

REVIEW ARTICLE

Capitation Payment Schemes for Primary Health Care in Low- and Middle-Income Countries: A Scoping Review

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ABSTRACT

Objectives: This study aimed to examine the implementation and evaluation of capitation payment schemes in primary health care (PHC) across low- and middle-income countries (LMICs). In particular, it focused on how these schemes are being implemented in real-world settings where data in LMICs are limited. The study also aimed to identify challenges in implementation and assess the contextual factors that influence the sustainability of capitation-based health financing strategies.

Materials and Methods: A scoping review was conducted using the PRISMA extension for scoping reviews (PRISMA-ScR) framework to systematically gather and synthesize the existing literature in the Sustainable Development Goals period published between 2015 and 2024. A comprehensive search was carried out in PubMed, OvidSP, and Scopus using strategic keywords related to capitation payments, PHC, and LMICs. After 456 initial records were scrutinized, 40 full-text articles were included. The literature were evaluated for implementation attributes, effectiveness, contextual challenges, and policy characteristics. Data extraction and analysis followed the Population, Concept, Context framework and were validated by an independent evaluator.

Results: This research identified 12 LMICs across four continents that have adopted capitation payment schemes for PHC. A wide range of implementation strategies was observed, depending on the context of each country. Significant challenges were identified in data reliability, politically, budget allocation, and policy planning. Evidence gaps were particularly evident in low-income countries, particularly during the pre-implementation phase of policy design, and the lack of diverse outcome evaluations or policy assessments.

Conclusion: Capitation payment schemes present promising opportunities to strengthen PHC and advance universal health coverage goals in LMICs. However, their success is highly dependent on local political, economic, and institutional contexts. Tailored implementation strategies, robust monitoring systems, and improved pre-implementation planning are essential to enhance policy effectiveness and sustainability. Future research should focus on standardized evaluation frameworks throughout the implementation process and on distinguishing policy effects from implementation fidelity.

Keywords: capitation payment, LMICs, essential health services, national healthcare system, primary healthcare

INTRODUCTION

Primary health care (PHC) is a whole-of-society approach that delivers accessible, comprehensive, continuous, and person-centered health services, integrating prevention, promotion, treatment, rehabilitation, and palliative care, while addressing the broader determinants of health. PHC serves as the foundation for achieving universal health coverage (UHC), which is a core component of the Sustainable Development Goals (SDGs) agenda. There is substantial evidence that PHC interventions are cost-effective in low- and middle-income countries (LMICs).^{1,2} The PHC sector in the health care system has a profound influence on the interactions and relationships between government, providers, purchasers, and the population across the entire health care landscape. Providers' payments play a key role in pushing broader health systems to gain financial control and overcome financial incentives to fund PHC.³ Current mechanisms for mobilizing and pooling health funds in LMICs suffer from several weaknesses due to fragmented and inadequate revenue sources, as well as inherent challenges in sharing and managing resources.⁴ Payment models for PHC providers can create financial incentives that have a profound effect on provider behavior, patient care, and health system efficiency.⁵ These models include input-based, service-based, performance-based, and population-based payments, with each option potentially providing specific incentives.³ Therefore, capitation payment schemes, particularly in PHC, have increasingly focused on different payment mechanisms to finance UHC targets in LMICs.

The LANCET Global Health Committee on Financing PHC stated, "The Commission's vision for PHC provider payment is a context-specific blended payment model built on capitation."⁶ The capitation payment transfers the financial risk from the buyer to the provider, separating the provider's payment from the volume of services delivered. Providers are responsible for any costs that exceed their preset capitation budget, whereas any savings can be retained and reinvested. This structure incentivizes providers to increase efficiency, attract more patients, and focus on improving the quality of care.³ Although capitation payment programs theoretically address known financial inadequacies, the contexts and issues in PHC differ across LMICs. Despite its critical importance, PHC in LMICs continues to face significant challenges in policy implementation, and there is limited literature focusing on this topic.⁶ Existing research findings

reported that the provider payment reform (PPR) system should improve hospitals' management capabilities by taking into account both PPR and reimbursable and non-reimbursable expenses.^{7,8} Other research reports that capitation in PHC deviates from economic and tax principles. Studying global PHC perspectives and reimbursement information could lead to the establishment of new standards for reporting in PHC systems.^{9,10} For example, some studies also indicated that LMIC financing reforms on reimbursement are well-functioning primarily during the COVID-19 pandemic, and PHCs are the best platform for providing basic healthcare services.^{11,12} PHC in LMICs continues to face significant challenges in policy implementation, and the literature on this topic remains limited.⁶ For instance, existing multinational reviews are often skewed toward high-income countries because the evidence base is more extensive, whereas reviews that focus on LMICs frequently examine policy effects within only one LMIC setting.^{13,14} Therefore, this study is the first scoping review to map and synthesize evidence on PHC capitation across multiple LMICs. We focus on how capitation in PHC is being implemented and what the results are. The findings of this study will help identify more effective and sustainable health financing strategies to support the achievement of UHC and improve health outcomes in LMICs.

MATERIALS AND METHODS

We conducted the scoping review using the Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR).¹⁵ PRISMA-ScR compiled evidence from the academic literature on capitation payment schemes and informed decision-making on sustainable health financing strategies to support UHC goals and improve health outcomes in LMICs.^{6,15} PRISMA-ScR addresses the lack of available literature on capitation payments as well as research gaps on the implementation of capitation payments in PHC in LMICs.^{15,16} The two evaluators (DM and TC) have verified the accuracy of the data processing, analysis, presentation, and validation. The scoping review eligibility criteria are i) geography: low-to-middle-income countries; ii) study focus: capitation payments alone, or combined with other payment methods within the PHC schemes; iii) study design: any analytical or observational study, and any research method, quantitative, qualitative, or review (no primary data); iv) language: English; v) publication type: peer-

reviewed journal, and grey literature; and vi) publication period SDGs era from 1 January 2015 to 31 October 2024.

First, we conducted a scoping review of the search criteria. The preliminary search was performed in PubMed, the well-known medical database, to identify and examine a study topic.¹⁷ This step defines the appropriate search criteria before developing a search strategy and finalizing the search criteria. Thus, the preliminary results revealed that the terms “LMIC” and “developing country” did not yield any results in the primary focus of this study. Importantly, the search terms “LMIC” and “developing country” were defined prominently by the World Bank and the United States National Library of Medicine’s Medical Subject Headings database, respectively.^{18,19} Consequently, we manually searched for these search terms in PubMed, OvidSP, and Scopus to identify the foci of the studies in the titles and abstracts.^{17,20,21} Hence, we then retrieved full-text articles published in English from 2015 to 2024 during the SDGs period for analysis.²² Multilingual translation is excluded because current AI-powered translation systems (such as Google Translate) have capabilities that are more limited than those of humans.²³ **Table 1** shows strategic keywords in the search, and the search strategies were not limited to medical subject headings (MeSH) terms alone. The authors conducted cross-checks through plain-text search using keywords from research concepts such as PHC, capitation, and LMICs (**Table 1**). After the initial scoping search, we removed the MeSH term and plain-text keywords for “LMIC” and “developing

countries” because they did not reliably retrieve all relevant studies.

We tabulated the results of the literature search in EndNote 21 (Clarivate Plc, Philadelphia, PA, USA). We removed duplicated literature titles and then saved the .enl file format for further analysis. Titles and abstracts were screened and assessed based on the search strategy. The independent evaluators (DM and TC) then scrutinized the full texts of the articles. The independent observers (DM and TC) analyzed and verified that the data from the literature were in line with the capitation payment, PHC, and LMIC included in this scoping review.

Two independent evaluators (DM and TC) extracted the following verified data from the literature as follows: country, first author, year of publication, type of capitation payment, implementation scale, PHC quality, study context, and affected area. The data extractions were then standardized to transform the synthetic data into consistent data and generate the presentation data according to the study description and study topic focus.¹⁵ The LMICs data patterns for the number of publications were extracted and presented in this scoping review.²⁴ We analyzed the research methodologies used in the verified literature data into four categories: review, quantitative, qualitative, and mixed methods (categories 1 to 3). The capitation payment challenges and facilitators were characterized into four periods: exploration, adoption decision or preparation, active implementation, and sustainability.

The independent evaluators and observers (DM and TC) ensured that this scoping review complied

Table 1 The Search Keywords

Databases	Operational Search Keywords
PubMed	(“capitation fee”[MeSH Terms] AND (“primary health care”[MeSH Terms] OR (“primary”[All Fields] AND “health”[All Fields] AND “care”[All Fields]) OR “primary health care”[All Fields] OR (“primary”[All Fields] AND “care”[All Fields]) OR “primary care”[All Fields])) AND (English [Language]) AND 2015/01/01:2024/12/31[Date - Publication]
OvidSP	((“capitation .mp”) AND (“primary care.mp” OR “primary health care.mp” OR “community care.mp” OR “general practitioner.mp” OR “family medicine.mp”)) AND (“limit to english language”) AND (“yr=”2015-Current”))
Scopus	TITLE-ABS (“capitation”) AND TITLE-ABS (“primary care” OR “primary healthcare” OR “primary health care” OR “general practitioner” OR “community care” OR “family medicine”) AND PUBYEAR > 2015 AND PUBYEAR < 2024 AND (LIMIT-TO (LANGUAGE , “English”))

Abbreviation: ABS, abstract

with the guidelines published by the Joanna Briggs Institute.²⁵ The focus of this study was developed based on the Population, Concept, and Context principles to ensure that data were analyzed and presented in a manner that provided clarity and meaningful titles for the scoping review.²⁶ This review's primary objective was to effectively address the research questions of the studies, which involved the direct extraction of data to answer the study's focused question. The bias-minimization steps included ensuring that the research objectives were met, the research questions were answered, and the evaluation and results were fair.²⁷ All processes in the scoping review were first

verified and confirmed by the first verifier (DM), and then by the second verifier (TC). Hence, the results presented in this study can be reproduced for data processing.

RESULTS

Figure 1 shows a flowchart of the final scoping review using PRISMA-ScR. The literature search yielded 456 publications. After we removed the duplicates, 259 publications remained. We screened a total of 259 titles and abstracts and identified 191 publications as mismatching the study criteria. Subsequently, 68 full-text publications were scrutinized, and 28 studies

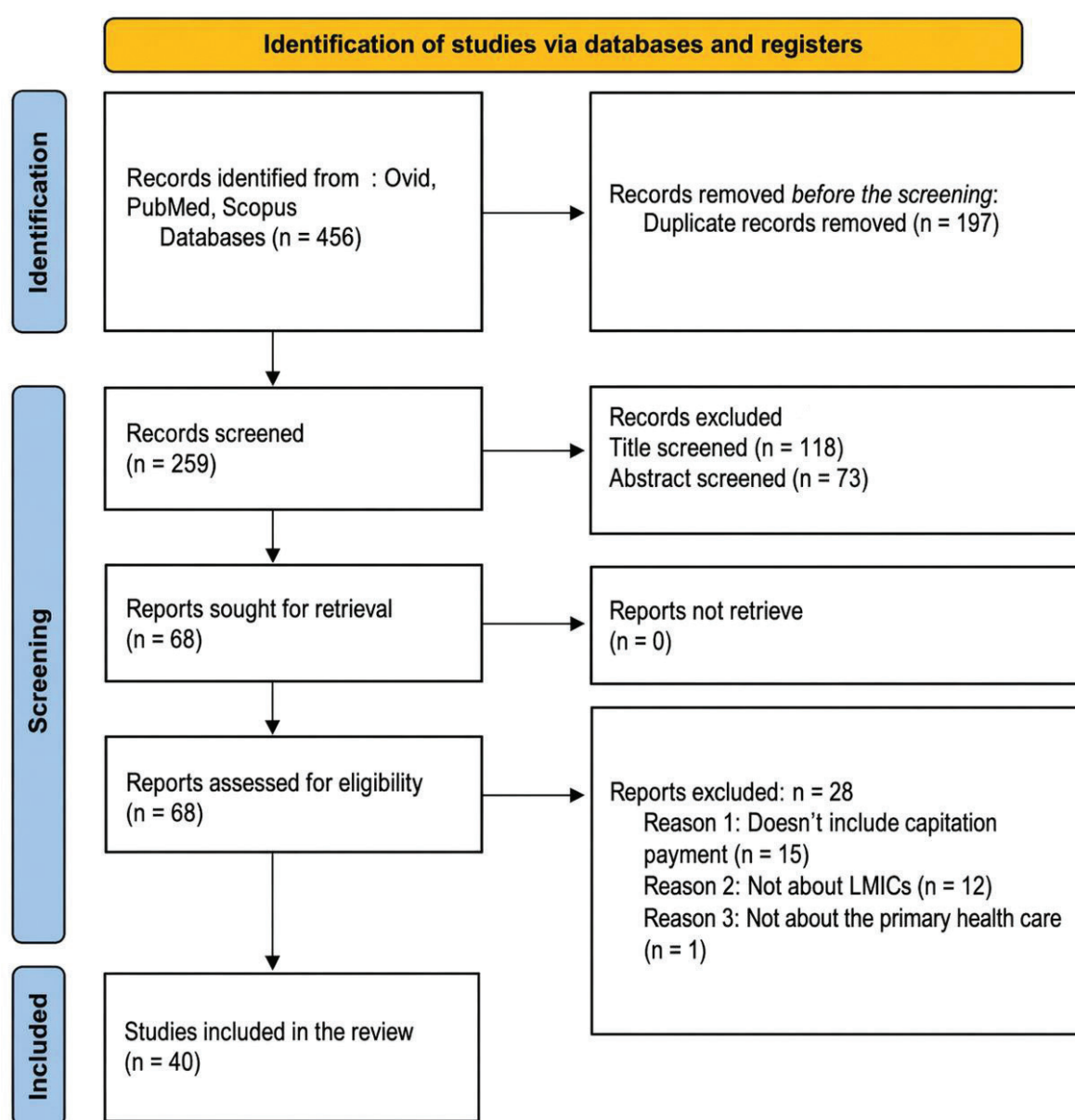


Figure 1 Algorithm Search for Scoping Review

were removed because they did not meet the focus of the study. Consequently, this scoping review comprised 40 full-text articles, as shown in **Figure 2**.

Of the 40 articles, 12 LMICs implemented capitation payment schemes for PHC across four continents: Asia, Europe, South America, and Africa. First, six countries on the Asia continent consisted of Southeast Asia (Indonesia), South Asia (India), East Asia (China and Mongolia), West Asia (Iran), and Central Asia (Tajikistan). Second, the three countries on the African continent are Ghana, Kenya, and Tanzania. Third, two countries were in Eastern Europe:

Georgia and Ukraine. Finally, one country in South America (Brazil) was included.

An evaluation of capitation payments in PHC is divided into eight attributes: (1) Adoption, (2) Acceptability, (3) Cost, (4) Effectiveness, (5) Feasibility, (6) Reach, (7) Sustainability, and (8) Chance. **Table 2** depicts the evidence of the study contexts. **Table 3** summarizes the 12 LMICs across four continents and characteristics of the studies included in this scoping review, revealing shared knowledge on capitation payments.

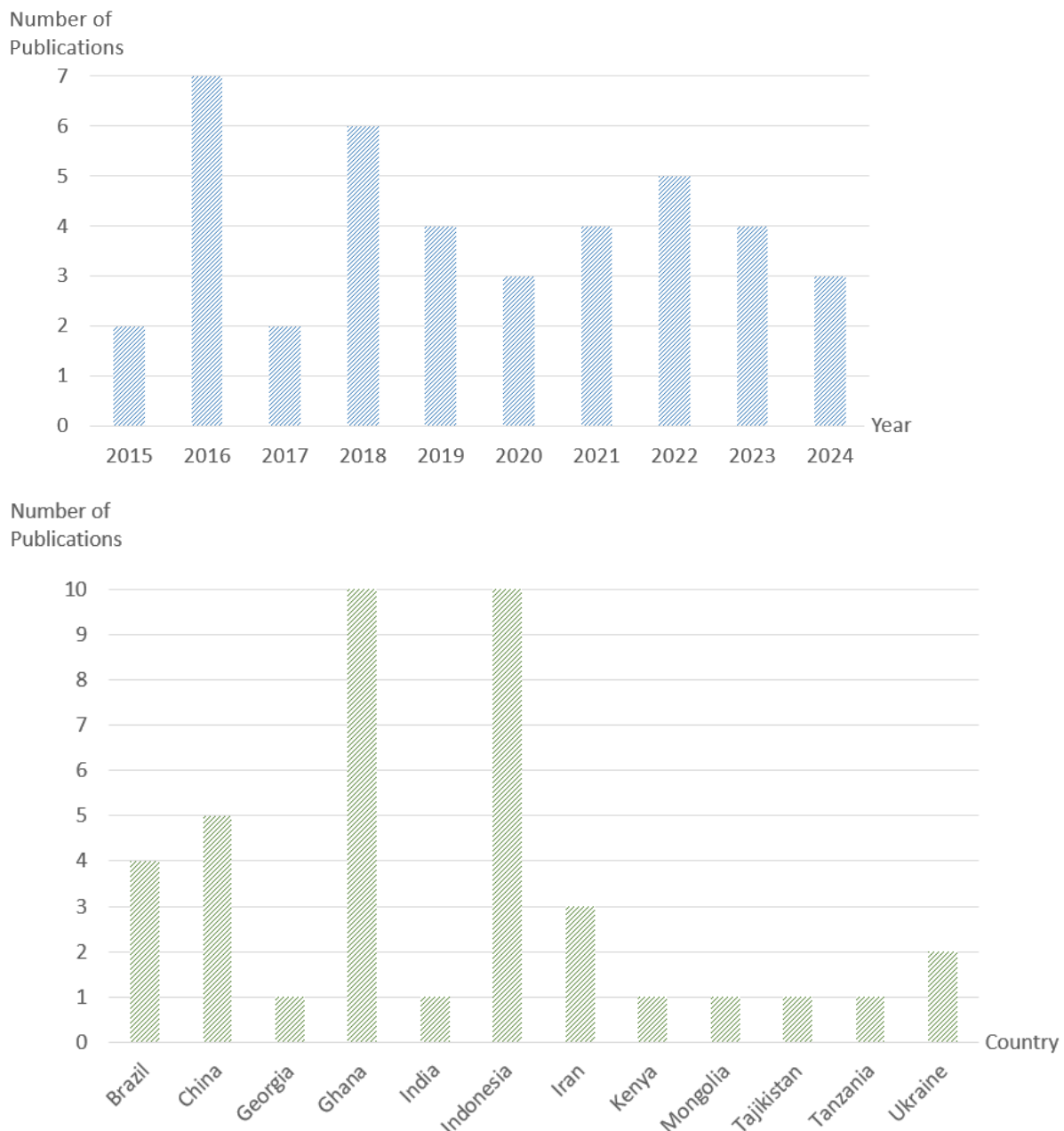


Figure 2 Capitation Payment Literature Results from LMICs (matched to Tables 3 and 4)

Table 2 Attributes for Evaluation of Capitation Payment Assessment in PHC

Attributes	Contexts
1- Adopt	Policies are promulgated at the regional or national levels. The regional policies are being implemented.
2- AB	Patients' perception of the policy and stakeholders' perception of the policy.
3- CST	Monetary and non-monetary resources for operations and implementations.
4- EFF	Primary care cost, primary care service utilization, and primary care quality assessments.
5- FS	Operation and deployment can overcome the challenges of capitation payment and support facilitators.
6- Reach	Characteristics of individuals affected by the facts of policy are detailed.
7- Sustain	Implementation outcomes over time.
8- CHC	Adverse effects such as increased drug costs and characteristic changes in healthcare personnel.

Abbreviations: AB, acceptability; Adopt, adoption; CHC, chance; CST, cost; EFF, effectiveness; FS, feasibility; Sustain, sustainability

Table 3 A Characteristic of Scoping Review Literature

Continent		Country	Capitation Payment Assessment							
			1	2	3	4	5	6	7	8
			Adopt	AB	CST	EFF	FS	Reach	Sustain	CHC
Asia	Southeast	Indonesia	✓	✓	✓	✓	✓	✓	✓	✓
	South	India								
	East	China	✓		✓	✓		✓	✓	
		Mongolia	✓					✓	✓	
	West	Iran	✓	✓	✓	✓	✓			
	Central	Tajikistan	✓							
	African	West Coast	Ghana	✓	✓	✓	✓	✓	✓	✓
East Coast		Kenya	✓		✓	✓		✓		
		Tanzania	✓	✓	✓					
Europe	Eastern	Georgia								
		Ukraine	✓	✓	✓		✓	✓	✓	
South America	Eastern	Brazil	✓		✓	✓		✓	✓	

Abbreviations: AB, acceptability; Adopt, adoption; CHC, chance; CST, cost; EFF, effectiveness; FS, feasibility; Sustain, sustainability

Table 4 illustrates the evidence of the capitation payment schemes found in this scoping review. We examined the implementation policies in each nation's strategies for implementing capitation policies, considering whether capitation payment was integrated into national PHC models or reforms. A primary reason for

selecting a specific region for implementation in each country was to enable policy implementation and assess its effects before nationwide implementation.

In addition, we categorized the effectiveness of the capitation payments in PHC into three categories: cost-effectiveness, utilization, and quality (**Table 5**).

Table 4 Capitation Payment Schemes

Year	Country	Reach		Policy	Strategy	Capitation Type
		Region	Level			
2019	Brazil	All	Nationwide	Prevent Brazil	PHC reform	Weighted capitation, performance-based payment, and incentives for strategic actions ^{28,29,30-31}
2017	Ukraine	All	Nationwide	Government financial guarantees of healthcare services	National health financing reform	Weighted capitation ³²⁻³³
2017	Tanzania	All	Nationwide	Direct health facility financing of health basket funds	New provider payment method	Weighted capitation ³⁴
2015	Kenya	All	Nationwide	NHIF outpatient capitation under the Supa cover	PHC financing schemes	Capitation payment ³⁵
2014	Indonesia	Padang, Pekanbaru, and Jambi	District to Nationwide	National health insurance initiatives	PHC reform	Weighted capitation with performance pay ³⁶⁻⁴⁵
2011	China	Shanghai	District to Nationwide	National health reform of the new rural cooperative medical schemes	Healthcare reform	Capitation payment ⁴⁶⁻⁴⁹
		Ningxia	District to Nationwide	Ningxia project	Healthcare reform	Capitation payment with performance pay ⁵⁰
2011	Iran	Tabriz	District	Urban family physicians project	n/a	Weighted capitation with performance pay ⁵¹⁻⁵³
2011	Mongolia	All	Nationwide	n/a	National health act on PHC	Weighted capitation ⁵⁴
2010	Ghana	Ashanti	District	National health insurance schemes	Capitation pilot	Capitation payment ⁵⁵⁻⁶⁴
2010	Tajikistan	Dangara and Varzob	District	n/a	Pilot project on capitation-based financing for PHC	Partial capitation ⁶⁵
n/a	Georgia	n/a	n/a	n/a	PHC reform	Capitation payment ⁶⁶
n/a	India	n/a	n/a	n/a	Scale-up PHC	Weighted capitation ⁶⁷

Abbreviations: n/a, not applicable; NHIF, The national health insurance fund; PHC, primary health care

Cost-effectiveness measures the expenditure costs of PHC after the implementation of the capitation payment policy. Utilization measures the number of patients using PHC services, whereas quality measures different forms of PHC by analyzing the quality of medical personnel or services provided by PHC. Overall, measures of cost-effectiveness suggest that the policy is largely associated with reduced costs. Utilization measures indicate an overall increase, consistent with improved healthcare access and service use. Findings on quality of care are mixed, likely reflecting heterogeneity in study designs, outcome definitions, and analytic methods across the included research.

Based on the implementation steps and context adapted from the conceptual model, we categorized the challenges into four stages: exploration, decision/implementation preparation, implementation, and maintenance. The evidence from the scoping review showed that the post-implementation phase, facilitator

area, and process evaluation posed significant challenges in implementing capitation payments in PHCs. Hence, it is assumed that countries that can overcome these challenges will develop a more resilient PHC and a stronger UHC for their citizens. **Table 6** reveals the challenges in implementing capitation payments in the PHC.

DISCUSSION

Capitation payment management for PHC in LMICs remains limited to well-known international digital health databases (**Figure 2**) (**Table 2**). The main reason is that LMICs that have implemented capitation payment systems often do not disclose knowledge management in international health databases. In addition, some countries may publish knowledge on capitation payment management in their local journals and in languages other than English. For example, low-income countries (LICs) such as Ethiopia have

Table 5 Capitation Payment Evaluation

PHC	Mixed-Methods		Quantitative		Qualitative	
	Measures	yr	Outcomes	Measures	yr	Outcomes
Cost-effectiveness	Budget post implementation	2	Increased by 8% ²⁸	Outpatient cost	4	Increased by 6% ⁴⁷
	Total medical expenditure	1	Decreased by 4% ⁴⁶	Inpatient cost	4	Increased by 35% ⁴⁷
	Total expenditure of funds	1	Decreased by 4% ⁴⁶	OOP payments	2	10% higher probability of OOP ⁵⁵
	Average expenditure per outpatient visit	1	Decreased after the 3 rd month ⁴⁶			
	Average expenditure per hospital stay	1	Increased by 14% ⁴⁶	Income and expenditure of the National Health Insurance scheme	4	Expenditure exceeds the income after 2 years. ⁵⁶
	Ratio of OOP payment medical expenses to annual net income per capitation	1	Increased by 0.5% ⁴⁶			
Utilization	Outpatient's utilization	2	Increased by 2% ⁴⁶	Registration population	2	Increased by 56% ²⁹
	Outpatient visits per capitation	2	Increased by 16% ⁴⁶	Capitation of outpatient visits	4	Increased from 14 times to 20 times ⁴⁷
	Outpatient visits	2	Increase utilization in rural areas ⁴⁶	Use of outpatient care	1	Increased by 47% ⁵⁰
	Health services coverage	3	Increased, but no difference compared to the district without capitation. ³⁶	Contact rate	1	Positive contact rate ²⁶
				Access to PHC services	9	Influenced by awareness ³⁵
Quality	Oral health	1	Increased capital by 32%, and increased working hours. ²⁸	Medical seeking behavior (outpatient)	4	Increased tertiary care services by 10% ⁴⁷
				Medical seeking behavior (inpatient)	4	Increased tertiary care services by 3% ⁴⁷
				Quality score (first contact, continuity of care, coordination, comprehensiveness)	2	Scores were similar between the two districts. ⁴⁸ Increased significantly compared with the control group. ⁴⁹

Table 5 Capitation Payment Evaluation (cont.)

PHC	Mixed-Methods	Quantitative	Qualitative
PHC	Number of higher education health professionals	1 Increased by 16% ²⁸	2 Follow-up rates increased but did not differ between control groups. ⁴⁹
			2 Quality perception in the region (per capita rate) was lower compared to the control group. ⁵⁷
			2 No differences from the control group ⁵⁵
	Classification by quality	4 Maximize quality but make no difference compared to districts without capitation. ³⁶	4 Provisions of ANC4+ in hospitals ⁵⁸
			2 Increased by 1% of chronic patients compared to the control group. ³⁷
		Satisfaction	5 Satisfaction has increased over time, but not due to capitation reform. ⁵⁸

Abbreviations: ANC4+, antenatal care - ANC; n/a, not applicable; NCD, noncommunicable diseases; OOP, out-of-pocket; PHC, primary health care; yr, year: time after the implementation
 ANC4+ indicates the number of times a woman's health is checked during pregnancy using standard questions.²

Table 6 Challenges of Capitation Payment and Support Facilitators for PHCs

Post-Implementation Phase	Facilitator Area	Process Evaluation
Exploration	Fundings	Miscalculation of cost rates leads to a lack of funding. ⁵⁶
	Sociopolitics	Setting unrealistic targets ³⁶
		Setting upper and lower bounds upon the capitation results in gaming the system. ³⁶
		A team of experts supported by international and national institutions developed a new Brazilian PHC financing model by examining federal lending and analyzing best practices from national and international literature. ³⁰
Adoption decision or preparation	Interorganizational networks	Lack of communication between the regional and central governments ⁴³
	Sociopolitics	Implementers involved politicians, which created the impression that capitation policy was a political issue ⁵⁶
	Organizational characteristics	The patient's lack of trust in the implementers ^{56,59}
Active implementation and sustainment	Adopter characteristics	Patients' lack of trust in the health providers ⁶¹
		PHC funds management autonomy ⁴⁰
		Lack of knowledge of the policy ^{39,42}
		Unequal implementation readiness ³⁹
		Patient's behavioural issues led to requesting unnecessary medications and referrals. ⁵¹
	Fundings	Delay in reimbursement claims ⁵⁹
		Overbilling practices ⁵⁶
		Health promotion activities ³⁹
	Fidelity monitoring or support	Regulations were rewritten to be more user-friendly. ³⁹
		Active monitoring and enforcement of the rule by providers ⁴⁰
		Slow internet is hindering efficiency and regular monitoring. ⁴⁰
		Lack of onsite technical support and regular information systems ^{36,40}
	Public-academic collaborations	Ability and competency to conduct high-quality research ³⁹
	Sociopolitics	Stakeholders' perception towards capitation ^{56,64}
		Patient's perception towards capitation ^{56,62}
		Low enrolment rates ⁵⁹

Abbreviations: PHC, primary health care

implemented capitation payment systems for PHC but have not published documents on capitation payment management, nor have they published literature in international publications.⁶⁸ Another consideration is that, in some countries, capitation policies were implemented only at a subnational or regional level (Table 5). When these initiatives did not meet expectations, subsequent policy expansion and related research activity may have stalled, resulting in limited published evidence. Therefore, researchers should be encouraged to conduct and share their knowledge with other academics, especially in LICs and LMICs.

In addition, another important gap lies in pre-implementation studies of capitation payment management for PHC models or pilot projects. As a result, this limits our understanding of the preparatory steps required for implementation fidelity, such as exploring the sociopolitical context, funding mechanisms, and organizational readiness.^{69,70} Furthermore, excluding non-English publications might result in the omission of important information, especially in LIC countries. Therefore, we address this gap in this review by presenting evidence in Table 6 regarding how to overcome the challenges in capitation payments to achieve sustainable capitation payments for PHC.

Importantly, this scoping review identifies the key factors that influence implementation outcomes, including funding mechanisms, monitoring approaches, and the political and socioeconomic context. Challenges in budget formulation and implementation have a significant effect on the capitation plan. For instance, in Ghana, the capitation spending rates were based on erroneous data from previous payment systems, raising concerns about inadequate budget allocation.⁵⁶ In contrast, Brazil uses an equity-weighted payment criterion to address socioeconomic and demographic inequalities.³⁰

This review identified several factors that influence the implementation outcomes. For example, as a result of many factors, Indonesia has found success and continued to implement capitation payments for PHC.⁴¹ This country has also implemented an efficient budget, with strict monitoring and enforcement mechanisms, allowing PHC facilities to independently manage their funds and improve the quality of services. Table 5 shows the Indonesian capitation payment scheme. Implementation fidelity and transparent reporting are equally important, as seen in Indonesia,

where the ability to analyze accurate data supports policy maintenance and adaptation.³⁹ Political and socioeconomic factors also play an important role. Political alignment among stakeholders, leaders, technical experts, and activists can influence policy prioritization and legitimacy. For instance, in Ghana, a lack of prioritized budget allocation and problems of political legitimacy hinder successful implementation.⁵⁶ In summary, we found that implementation is shaped by multiple, context-specific factors that vary across countries, even in countries that employed a capitation policy nationally for several years. This heterogeneity complicates efforts to draw clear, generalizable conclusions about the determinants of successful implementation. Accordingly, our findings underscore the importance of tailoring capitation payment models to each setting's political, economic, and institutional context during design and rollout.

Another key point from this literature review analysis shows a variety of outcome measures for capitation payment policies, which complicates the efforts to draw clear conclusions. Financial assessments often focus on the total PHC costs or the patients' costs, the latter of which allows for a clearer understanding of equity implications.⁷¹ For example, service outcomes were measured on the outpatient visits and chronic disease management. These results are important in the assessment of health access and promotion but are often influenced by broader health reforms, which confound policy-specific effects. Alternatively, quality of care assessment is generally based on patient perceptions, examining dimensions such as continuity of care and comprehensiveness of services. Stakeholder perceptions gathered through interviews and surveys provided a deep understanding of the implementation challenges and areas for improvement.⁷² In addition, the measures of stakeholder perception in PHC. Moreover, the interrelated nature of capitation payments and broader reforms complicates that attribution of outcomes to a single payment model.⁷³ Addressing these issues requires standardized assessment measures that isolate the impact while considering contextual variables.

Future policymakers should ensure accuracy and guide policy changes; comprehensive data collection at every stage of the implementation is essential for strong monitoring. Developing a tool to map national PHC financial ecosystems could provide a foundation for informed policymaking.¹⁵ Financial assessment

should focus on equitable resource distribution and allocation within PHC facilities using advanced methods such as the health resource density index.⁷⁴ In addition, future research studies should distinguish between implementation outcomes and policy outcomes to clarify whether observed possessions are due to capitation payment models or their implementation. To capture the role of populations in shaping PHC systems, service evaluations should focus on patient-focused outcomes, such as preventive care utilization and provider selection, especially the equity aspect, such as access for the vulnerable population. The assessment of institutional structures, particularly the independence of service providers, requires a qualitative approach to contextualize decision-making processes and resource allocation challenges.⁴

For literature gap during reimplementation phase of the policy, we propose a simple implementation timeline to structure planning and reporting: (i) Pre-implementation, including readiness assessment, stakeholder engagement, and budget/enrolment modelling; (ii) Pilot phase, involving limited rollout with predefined indicators for cost, utilization, and quality; (iii) Scale-up, characterised by gradual expansion with iterative adaptation based on monitoring results; and (iv) Sustainability, requiring continuous monitoring, equity safeguards (e.g., risk/needs adjustment), and transparent reporting to maintain accountability and policy learning. These recommendations are intended to increase the rigor and relevance of future research methods and support evidence-based policy development.

In summary, four take-home messages emerge. First, capitation implementation is strongly context dependent, shaped by financing arrangements, political legitimacy, and institutional capacity. Second, strong monitoring and data systems (accurate enrolment/budget modelling, routine indicators, and transparent reporting) are critical to sustain and adapt reforms. Third, the equity effects of design choices (e.g., weighted vs flat-rate capitation) remain insufficiently evaluated to support firm conclusions. Finally, major research gaps persist, limited pre-implementation evidence, heterogeneous outcome measures, and sparse LIC data highlighted the need for prospective, standardized evaluations that document implementation fidelity and track cost, utilization, quality, and equity over time.

This scoping review provides a broad overview of capitation policy research in PHC, identifying key gaps in geographic coverage and methodology. It emphasizes the need for a more in-depth analysis of the implementation processes and contextual factors that influence policy outcomes in individual countries. This work relies on a single reviewer (DM) for reviewing and scrutinizing the limits of its methodological robustness. Unlike our previous systematic reviews, this method does not assess the quality of studies; instead, it provides generalized results rather than specific, actionable insights.^{75,76} The exclusion of non-English publications further narrows the scope, potentially omitting important contributions from non-English-speaking countries. Despite these limitations, this review provided valuable guidelines for future research, emphasizing the importance of addressing geographic differences, improving assessment measures, and integrating preimplementation studies into the evidence base. Therefore, researchers can better inform the development of equitable, effective, and sustainable capitation payment models for PHC in LMICs.

CONCLUSION

Overall, evidence shows that capitation payment in primary healthcare is frequently associated with reduced costs and increased utilization, while reported effects on quality of care are mixed and difficult to compare due to heterogeneous outcomes and methods. The review also identified substantial evidence gaps, particularly limited pre-implementation analysis, sparse reporting from LICs, and insufficient evaluation of equity-oriented design features (e.g., weighted versus flat-rate payments) and monitoring systems. In conclusion, capitation reforms for PHC should be supported by comprehensive, stage-specific data collection to strengthen monitoring, guide mid-course adjustments, and improve accountability. Policy and evaluation should incorporate an explicit equity lens, mapping the national PHC financing ecosystem and assessing resource distribution within facilities (e.g., using health resource density metrics). Future research should separate policy effects from implementation fidelity, use patient-centred and equity-sensitive outcomes, and address the pre-implementation evidence gap by reporting systematically across the stages of pre-implementation, pilot, scale-up, and sustainability.

Conflict of Interest

The authors declare no conflict of interest, no personal relationships, and no financial interests that have influenced the research reported in this paper.

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Author Contributions

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Data Availability Statement

The data are included in this article. Please do not hesitate to contact the authors or the corresponding authors for any enquiries regarding this study.

REFERENCES

1. Weel VC, Kidd MR. Why strengthening primary health care is essential to achieving universal health coverage. *Can Med Assoc J* 2018;190(15):E463-6. doi: 10.1503/cmaj.170784.
2. Watkins DA, Yamey G, Schäferhoff M, Adeyi O, Alleyne G, Alwan A, et al. Alma-ata at 40 years: reflections from the lancet commission on investing in health. *Lancet* 2018; 392(10156):1434-60. doi: 10.1016/S0140-6736(18)32389-4.
3. Langenbrunner JC, Cashin C, O'Duagherty S. Designing and implementing health care provider payment systems: how-to manuals [internet]. 2009 [cited 2025 Jul 12]. Available from: <https://doi.org/10.1596/978-0-8213-7815-1>
4. Siqueira M, Coube M, Millett C, Rocha R, Hone T. The impacts of health systems financing fragmentation in low- and middle-income countries: a systematic review protocol. *Syst Rev* 2021;10(1):164. doi: 10.1186/s13643-021-01714-5.
5. Robinson JC. Theory and practice in the design of physician payment incentives. *Milbank Q* 2001;79(2):149-77. doi: 10.1111/1468-0009.00202.
6. Hanson K. Introducing the lancet global health commission on financing primary health care: putting people at the centre. *Lancet Glob Health* 2022;10(1):e20-1. doi: 10.1016/S2214-109X(21)00510-6.
7. Lei X, Mak HY, Shi J, Ta Y. A comprehensive assessment of provider payment reform: insights from China. *J Econ Behav Organ* 2025;237:107160. doi: 10.1016/j.jebo.2025.107160.
8. Hsiang-Te Tsuei S, Chi-Man Yip W. How hospitals' goal setting, feedback, and process standardization capacity impact provider payment reforms. *Soc Sci Med* 2025;370:117831. doi: 10.1016/j.socscimed.2025.117831.
9. Schaeffers J, Wenang S, Afdal A, Mukti AG, Sundari S, Haier J. Population-based study on coverage and healthcare processes for cancer during implementation of national healthcare insurance in Indonesia. *Lancet Reg Health Southeast Asia* 2022;6:100045. doi: 10.1016/j.lansea.2022.100045.
10. Putri NK, Purwaningrum F, Thabrany H, Khotimah EH. Theory-practice gap of capitation payment in the Indonesian national health insurance: toward universal health coverage. *Int J Health Gov* 2024;29(1):5-20. doi: 10.1108/IJHG-08-2023-0081.
11. Pholpark A, Mon HM, Lim LT, Tsilaajav T, de Oliveira Cruz V, Hanvoravongchai P. Challenging inadequate and fragmented primary health care financing: findings from Bangladesh, Indonesia, Maldives, and Nepal. *Lancet Reg Health Southeast Asia* 2025;38:100613. doi: 10.1016/j.lansea.2025.100613.
12. Hanson K. Introducing the Lancet Global Health Commission on financing primary health care: putting people at the centre. *Lancet Glob Health* 2022;10(1):e20-1. doi: 10.1016/S2214-109X(21)00510-6.
13. Massuda A. Primary health care financing changes in the Brazilian health system: advance ou setback? *Cien Saude Colet* 2020;25(4):1181-8. doi: 10.1590/1413-81232020254.01022020.
14. Khodjamurodov G, Sodiqova D, Akkazieva B, Rechel B. Tajikistan: health system review. *Health Syst Transit* 2016;18(1):1-114.
15. Peters MDJ, Marnie C, Tricco AC, Pollock D, Munn Z, Alexander L, et al. Updated methodological guidance for the conduct of scoping reviews. *JBIM Evid Synth* 2020;18(10): 2119-26. doi: 10.11124/JBIES-20-00167.
16. Page MJ, McKenzie J, Bossuyt P, Boutron I, Hoffmann T, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71.
17. PubMed database [internet]. [cited 2025 Jul 12]. Available from: <https://pubmed.ncbi.nlm.nih.gov/>
18. The World Bank. World bank country and lending groups [internet]. 2022 [cited 2025 Jul 12]. Available from: <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-andlending-groups>
19. The United States National Library of Medicine (NLM). Medical subject headings (MeSH) [internet]. 2024 [cited

- 2025 Jul 12]. Available from: <https://id.nlm.nih.gov/mesh/D003906.html>
20. Ovid technologies [internet]. [cited 2025 Jul 12]. Available from: <https://ovidsp.ovid.com/>
21. Scopus [internet]. [cited 2025 Jul 12]. Available from: <https://www.scopus.com/>
22. The Sustainable Development Goals (SDGs) [internet]. [cited 2025 Jul 12]. Available from: <https://sdgs.un.org/goals>
23. De Siano GD, Fasolino AR, Sperlí G, Vignali A. Translating code with large language models and human-in-the-loop feedback. *Inf Softw Technol* 2025;186:107785. doi: [10.1016/j.infsof.2025.107785](https://doi.org/10.1016/j.infsof.2025.107785).
24. Whitsel LP, Honeycutt S, Radcliffe R, Johnson J, Chase PJ, Noyes P. Policy implementation and outcome evaluation: establishing a framework and expanding capacity for advocacy organizations to assess the impact of their work in public policy. *Health Res Policy Syst* 2024;22(1):27. doi: [10.1186/s12961-024-01110-0](https://doi.org/10.1186/s12961-024-01110-0).
25. Joanna Briggs Institute [internet]. [cited 2025 Jul 12]. Available from: <https://jbi.global/>
26. Weill Cornell Medicine. Systematic reviews: scoping reviews [internet]. [cited 2025 Jul 12]. Available from: <https://med.cornell.libguides.com/systematicreviews/scopingreviews>
27. Chaichana T. Maritime computing transportation, environment, and development: trends of data visualization and computational methodologies. *Adv Technol Innov* 2023;8(1):38-58. doi: [10.46604/aiti.2023.10419](https://doi.org/10.46604/aiti.2023.10419).
28. Harzheim E, D'Avila OP, Pedebos LA, Wollmann L, Costa LGM, Cunha CRHD, et al. Primary health care for 21st century: first results of the new financing model. *Cien Saude Colet* 2022;27(2):609-17. doi: [10.1590/1413-81232022272.20172021](https://doi.org/10.1590/1413-81232022272.20172021).
29. Sellera PEG, Silva MRM, Mendonça AVM, Ginani VC, Sousa MF. Weighted capitation incentive (Previne Brasil Program): impacts on the evolution of the population register in PHC. *Cien Saude Colet* 2023;28(9):2743-50. doi: [10.1590/1413-81232023289.20142022](https://doi.org/10.1590/1413-81232023289.20142022).
30. Harzheim E, D'Avila OP, Ribeiro DC, Ramos LG, Silva LED, Santos CMJD, et al. New funding for a new Brazilian Primary Health Care. *Cien Saude Colet* 2020;25(4):1361-74. doi: [10.1590/1413-81232020254.35062019](https://doi.org/10.1590/1413-81232020254.35062019).
31. Massuda A. Primary health care financing changes in the Brazilian health system: advance ou setback? *Cien Saude Colet* 2020;25(4):1181-8. doi: [10.1590/1413-81232020254.01022020](https://doi.org/10.1590/1413-81232020254.01022020).
32. Avila C. Implementing health financing policies to overhaul the healthcare delivery system in Ukraine. *J Hosp Manag Health Policy* 2020;5:7. doi: [10.21037/jhmhp-20-97](https://doi.org/10.21037/jhmhp-20-97).
33. Anufriyeva V, Pavlova M, Chernysh Stepurko T, Groot W. Satisfaction with primary health care in Ukraine in 2016-2020: a difference-in-differences analysis on repeated cross-sectional data. *Health Policy* 2023;137:104916. doi: [10.1016/j.healthpol.2023.104916](https://doi.org/10.1016/j.healthpol.2023.104916).
34. Maiba J, Singh NS, Cassidy R, Mtei G, Borghi J, Kapologwe N, et al. Assessment of strategic healthcare purchasing and financial autonomy in Tanzania: the case of results-based financing and health basket fund. *Front Public Health* 2024;11:1260236. doi: [10.3389/fpubh.2023.1260236](https://doi.org/10.3389/fpubh.2023.1260236).
35. Were BN, Mwangi EM, Muiruri LW. Barriers of access to primary healthcare services by National Health Insurance Fund capitated members in Uasin Gishu county, Kenya. *BMC Health Serv Res* 2024;24:1025. doi: [10.1186/s12913-024-11282-8](https://doi.org/10.1186/s12913-024-11282-8).
36. Suranugraha K, Nopiyan NMS, Januraga PP. Impact of budget increase and primary health care performance in the era of national health insurance: case study in the Buleleng district. *Kesmas Natl Pub Health J* 2018;13(2):92-8. doi: [10.21109/kesmas.v13i2.1875](https://doi.org/10.21109/kesmas.v13i2.1875).
37. Sambodo NP, Bonfrer I, Sparrow R, Pradhan M, van Doorslaer E. Effects of performance-based capitation payment on the use of public primary health care services in Indonesia. *Soc Sci Med* 2023;327:115921. doi: [10.1016/j.socscimed.2023.115921](https://doi.org/10.1016/j.socscimed.2023.115921).
38. Febriawati H, Alfansi L, Hadi ED, Ab SA. The role of management function to the achievement of Puskesmas indicator as a gatekeeper of national health guarantee in Bengkulu City. *Indian J Public Health Res Dev* 2018;9(9):353-7. doi: [10.5958/0976-5506.2018.01023.9](https://doi.org/10.5958/0976-5506.2018.01023.9).
39. Eichler R, Gigli S, LeRoy L. Implementation research to strengthen health care financing reforms toward universal health coverage in Indonesia: a mixed-methods approach to real-world monitoring. *Glob Health Sci Pract* 2018;6(4):747-53. doi: [10.9745/GHSP-D-18-00328](https://doi.org/10.9745/GHSP-D-18-00328).
40. Tan SY. Bureaucratic autonomy and policy capacity in the implementation of capitation payment systems in primary healthcare: comparative case studies of three districts in Central Java, Indonesia. *J Asian Public Policy* 2018;12(4):1-21. doi: [10.1080/17516234.2018.1459150](https://doi.org/10.1080/17516234.2018.1459150).
41. Tan SY, Qian J. An unintended consequence of provider payment reform: the case of capitation grants in the National Health Insurance reform of Indonesia. *Int J Health Plann Manage* 2019;34(4):e1688-710. doi: [10.1002/hpm.2883](https://doi.org/10.1002/hpm.2883).
42. Purnamasari T, Puspadari DA, Hasanbasri M, Hafidz F, Muttaqien M. Regional government concerns in health services in remote areas: case study on special capitation policies in North Bengkulu Regency. *BIO Web of Conferences* 2020;28(1):05003. doi: [10.1051/bioconf/20202805003](https://doi.org/10.1051/bioconf/20202805003).
43. Sulistyaningrum IH, Kristina SA, Mukti AG, Kusnadi SA. Analysis of chronic disease direct cost at public primary health cares in Indonesia. *Bangladesh J Med Sci* 2021;20(4):762-7. doi: [10.3329/bjms.v20i4.54131](https://doi.org/10.3329/bjms.v20i4.54131).
44. Sulistyaningrum IH, Kristina SA, Mukti AG, Kusnadi SA. The normative cost of twenty most prominent diseases in Yogyakarta, Indonesia: a Delphi consensus study. *Bangladesh J Med Sci* 2022;21(2):291-301. doi: [10.3329/bjms.v21i2.58061](https://doi.org/10.3329/bjms.v21i2.58061).
45. Putri NK, Purwaningrum F, Thabrany H, Khotimah EH. Theory-practice gap of capitation payment in the Indonesian national health insurance: toward universal health coverage. *Int J Health Gov* 2024;29(1):5-20. doi: [10.3329/bjms.v21i2.58061](https://doi.org/10.3329/bjms.v21i2.58061).
46. Jing L, Bai J, Sun X, Zakus D, Lou J, Li M, et al. NRCMS capitation reform and effect evaluation in Pudong new area of Shanghai. *Int J Health Plann Manage* 2016;31(3):e131-57. doi: [10.1002/hpm.2302](https://doi.org/10.1002/hpm.2302).
47. Wang Y, Shu Z, Gu J, Sun X, Jing L, Bai J, et al.

- Evidence for capitation reform in a new rural cooperative medical scheme in Pudong new area, Shanghai: a longitudinal study. *Int J Health Plann Manage* 2017;32(3):307-16. doi: [10.1002/hpm.2432](https://doi.org/10.1002/hpm.2432).
48. Wei X, Li H, Yang N, Wong SY, Chong MC, Shi L, et al. Changes in the perceived quality of primary care in Shanghai and Shenzhen, China: a difference-in-difference analysis. *Bull World Health Organ* 2015;93(6):407-16. doi: [10.2471/BLT.14.139527](https://doi.org/10.2471/BLT.14.139527).
 49. Yin J, Wei X, Li H, Jiang Y, Mao C. Assessing the impact of general practitioner team service on perceived quality of care among patients with non-communicable diseases in China: a natural experimental study. *Int J Qual Health Care* 2016;28(5):554-60. doi: [10.1093/intqhc/mzw075](https://doi.org/10.1093/intqhc/mzw075).
 50. Powell-Jackson T, Yip WC, Han W. Realigning demand and supply side incentives to improve primary health care seeking in rural China. *Health Econ* 2015;24(6):755-72. doi: [10.1002/hec.3060](https://doi.org/10.1002/hec.3060).
 51. Esmaeili R, Hadian M, Rashidian A, Shariati M, Ghaderi H. The experience of risk-adjusted capitation payment for family physicians in Iran: a qualitative study. *Iran Red Crescent Med J* 2016;18(4):e23782. doi: [10.5812/ircmj.23782](https://doi.org/10.5812/ircmj.23782).
 52. Nosratnejad S, Esmaeili R, Tabrizi JS, Mahboub-Ahari A. Development of age-sex adjusted capitation payment: the experience of Iranian public health complexes. *Int J Health Plann Manage* 2019;34(1):e183-93. doi: [10.1002/hpm.2631](https://doi.org/10.1002/hpm.2631).
 53. Rafiei N, Vatankhah S, Kabir MJ. Primary care physician payment mechanisms toward universal health coverage: a study of Iran and selected countries. *Int J Health Plann Manage* 2022;37(1):372-86. doi: [10.1002/hpm.3340](https://doi.org/10.1002/hpm.3340).
 54. Guillon M, Mathonnat J, Naranituya B, Dorjmyagmar B, Enkhtsetseg E. Exploring the efficiency of primary health care provision in rural and sparsely populated areas: a case study from Mongolia. *Health Policy Plan* 2022;37(7):822-35. doi: [10.1093/heapol/czac042](https://doi.org/10.1093/heapol/czac042).
 55. Siita S, Cox SE, Hanson K. Does capitation affect patient satisfaction and prevalence of out-of-pocket payments in the insured? A propensity score analysis of Ghana's demographic and health survey data. *BMC Health Serv Res* 2019;19:732. doi: [10.1186/s12913-019-4581-4](https://doi.org/10.1186/s12913-019-4581-4).
 56. Koduah A, van Dijk H, Agyepong IA. Technical analysis, contestation and politics in policy agenda setting and implementation: the rise and fall of primary care maternal services from Ghana's capitation policy. *BMC Health Serv Res* 2016;16:323. doi: [10.1186/s12913-016-1576-2](https://doi.org/10.1186/s12913-016-1576-2).
 57. Andoh-Adjei FX, Nsiah-Boateng E, Asante FA, Spaan E, van der Velden K. Perception of quality health care delivery under capitation payment: a cross-sectional survey of health insurance subscribers and providers in Ghana. *BMC Fam Pract* 2018;19(1):37. doi: [10.1186/s12875-018-0727-4](https://doi.org/10.1186/s12875-018-0727-4).
 58. Yambah JK, Mensah KA, Kuunibe N, Laar K, Atinga RA, Ofori Boateng M, et al. The effect of the capitation policy withdrawal on maternal health service provision in Ashanti Region, Ghana: an interrupted time series analysis. *Glob Health Res Policy* 2022;7(1):38. doi: [10.1186/s41256-022-00271-1](https://doi.org/10.1186/s41256-022-00271-1).
 59. Aikins M, Tabong PT, Salari P, Tediosi F, Asenso-Boadi FM, Akweongo P. Positioning the National Health Insurance for financial sustainability and Universal Health Coverage in Ghana: a qualitative study among key stakeholders. *PLoS One* 2021;16(6):e0253109. doi: [10.1371/journal.pone.0253109](https://doi.org/10.1371/journal.pone.0253109).
 60. Andoh-Adjei FX, Spaan E, Asante FA, Mensah SA, van der Velden K. A narrative synthesis of illustrative evidence on effects of capitation payment for primary care: lessons for Ghana and other low/middle-income countries. *Ghana Med J* 2016;50(4):207-19. doi: [10.4314/gmj.v50i4.3](https://doi.org/10.4314/gmj.v50i4.3).
 61. Andoh-Adjei FX, Cornelissen D, Asante FA, Spaan E, van der Velden K. Does capitation payment under national health insurance affect subscribers' trust in their primary care provider? A cross-sectional survey of insurance subscribers in Ghana. *BMC Health Serv Res* 2016;16(1):437. doi: [10.1186/s12913-016-1622-0](https://doi.org/10.1186/s12913-016-1622-0).
 62. Sackey FG, Amponsah PN. Willingness to accept capitation payment system under the Ghana National Health Insurance policy: do income levels matter? *Health Econ Rev* 2017;7(1):38. doi: [10.1186/s13561-017-0175-1](https://doi.org/10.1186/s13561-017-0175-1).
 63. Andoh-Adjei FX, van der Wal R, Nsiah-Boateng E, Asante FA, van der Velden K, Spaan E. Does a provider payment method affect membership retention in a health insurance scheme? a mixed method study of Ghana's capitation payment for primary care. *BMC Health Serv Res* 2018;18(1):52. doi: [10.1186/s12913-018-2859-6](https://doi.org/10.1186/s12913-018-2859-6).
 64. Andoh-Adjei FX, Nsiah-Boateng E, Asante FA, Velden KV, Spaan E. Provider preference for payment method under a national health insurance scheme: a survey of health insurance-credentialed health care providers in Ghana. *PLoS One* 2019;14(8):e0221195. doi: [10.1371/journal.pone.0221195](https://doi.org/10.1371/journal.pone.0221195).
 65. Khodjamurodov G, Sodiqova D, Akkazieva B, Rechel B. Tajikistan: health system review. *Health Syst Transit* 2016;18(1):1-114.
 66. Verulava T, Jorbenadze A. Primary health care reforms in Georgia: the experience and challenges. *Arch Balk Med Union* 2022;57(4):384-9. doi: [10.31688/ABMU.2022.57.4.07](https://doi.org/10.31688/ABMU.2022.57.4.07).
 67. Singh D, Prinja S, Bahuguna P, Chauhan AS, Guinness L, Sharma S, et al. Cost of scaling-up comprehensive primary health care in India: implications for universal health coverage. *Health Policy Plan* 2021;36(4):407-17. doi: [10.1093/heapol/czaa157](https://doi.org/10.1093/heapol/czaa157).
 68. Koricho M, Zerayacob T, Abebe F, Argaw M, Mengistu D, Birhane F, et al. An assessment of provider payment mechanisms (PPMs) in Ethiopia: implications for redesign of PPMs and progress toward universal health coverage. *Health Syst Reform* 2024;10(1):2377620. doi: [10.1080/23288604.2024.2377620](https://doi.org/10.1080/23288604.2024.2377620).
 69. Aarons GA, Hurlburt M, Horwitz SM. Advancing a conceptual model of evidence-based practice implementation in public service sectors. *Adm Policy Ment Health* 2011;38(1):4-23. doi: [10.1007/s10488-010-0327-7](https://doi.org/10.1007/s10488-010-0327-7).
 70. Proctor E, Silmere H, Raghavan R, Hovmand P, Aarons G, Bunger A, et al. Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. *Adm Policy Ment Health* 2011;38(2):65-76. doi: [10.1007/s10488-010-0319-7](https://doi.org/10.1007/s10488-010-0319-7).
 71. Laokri S, Soelaeman R, Hotchkiss DR. Assessing out-of-

- pocket expenditures for primary health care: how responsive is the Democratic Republic of Congo health system to providing financial risk protection? *BMC Health Serv Res* 2018;18(1):451. doi: [10.1186/s12913-018-3211-x](https://doi.org/10.1186/s12913-018-3211-x).
72. Purvis RS, Abraham TH, Long CR, Stewart MK, Warmack TS, McElfish PA. Qualitative study of participants' perceptions and preferences regarding research dissemination. *AJOB Empir Bioeth* 2017;8(2):69-74. doi: [10.1080/23294515.2017.1310146](https://doi.org/10.1080/23294515.2017.1310146).
 73. Mash R. The contribution of family medicine to African health systems. *Afr J Prim Health Care Fam Med* 2016;8(1):e1-2. doi: [10.4102/phcfm.v8i1.1251](https://doi.org/10.4102/phcfm.v8i1.1251).
 74. Sun X, Lv B, Gao X, Meng K. Can the allocation of primary health care system resources affect efficiency? A spatial Dubin model study in China. *BMC Prim Care* 2024;25(1):62. doi: [10.1186/s12875-024-02290-y](https://doi.org/10.1186/s12875-024-02290-y).
 75. Sun Z, Chaichana T. A systematic review of computational fluid dynamics in type B aortic dissection. *Int J Cardiol* 2016;210:28-31. doi: [10.1016/j.ijcard.2016.02.099](https://doi.org/10.1016/j.ijcard.2016.02.099).
 76. Chaichana T, Sun Z. Epidemiological relationship of photoplethysmography signal derived from arterial stiffness and blood pressure to coronary artery disease: a systematic review. *Vajira Med J* 2024;68(3):e268820. doi: [10.62691/vmj.2024.268820](https://doi.org/10.62691/vmj.2024.268820).