.1	4.2	4.3	4.4	4.5	5.1	5.2	5.3	5.4	5.5
Limwattananon et al., 2012	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	N/A
Tobe et al., 2013	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	C	Y	Y	Y	N/A	N/A	N/A	N/A	N/A
Tangcharoensathien et al., 2015	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	N/A
Suriyawongpaisal et al., 2016	Y	Y	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y
Peabody et al., 2017	Y	Y	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	C	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Johns et al., 2017	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Wagner et al., 2018	Y	Y	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	C	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Suriyawongpaisal et al., 2018	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Patcharanarumol et al., 2018	Y	Y	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y
Bodhisane & Pongpanich, 2019	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	C	Y	Y	Y	N/A	N/A	N/A	N/A	N/A
Sambodo et al., 2021	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ha et al., 2021	Y	Y	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y
Vu et al., 2021	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	N/A
Maulana et al., 2022	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	N/A
Couturier et al., 2022	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	C	Y	C	Y	N/A	N/A	N/A	N/A	N/A
Sangthawan et al., 2022	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	C	Y	N/A	N/A	N/A	N/A	N/A
Bodhisane & Pongpanich, 2022	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	C	Y	C	Y	N/A	N/A	N/A	N/A	N/A
Sambodo et al., 2023	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arviana et al., 2024	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	N/A
Wijayati & Handayani, 2025	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nguyena & Hong, 2025	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note:
Y = Yes (Compliant), N = No (Non-Compliant), C = Cannot tell (Evidence is Unclear), N/A = Not Applicable

Part 4 – List of Domains and Keywords for The Search

Table S3. List of Domains and Keywords for The Search

Domain	Keywords
Health Insurance System	"national health insurance", "social health insurance", "universal coverage scheme", "public health insurance"
Cost-Containment Instruments	"capitation", "diagnosis-related groups", "prospective payment", "pay for performance", "copayment", "deductible", "gatekeeping"
UHC Outcomes	"financial protection", "out-of-pocket expenditure", "catastrophic health expenditure", "access to care", "equity", "service utilization"
Geographic Context	"Southeast Asia", "Brunei Darussalam", "Lao PDR", "Timor-Leste", ASEAN, Indonesia, Thailand, Philippines, Vietnam, Malaysia, Singapore, Cambodia, Myanmar, Laos

Note: Quotation marks in this table reflect technical indexing standards for Exact Phrase Matching. They are retained for multi-word official names (e.g., "Brunei Darussalam", "Timor-Leste") to ensure search precision in Scopus and PubMed, while omitted for single-word identifiers for formatting consistency. All 11 Southeast Asian countries were included in the Boolean search strings (see Part 1).

Part 5 – List of Articles Excluded After Full-Text Reading

Table S4. Full-text articles excluded after full-text reading (n=19)

No.	Authors (year)	Title	Reason for Exclusion
1	Thein et al., 2021	Effects of a new health financing scheme on out-of-pocket health expenditure in Yangon, Myanmar	Not a mandatory national health insurance scheme; pilot program implemented by NGO at micro scale, not representative of national system.
2	Nimah et al., 2025	Explaining Indonesian Patients' Experiences About Changes in the Hemodialysis Cost System	Qualitative descriptive study; does not evaluate a specific cost-containment instrument; no quantitative measurement of OOP/CHE.
3	Chaleunvong et al., 2020	Factors associated with patient payments exceeding National Health Insurance fees and out-of-pocket payments in Lao PDR	Cross-sectional descriptive study; does not evaluate impact of specific cost-containment instrument; no before-after or comparator group.
4	Nagpal et al., 2019	Financial protection and equity of access to health services with the free maternal and child health initiative in Lao PDR	Intervention is fee exemption (not a cost-containment instrument); focus on access expansion rather than cost control.
5	Tangcharoensathien et al., 2020	Financial risk protection of Thailand's universal health coverage: Results from series of national household surveys	Descriptive trend study of aggregate outcomes; does not evaluate impact of specific cost-containment instrument; no comparator/intervention.
6	Vuong dkk., 2021	Good budget or good care: The dilemma of social health insurance in Vietnam	Cross-sectional associational study; does not evaluate specific cost-containment instrument; only analyzes factors associated with financial burden.
7	Axelson et al., 2009	Health financing for the poor produces promising short-term effects on utilization and out-of-pocket expenditure: Evidence from Vietnam	Intervention is a pro-poor financing program (HCFP), not a specific cost-containment instrument; setting is not a mandatory universal NHIS.
8	Tabuñar & Dominado, 2021	Hospitalization Expenditure of COVID-19 Patients at UP-PGH with PhilHealth Coverage	Descriptive cost study at a single hospital during pandemic; does not evaluate cost-containment instrument; descriptive design only.
9	Ensor et al., 2017	Impact of health financing policies in Cambodia: A 20 year experience	Focuses on general health financing policies (user fees, HEF, vouchers, CBHI), not specific cost-containment instruments; Cambodia did not have mandatory NHIS during study period.
10	Eichler et al., 2018	Implementation Research to Strengthen Health Care Financing Reforms Toward Universal Health Coverage in Indonesia	Implementation research, not an impact study; does not quantitatively measure UHC outcomes (OOP, CHE, access, equity).
11	Jacobs et al., 2018	Making free public healthcare attractive: Optimizing health equity funds in Cambodia	Intervention is HEF + iSHPS (complex package), not a specific cost-containment instrument; setting is not a mandatory NHIS.
12	Sparrow et al., 2013	Social health insurance for the poor: Targeting and impact of Indonesia's Askeskin programme	Askeskin is a targeted program for the poor (pre-JKN), not a universal mandatory NHIS; focus on targeting and utilization, not cost-containment.
13	Hipolitus et al., 2020	The impact of multilevel referral system in patients with peritonitis in Indonesia: A cross-sectional study	Does not measure financial protection outcomes (OOP/CHE); only clinical outcomes; single-facility cross-sectional design.
14	Utarini et al., 2025	The influence of provider payment mechanisms on TB service provider behavior in Indonesia	Measures provider behavior (case detection, treatment completion), NOT UHC outcomes (patient OOP, CHE, access, equity).
15	Handayani et al., 2021	The Regional And Referral Compliance Of Online Healthcare Systems By Indonesia National Health Insurance Agency	Measures referral compliance (implementation outcome), NOT financial protection, patient access, or equity.
16	Andree et al., 2021	The sensitivity of hospital coding to prices: evidence from Indonesia	Measures provider behavior (upcoding), NOT UHC outcomes; no patient-level OOP/CHE data.
17	Forse et al., 2023	A qualitative assessment on the acceptability of providing cash transfers and social health insurance for tuberculosis-affected families in Ho Chi Minh City, Vietnam	Intervention is cash transfer + SHI (social protection), not a cost-containment instrument; qualitative descriptive study; no quantitative OOP/CHE measurement.
18	Kasra et al., 2022	Does provider payment method improve the completeness of medical records? A study on the impact of the casemix system in Indonesia	Outcome measured is completeness of medical records (provider-level administrative outcome), NOT UHC outcomes (OOP, CHE, access, equity, quality, efficiency).
19	Khoiri et al., 2020	Disposition of Implementers on The Hospitals Payment System Change in The Indonesian National Health Insurance Era	Outcome measured is provider attitudes and perceived financial pressure (provider-level outcomes), NOT patient-level UHC outcomes.