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# Impact of Multi-Payers' Capitation Model on Service Utilization in Primary Health Centres of Bayelsa State, Nigeria: A Retrospective Study

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## ABSTRACT

***Background:*** *This study assessed the impact of a multi-payer capitation model on service utilization patterns and enrollment dynamics in primary health centers (PHCs) across Bayelsa State, Nigeria. The capitation system aimed to enhance healthcare access and incentivize preventive care, particularly for maternal and child health services amidst varying socio-demographic characteristics across Local Government Areas (LGAs).*

***Methods:*** *A retrospective observational design was employed, analyzing existing records from 105 PHCs serving catchment populations of approximately 10,000 residents each. Data were collected from routine facility records, including enrollment registers, service utilization logs, and capitation payment ledgers from multiple payers such as NPHCDA Gateway, NHIS Gateway, UNICEF/GAVI, and others. Statistical analyses were conducted to explore associations between capitation characteristics and key utilization indicators over the study period from 2023 to 2025.*

***Results:*** *The findings revealed a significant increase in service utilization, with general attendance visits rising from 647,467 in 2023 to 1,033,692 in 2025. Specific services, including antenatal care and deliveries attended by skilled birth attendants, also experienced substantial growth. Notably, the data indicated a higher female representation in enrollment across all LGAs, which correlated with increased utilization of maternal health services. However, disparities in service utilization relative to enrollment numbers were observed, suggesting barriers to effective engagement.*

***Conclusion:*** *The multi-payer capitation model positively influenced service utilization in primary healthcare settings, particularly for maternal and child health services. The study underscored the importance of enhanced coordination among payers and the need for improved outreach strategies to optimize engagement and health outcomes in Bayelsa State. Continued investment in the capitation framework was deemed essential for sustaining healthcare access and improving overall health outcomes for vulnerable populations.*

## Keywords
Capitation, Primary healthcare, Service utilization, Enrollment dynamics, Health outcomes, Preventive care.

## Introduction
Capitation was a payment approach that provided a fixed amount per enrolled individual per period to providers or networks, regardless of the number or type of services used, with the aim of aligning financial incentives toward efficiency, prevention, and coordinated care [1]. Payers encompassed governments, private insurers, and integrated delivery systems, and the model was implemented across diverse economies to curb rising costs and to influence utilization patterns [2]. In many settings, capitation was designed to transfer financial risk to providers, paired with risk adjustment and quality incentives to mitigate under-service, while attempting to preserve or improve access for populations. Across high-income countries,

capitation often operated alongside gatekeeping, tiered networks, and risk-based contracting, which tend to reduce unnecessary specialist visits and inpatient admissions when accompanied by robust data systems and care coordination infrastructure. In several instances, capitation led to greater emphasis on primary care and chronic disease management, with providers striving to keep populations healthy through preventive services, early management of conditions, and effective referral practices. Some evaluations indicated improved delivery of routine preventive services, such as screenings and vaccinations, particularly when capitation was integrated with care management programs and performance feedback. Yet, there were also concerns about under-utilization or delayed utilization of high-cost services in settings with tight capitation or weak risk adjustment, suggesting the need for ongoing monitoring and corrective mechanisms. Utilization patterns varied by geography and income level. In high-income regions, capitation frequently coexisted with comprehensive information technology, standardized measurement, and professional standards that supported coordinated care and utilization control. In middle- and low-income environments, challenges included limited data availability, insufficient administrative capacity, and variable engagement from providers, which affected the reliability of risk pooling and could constrain equitable access. Cross-country comparisons noted that the impact on utilization depended heavily on governance, regulatory frameworks, presence of complementary payment reforms (such as blended payments or performance bonuses), and the strength of primary care networks. Provider incentives under capitation tend to shift care toward outpatient, primary-care–driven models, with increased attention to continuity and prevention, and more emphasis on care coordination and management of chronic diseases. Some studies reported improvements in care continuity and patient experience when capitation was paired with mature information systems and decision-support tools. Conversely, incentives that rewarded volume or inadequately adjusted risk could lead to selective service provision, cream-skimming, or restricted access for high-cost patients in certain contexts [3]. Quality outcomes were mixed; while some systems maintained or improved quality indicators with appropriate monitoring, others experienced declines when oversight was insufficient or when risk adjustment was inadequate. Access generally improved for enrolled populations through better care coordination, yet disparities emerged if networks were narrow or if vulnerable groups faced enrollment or financing barriers. Equity outcomes depended on how risk adjustment accounted for heterogeneity, how inclusive enrollment was, and how transparent performance measurement remained. From a cost and sustainability viewpoint, capitation frequently supported cost containment through standardized payments and a focus on primary-care–driven management of chronic conditions. Financial viability depended on accurate enrollment, robust risk stratification, and the availability of supplementary payments to support high-need patients and innovative care models. Some evaluations highlighted governance requirements to prevent under-service and ensure resources for high-cost cases, especially where populations faced significant disease burdens or where care fragmentation existed. Policy design elements such as risk adjustment accuracy, enrollment accuracy, network configuration, gatekeeping, and blended payment mix shaped utilization outcomes by aligning incentives with efficient, appropriate care while preserving access. Quality measurement, accountability mechanisms, and continuous data analytics were critical to monitor utilization, control costs, and protect equity.

The multi-payer model of capitation in the Nigerian experience was described as a payment reform in which providers or networks received a fixed per-member-per-period amount to manage a defined population, with the aim of encouraging cost containment, preventive care, and coordinated service delivery, while transferring financial risk to providers within a mixed payer environment that included government schemes, private insurers, and employer-based plans [2]. In practice, capitation arrangements were implemented within certain primary health care programs and private sector schemes, accompanied by risk pools, gatekeeping, and activity-based incentives intended to steer utilization toward primary care and appropriate referral pathways, though the depth and breadth of implementation varied across states and programmatic contexts.

Utilization patterns under Nigerian capitation experiences tend to show shifts toward stronger primary care engagement and enhanced emphasis on the management of chronic conditions and maternal–child health services, as providers faced fixed payments that incentivized keeping populations healthy and reducing unnecessary hospital visits. Some evaluations indicated improvements in preventive service uptake, routine screenings, and vaccination coverage when capitation was paired with robust care coordination, standardized guidelines, and monitoring mechanisms; however, these gains were not universal and depended on the strength of enrollment, data systems, and governance. In several contexts, concerns emerged about potential under-utilization of high-cost services, cream-skimming, or selection of healthier enrollees when risk adjustment and oversight were weak or when capacity to manage high-needs patients was insufficient, highlighting the importance of risk stratification and continuous quality assurance. Geographically, utilization effects reflected Nigeria's federal structure and state-level implementation, with variations across northern and southern regions, urban and rural settings, and public versus private delivery environments. In some states, capitation arrangements operated within primary health care reform efforts that sought to universalize basic care access, promote gatekeeping, and align incentives for community-based preventive services; in others, capitation remained limited or experimental, with inconsistent enrollment and weaker data systems, which constrained reliable risk pooling and accurate utilization monitoring. Cross-cutting factors influencing utilization included governance quality, the regulatory environment, the design of mix payment approaches (such as combining capitation with performance bonuses or fee-for-service components in certain schemes), and the presence of functional health information systems to track enrollment, service use, and outcomes. Provider

behaviour under Nigerian capitation models tend to shift toward more outpatient, primary-care–driven management, with a greater focus on continuity of care, patient education, and referral efficiency when capitation was implemented with clear guidelines and performance feedback. Some programs reported improvements in service delivery indicators, including antenatal care attendance, childhood immunization rates, and chronic disease management metrics, alongside better patient experience through more regular follow-up and appointment adherence. Conversely, where risk adjustment was inadequately developed, enrollment was unstable, or monitoring was weak, providers sometimes limited services that appeared financially unrewarding, delayed referrals for high-cost interventions, or exercised caution in admitting complex cases, potentially dampening access to necessary care for the most vulnerable populations. Quality, access, and equity considerations in the Nigerian experience were mixed. In settings with robust governance, transparent performance measurement, and payer collaboration, quality indicators and access to essential services generally improved for enrolled groups, though disparities persisted between underserved communities and better-served urban populations. Equity concerns centred on ensuring that high-need and marginalized groups secured adequate enrollment and risk protection, and that rural populations maintained timely access to essential services despite potential administrative hurdles. Cost containment outcomes were observed in some pilot programs through standardized capitation payments and emphasis on preventive care, though financial sustainability hinged on accurate enrollment, reliable data systems, and the integration of supplementary payments to support high-cost cases and complex care pathways. Policy design elements that shaped utilization in Nigeria included the precision of enrollment processes and eligibility rules, the adequacy of risk adjustment to reflect health status and comorbidity, the configuration of networks and gatekeeping to optimize access and referral efficiency, and the use of blended payment models to balance incentives between cost control and high-quality care. Information technology capacity and data analytics were critical for monitoring utilization, assessing risk pools, and guiding corrective actions. Stakeholders identified the need for ongoing governance, transparency, and stakeholder engagement to sustain gains in utilization while protecting access and equity. Scholarly observations specific to the Nigerian context indicated that capitation could influence utilization when coupled with strong primary health care reforms, clear contract terms, and active monitoring, though results depended on state-level execution, funding stability, and the ability to harmonize public and private payer ambitions [4,5]. Some studies suggested that capitation-based approaches in Nigeria had potential to reduce unnecessary facility-based utilization and foster preventive care, but they required robust risk adjustment, comprehensive enrollment coverage, and reliable health information systems to avoid under-utilization and inequities. As Lagos, Kano, and several other states pursued primary care strengthening and payment reform pilots, early indicators pointed to incremental improvements in service use for maternal and child health, outpatient management of chronic diseases, and immunization uptake where capitation arrangements were effectively integrated with governance, supervision, and data-driven management [6].

## Statement of the Problem

The study examined Bayelsa State's primary health care system where a multiple-payers mix model operated with fixed capitation rates, unprecedented funding from diverse payers, and fragmented payment methods, all of which coincided with heterogeneous enrolment dynamics. Some payers prioritized disease burden in their allocations, others targeted the poor and vulnerable, and yet others focused on vulnerable women and children, each employing different risk-pooling approaches; this fragmentation occurred amid perceived poor coordination and administrative challenges among payers and implementing agencies. Moreover, several payer programs had short life cycles, leaving substantial vacuum and discontinuities once programs exited, which disrupted funding continuity, supply reliability, and staffing stability. Consequently, service utilization dynamics were affected through irregular and uneven funding streams, delays or gaps in reimbursements, and misaligned incentives, undermining predictable access to preventive and curative services, reducing continuity of care, and destabilizing enrolment across health facilities. In this context, the study sought to determine how the combination of differential capitation rates, fragmented and varied budgeting, disparate enrolment priorities, short-lived payer programs, and diverse risk-pooling approaches influenced trends in utilization—such as general attendances, immunizations, maternal and child health services—and enrolment dynamics at the facility level within Bayelsa State.

## Justification of the Study

The study was justified by the need to understand how a primary health centres serving a catchment population of 10,000 could effectively meet the health needs of each ward within districts that spanned both rural and urban geographies. The facilities provided a comprehensive set of services for communicable and non-communicable diseases, including diabetes mellitus screening, hypertension screening, malaria diagnosis and treatment, diarrhea management, pneumonia care, immunization services, antenatal care, deliveries, and laboratory services utilizing rapid diagnostic tests (RDT) and microscopy. This breadth of services situated the centre as a pivotal frontline interface within a multi-payer framework, where understanding the operability of service platforms, utilization patterns, and payer mechanisms held critical policy and practice relevance for improving health outcomes in Bayelsa State. The justification stemmed from recognizing that a ward-based health need profile could only be addressed through integrated service delivery that harmonized preventive, curative, and emergency services within a PHC setting. The study acknowledged that the geospatial distribution of facilities across rural and urban zones necessitated an examination of how access barriers, referral linkages, and utilization behaviours differed by location. It was thus essential to explore whether the service platform—comprising immunization campaigns, ANC visits, safe deliveries, malaria diagnostics, and chronic disease screening—was sufficiently

resilient to fluctuating demand and capable of supporting efficient patient flow under a multi-payer financing regime. The inclusion of basic emergency obstetric care (basic emergency obstetric care) considerations within the platform further underscored the urgency of assessing readiness, timely referral pathways, and the capacity to manage obstetric emergencies across the catchment. The study also justified its focus on service utilization within a multi-payer context because payers design and reimbursement workflows influenced patient access, affordability and continuity of care. Capitation payments, pooled risk arrangements, and cross-subsidization across NPHCDA Gateway, NHIA Gateway, UNICEF/GAVI, GAC/CHAI, and Bayelsa Equity Fund created incentives and constraints that could modify provider behaviour, resource allocation, and clinical decision-making. By examining utilization patterns for ANC, immunizations, deliveries, malaria management, and chronic disease screening, the study sought to determine whether the payment architecture promoted or hindered preventive service uptake, timely treatment, and adherence to clinical guidelines. The explicit emphasis on RDT and microscopy within laboratory services highlighted how diagnostic capacity and turnaround times affected patient trust, treatment accuracy, and health outcomes, thereby justifying precise measurement of service quality and efficiency. From a methodological standpoint, the study justified the use of a holistic framework that integrated governance, financing, service delivery, and health outcomes because previous literature indicated that isolated analyses of one component could misrepresent system performance in multi-payer environments. The diverse service portfolio provided by the PHC—ranging from preventive immunizations to acute care for pneumonia and malaria, to chronic disease screening—required a comprehensive assessment to capture how systemic factors interacted to shape care accessibility and quality across both rural and urban wards. The geography of service locations, with catchments that spanned multiple wards, necessitated attention to equity considerations, including potential disparities in access, utilization, and health outcomes between populations in differing locales. In summary, the study's justification rested on the premise that understanding how a capable PHC platform functioned within a complex multi-payer financing arrangement was essential for identifying bottlenecks, informing policy reforms, and guiding resource allocation aimed at improving maternal and child health, infectious disease control, chronic disease prevention, and emergency obstetric care. The findings were anticipated to yield actionable insights for strengthening governance mechanisms, optimizing reimbursement flows, enhancing the efficiency and equity of service delivery, and ultimately improving health outcomes for the 10,000-strong catchment across rural and urban wards.

## General Objective

To assess how a multiple-payers capitation model in Bayelsa State's primary health care influenced service utilization patterns and enrolment dynamics at the facility level, using retrospective data and focusing on the interplay between capitation variations, funding flows, and enrolment outcomes.

## Specific Objectives

a) To describe the structure of the payer mix, including the number of payers, capitation rates, budgeting scales, payment modalities, and program lifecycles in Bayelsa State PHC.
b) To examine associations between capitation characteristics (rate, timeliness, and total funding) and key utilization indicators (general attendance, immunization uptake, antenatal and delivery services, and family planning services) across facilities and over time.
c) To evaluate how different enrolment dynamics (stability, churn, and expansion) related to payer priorities (disease burden focus, poverty targeting, and protection of vulnerable groups such as women and children) and risk-pooling approaches.
d) To assess the impact of payment fragmentation and coordination challenges on service delivery continuity, supply availability, and staffing stability, and how these factors mediated utilization and enrolment trends.
e) To explore whether program life-cycle length of payers influenced funding continuity, service delivery, and enrolment retention, and identify periods of vulnerability related to payer exits.
f) To identify contextual factors (geography, facility type, and socioeconomic characteristics) that moderated the relationships between capitation streams and utilization/enrolment outcomes.
g) To generate evidence-informed recommendations for improving governance, data systems, and payment arrangements to enhance timely reimbursements, reduce fragmentation, and strengthen enrolment stability in Bayelsa State PHC.

## Research Questions

a) What relationships existed between capitation characteristics (rates, timeliness, total funding) and service utilization indicators (general attendances, immunization uptake, antenatal and delivery services, family planning) across health centres and LGAs?
b) How did payer mix (government, NGOs, private, and mixed streams) influence enrolment stability, churn, and expansion at health centres within different LGAs?
c) In what ways did payment fragmentation and coordination challenges affect service delivery continuity, supply availability, and staffing stability across LGAs?
d) Did program life-cycle lengths of payers correlate with funding continuity and enrolment retention, and were there identifiable periods of vulnerability when payers exited in various LGAs?
e) How did different risk-pooling approaches and payer priorities (disease burden focus, poverty targeting, protection of vulnerable groups such as women and children) relate to utilization patterns and enrolment dynamics across LGAs?
f) What contextual factors (geography, facility type, catchment characteristics, and socioeconomic conditions) moderated the associations between capitation streams and utilization/

enrolment outcomes across LGAs?

g) What evidence emerged on governance and data systems that could have improved timeliness of reimbursements, reduced fragmentation, and strengthened enrolment stability across health centres in the studied LGAs?

## Scope and Limitation of the Study

### Scope

The retrospective study examined the impact of multiple payers under a capitation financing arrangement on healthcare utilization at primary health centres (PHCs) in Bayelsa State. It focused on PHCs that served a catchment population of 10,000 and operated across both rural and urban wards, offering a broad package of services including communicable and non-communicable disease management (such as diabetes mellitus screening, hypertension screening, malaria diagnosis and treatment, diarrhea management, and pneumonia care), immunization services, antenatal care (ANC), deliveries, and laboratory diagnostics using rapid diagnostic tests (RDT) and microscopy. The analysis considered utilization indicators relevant to a multi-payer context, such as general attendances, ANC attendance, facility-based deliveries, immunization uptake, malaria testing and treatment rates, chronic disease screening, and referral frequencies, with particular attention to how capitation payments from NPHCDA Gateway, NHIA Gateway, UNICEF/GAVI, GAC/CHAI, and the Bayelsa Equity Fund influenced patterns of access and use over the study period. The scope also encompassed examination of governance aspects, data quality, and the reliability of reimbursement flows as they related to observed utilization trends, while situating findings within the broader policy framework of Bayelsa State's primary healthcare system and multi-payer financing environment.

### Limitations

The study's limitations included its retrospective design, which constrained causal inferences about the relationship between capitation and utilization due to potential unmeasured confounding and temporal changes. Data quality posed a constraint, as reliance on routine facility records could involve missing, incomplete, or inconsistently documented entries, particularly for enrolment figures, payment receipts, and service utilization across payers' streams. The scope was limited to PHCs within Bayelsa State and might not be generalizable to other states or to PHCs with different catchment sizes, resource endowments, or payer configurations. The cross-sectional snapshot nature of certain utilization indicators could hinder the assessment of longer-term trends and lag effects of payer reforms on service use. Additionally, variations in documentation standards, reporting practices across facilities, and potential under-reporting of informal sector enrolment could have biased estimates of payer-specific utilization. Finally, policy shifts, reimbursement delays, or changes in capitation rates during the study period could have influenced utilization independently of historical payer mechanisms, limiting the precision of attributing observed effects to the multi-payer capitation model.

## Literature Review

Capitation payment, defined as a fixed payment per enrolled individual to cover a defined set of health services over a specified period, had emerged as a prominent provider-payment mechanism in global health financing debates, particularly for its potential to strengthen primary healthcare and advance universal health coverage (UHC). Its appeal lies in shifting financial risk to providers, incentivizing the efficient use of resources, and promoting population health management and continuity of care. In global discussions, capitation was often presented as a foundational element of strong primary healthcare systems and a mechanism for aligning incentives toward preventive and chronic care management, which were central to UHC goals of expanding access, improving quality, and reducing financial hardship. The theoretical rationale for capitation rests on the premise that a per-capita payment, when coupled with well-defined benefit packages, enrolment, risk adjustment, and robust governance, creates budget certainty for payers and predictable access points for patients, while encouraging providers to invest in preventive services, care coordination, and the efficient management of chronic conditions. This alignment with primary care fortifies the gatekeeping function of primary healthcare, reduces unnecessary higher-cost hospital utilization, and supports equity, provided that policies are designed with explicit attention to protecting vulnerable populations and ensuring service coverage for high-need patients [7]. Empirical evidence worldwide presented a nuanced portrait of capitation's impact on utilization and health system performance. In high-income settings, capitation—often blended with other payment modalities such as pay-for-performance or capitation-with-supplementary incentives—had yielded mixed results. Some programs demonstrated improved access to preventive services, greater continuity of care, and better care coordination under capitation when risk pools were adequately sized, enrolment was broad, and quality monitoring was rigorous (ANC). Other studies raised concerns about under-provision for high-need patients or restricted utilization of costly services when risk adjustment is imperfect or when quality safeguards were weak. For example, from empirical evidence and contexts, it was suggested that capitation could enhance preventive service uptake and continuity if contracts were designed to avoid under-treatment and to align incentives with population health objectives, but under-provision and inequities could arise in the absence of robust risk adjustment and monitoring mechanisms. The overarching lesson was that capitation's effect on utilization was highly contingent on contract design elements, including the scope of services, the degree of risk adjustment, the presence of performance incentives, the timeliness of payments, and the governance framework that ensures accountability and quality [10]. In low- and middle-income countries, capitation had gained traction as part of broader health financing reforms aimed at expanding coverage and strengthening primary healthcare. The literature indicated that capitation could support improved access and continuity of care when embedded in national health insurance schemes or social health protection programs that define a clear essential services package and deliver timely reimbursements [11]. However, in low- and middle-income

countries' contexts also reveal vulnerabilities: capitation rates that inadequately reflect local cost structures or disease burden could lead to under-provision, especially for high-cost or high-need patients. Administrative constraints might hamper enrolment, risk adjustment, and data collection; and supply-side bottlenecks, supply chain disruptions, and workforce shortages could blunt potential utilization gains [12]. In such settings, the success of capitation hinges on robust mechanism design, including risk adjustment to protect vulnerable groups, transparent beneficiary enrolment, reliable information systems for monitoring utilization and costs, and strong quality assurance to deter under-service. When these elements were in place, capitation has the potential to improve access to essential services, encourage preventive care, and promote efficient management of chronic diseases at the primary healthcare level, which aligned with UHC aims to reduce catastrophic health expenditures and improve equity in service utilization [11]. A primary care focus was central to evaluating capitation's relevance for UHC. Capitation's emphasis on a defined enrolled population and per-capita payments could incentivize providers to invest in longitudinal patient relationships, preventive care, and proactive management of chronic conditions, thereby potentially shifting utilization toward primary healthcare services and away from high-cost episodic care. Yet a persistent concern in primary healthcare-centred capitation is the risk of under-service or gatekeeping distortions if providers face financial penalties for higher-cost patients or if risk adjustment inadequately captures case mix. Consequently, robust risk stratification, adequate incentives to address high-need patients, and ongoing quality measurement become essential design features. Studies exploring primary healthcare under capitation frequently highlighted the importance of clearly defined benefit packages, standardized clinical guidelines, enrolment portability, and continuous data-driven feedback loops to monitor utilization, costs, and outcomes. These elements help ensure that capitation supports equitable access to needed services without compromising care quality, particularly for vulnerable groups who might have higher utilization needs. A nuanced understanding of health system financing interactions was also warranted. Capitation rarely operates in isolation; it was typically embedded within broader mix of provider payments, regulatory standards, and social health protection schemes. The presence of complementary financing mechanisms—such as salary-based public provider payments, performance-based incentives, or capitation-without-payment for certain essential services—could significantly shape utilization responses. The literature suggested that when capitation is harmonized with performance-based payments tied to quality and process measures, providers might sustain or improve utilization of preventive and chronic care services without compromising acute or high-cost services, provided risk adjustment and financing sufficiency were adequate. Conversely, poorly calibrated blends might produce perverse incentives towards risk selection, patient avoidance, or under-provision of complex care needs, undermining UHC objectives. Risk adjustment emerges as a critical determinant of equity under capitation. Without effective adjustments for age, co-morbidity, socio-economic status, and other determinants of health care costs, capitation could inadvertently disincentivize care for high-cost individuals, potentially widening disparities in utilization and health outcomes. Therefore, a successful capitation model for UHC emphasizes transparent risk adjustment methodologies, supplementary payments for high-need populations, and targeted subsidies to ensure access to essential services for the poor and marginalized. Equity-focused design features, coupled with enforcement mechanisms and stakeholder accountability, help reconcile efficiency aims with the moral and policy imperative of equitable access, a central tenet of UHC [13,14]. Ensuring universal access to essential services requires explicit attention to marginalized groups, including the poor, rural residents, women, people with disabilities, and those with chronic illnesses who typically require more resources. Equity-oriented design features—such as risk-adjusted capitation rates, additional subsidies for high-need populations, and targeted outreach for underserved communities—were consistently advocated in the literature as means to prevent widening gaps in service utilization. Transparent criteria for enrolment, portability of benefits across primary healthcare, and grievance redress mechanisms further reinforce trust and sustained utilization in primary healthcare under capitation. Quality assurance and accountability were indispensable complements to capitation. To avoid a deterioration in care quality in the pursuit of cost containment, capitation schemes often integrate quality metrics, performance incentives, clinical governance structures, and patient feedback processes. The literature consistently underscored that the mere introduction of capitation does not guarantee improved utilization or outcomes; rather, success depends on the alignment of payment incentives with evidence-based practice, patient-centred care, and measurable quality standards [15]. In primary healthcare, quality safeguards might include standardized essential service packages, regular clinical audits, continuous professional development, and robust referral and care coordination pathways to ensure that preventive and chronic care were delivered appropriately while not deterring necessary higher-level services when indicated [16]. From a policy perspective, the context of implementation—such as enrolment strategies (mandatory versus voluntary), portability of benefits, governance arrangements, and the reliability of capitation payments—significantly shapes utilization patterns and equity outcomes. Enrolment breadth, portability across levels of care, and the speed and predictability of reimbursements influence provider behaviour and patient access. In settings with weak administrative capacity or delayed payments, facilities might face cash-flow disruptions that undermine service delivery and patient trust, thereby dampening utilization gains. Conversely, transparent governance, straightforward enrolment processes, and dependable reimbursement cycles could facilitate consistent primary healthcare utilization, improved care continuity, and a stronger primary healthcare foundation for UHC [1,17]. From program design standpoint, the literature emphasized iterative learning and contextualization. Capitation programs should be accompanied by phased implementation, pilot testing in diverse primary healthcare settings, and continuous monitoring with feedback loops that inform rate setting, risk-adjustment refinement, and quality

assurance. In practice, this translates into establishing clear lines of accountability among payers, providers, and regulatory bodies, with transparent reporting of utilization trends, spending, and health outcomes disaggregated by sociodemographic groups to detect and address disparities. For Bayelsa State, operationalizing these insights entailed mapping primary healthcare networks, delineating enrolled populations at the community level, and ensuring that information systems capture patient-level utilization data across facilities. Training for health workers on capitation-based workflows, including population health management, preventive care protocols, and referral criteria under a capitation regime, was integral to maximizing potential utilization gains while maintaining quality. In the African context, several country experiences offer a relevant cautionary and instructive lessons. Pilot experiences in countries such as Ghana, Tanzania, and Kenya illustrated that capitation could expand primary care access and improve continuity when coupled with strong governance and credible financial flows, but there were concerns about equity and quality if the schemes do not adequately protect vulnerable populations or failed to adequately remunerate high-need patients [12]. Moreover, regional cross-country analyses underscored the importance of local epidemiology, workforce distribution, and facility readiness in shaping how capitation translates into utilization changes at the primary healthcare level. For Bayelsa State, this implies a tailored capitation design fit in state's disease burden profile (e.g., malaria, infectious diseases, NCDs), catchment population sizes of primary healthcare, and the capacity of primary healthcare to deliver preventive and chronic care within defined packages. It also suggested prioritizing data governance, interoperability of health information systems, and capacity-building for health managers to monitor utilization metrics and respond to disparities revealed by routine data. Literally, the literature suggested that capitation could contribute positively to UHC by strengthening primary healthcare, aligning incentives for preventive and chronic care, and promoting more predictable financing for essential services, provided that several design conditions were met [11]. These included robust risk adjustment to protect the vulnerable, transparent enrolment and portability, stable and timely payments to providers, explicit and comprehensive benefit packages, and integrated quality assurance and governance structures to prevent under-service and ensure equitable access. The balance between cost containment and service provision hinges on how well these design elements were implemented, monitored, and adapted over time in response to changing population needs and health system performance. In primary healthcare-centric models, the potential for capitation to catalyze UHC depends on attuned policy packaging—combining capitation with clear service scopes, accountability frameworks, and continuous performance feedback—to realize improvements in utilization that were accessible, affordable, and aligned with the principles of equity and quality that underpin universal health coverage [18]. As Nigeria and states like Bayelsa contemplate health reform trajectories aimed at UHC, the global evidence base underscored that capitation could be a viable instrument to enhance primary healthcare utilization and progress toward UHC, but its success was contingent on thoughtful, context-sensitive design, robust data systems, and sustained governance and oversight. The Bayelsa State context raised specific relevance for applying capitation to primary healthcare. As a subnational setting within a low- and middle-income, Bayelsa shares broader regional challenges, including workforce constraints, variable supply chains, and financial fragmentation [19]. Capitation could, in principle, bolster primary healthcare by providing predictable funding for a defined population, enabling standardized essential service delivery, and incentivizing preventive care and chronic disease management at the community level. Realizing these benefits would require carefully calibrated capitation rates that reflect local service costs and epidemiological profiles, robust risk adjustment to protect vulnerable groups, reliable enrolment and portability, timely payments, and strong governance and quality assurance mechanisms. Additionally, given the potential for urban-rural disparities and socio-economic inequities in Bayelsa [20], a good designed features that explicitly address equity—such as targeted subsidies, enrolment outreach to underserved communities, and performance incentives tied to equity-focused indicators—would be essential. The reliability of data and information systems to monitor utilization, costs, and health outcomes at primary healthcare in Bayelsa would be a foundational prerequisite for evaluating the impact of capitation on utilization in a retrospective study, enabling the estimation of changes in primary healthcare utilization patterns, preventive service uptake, and referral rates before and after capitation implementation, if applicable. In theoretical terms, researchers framed capitation as a prospective payment arrangement that transferred financial risk from payers to providers while decoupling reimbursement from individual services. They posited that when capitation streams originated from multiple payers, providers faced a composite set of incentives that could shape capacity planning, service scope, and patient access. They anticipated that payer mix characteristics—such as the identity of payers (government, NGOs, private entities), payment timeliness, and differential capitation rates—would translate into observable shifts in utilization and enrolment through mechanisms related to affordability, perceived quality, and access to a broader array of PHC services [21-23]. When researchers explored effects on service utilization, they often found that mixed capitation environments yielded more stable funding streams. This stability tended to support consistent staffing, predictable clinic hours, and uninterrupted supply chains, which collectively sustained or modestly increased utilization of PHC services [24]. Across multiple contexts, indicators such as the number of primary care visits, preventive service uptake (including immunizations and screening), chronic disease management contacts, and maternal-child health interactions rose relative to baselines that preceded the introduction of mixed capitation streams [7,25]. The magnitude of these increases frequently depended on payment timeliness, sufficiency of total capitation, and the relative scale of each payer's contribution; when one payer's disbursements lagged, utilization dynamics sometimes tempered temporarily, though the overall trend remained toward higher engagement compared with single-payer configurations. Comparative studies that contrasted

mixed with single-payer capitation environments suggested that diversification could dampen funding volatility, thereby buffering utilization declines during policy shocks or budgetary shocks [26,27]. In several settings, facilities leveraged the presence of multiple capitation streams to expand outreach activities, maintain essential preventive and chronic care services, and reduce postponement of care during fiscal stress. Nonetheless, the literature also highlighted that misalignment among payers—differences in eligibility rules, reporting requirements, or performance metrics—introduced data-system complexities and attribution challenges. In such cases, aggregate utilization improved only moderately, and gains tended to be uneven across payer categories or catchment areas when analyzed at disaggregated levels. Enrolment dynamics under mixed capitation were characterized by notable stability in many studies. Consolidated funding from diverse payers often correlated with steadier enrolment trajectories, reducing abrupt churn associated with payer-specific lapses. In some contexts, enrolment grew when capitation per enrolled person remained predictable and sufficient to sustain outreach, enrolment campaigns, and continued engagement with the health system. Perceived affordability and access emerged as recurring drivers of enrolment growth or retention; when capitation payments enabled a broader service package, communities appeared more inclined to enroll and maintain contact with PHC facilities [9]. However, enrolment responses sometimes mirrored the target populations and program designs of individual payers; NGO- or private-payer dominated streams tended to steer enrolment toward populations aligned with those organizations' missions, producing spatial or demographic heterogeneity in enrolment patterns. Service scope and quality appeared to be influenced by payer mix as well. Mixed capitation streams frequently motivated health centres to broaden the service portfolio to align with payer expectations and reporting demands, encompassing immunizations, family planning, antenatal and postnatal care, and chronic disease management. Payer-specific incentives sometimes steered service prioritization toward particular domains—maternal and child health or preventive care—leading to heterogeneous utilization across service types. The degree of payer alignment mattered; when payers shared objectives and harmonized indicators, facilities demonstrated more coherent service delivery, smoother enrolment processes, and easier data attribution [23]. Conversely, misaligned incentives and divergent performance targets increased administrative burden and occasionally attenuated the potential utilization gains from mixed capitation. Payment timing and administrative burden emerged as recurrent determinants of utilization and enrolment dynamics. Timely, predictable capitation payments across payer streams supported stable staffing levels and service capacity, which translated into higher utilization and more stable enrolment. In contrast, delays or irregular disbursements undermined service uptake, particularly for outreach and preventive services. The administrative complexity of managing multiple capitation streams sometimes diverted staff attention toward reporting and compliance tasks, potentially reducing time available for direct care [28]; however, when information systems effectively integrated multiple payer requirements, facilities tended to realize more robust utilization and enrolment outcomes. Methodological considerations noted in the literature emphasized that causal inference was often limited. Most studies relied on retrospective analyses, time-series data, and facility-level observational designs rather than randomized or quasi-experimental approaches. This limitation underscored the need for disaggregated analyses to disentangle effects by payer type, service category, and population subgroup. While aggregate indicators frequently suggested improvements in utilization and enrolment with mixed capitation, deeper heterogeneity often lay beneath the surface, contingent on local context, governance arrangements, and operational capacities. From a policy perspective, findings suggested that mixed payer capitation streams could yield beneficial outcomes when governance facilitated payer coordination, standardized data collection, and alignment of population health objectives. In systems with well-integrated information systems and clear, shared incentives, utilization gains and enrolment stability tended to be more pronounced. Risks persisted where payer rules diverged, administrative burdens intensified, or payment timeliness faltered, as these factors could blunt or reverse potential benefits and exacerbate inequities across service areas and populations [29,30]. In summary, the literatures depicted a nuanced landscape in which multi-payer capitation streams often stabilized funding, broadened service scopes, and supported higher utilization and more stable enrolment in PHC settings, particularly when payments were timely, adequate, and well-coordinated across payers. Yet, the benefits were nuanced and contingent on harmonized incentives, manageable administrative demands, and robust information systems capable of integrating disparate payer requirements.

## Theoretical Framework

In Bayelsa State, analyses of health financing and outcomes began with a focus on Cost-Benefit Analysis (CBA), Cost-Effectiveness Analysis (CEA), Cost-of-Illness Studies (COI), and the Theory of Risk and Insurance to understand the operations and implications of the social health insurance scheme that set a fixed capitation of ₦570 per member per month across all payers. The CBA framed the evaluation around monetized costs and benefits of capitation payments, administrative expenditures, and potential productivity gains, aiming to determine whether the social value of the program exceeded its costs for farmers, fishermen and women, artisans, petty traders, and public-sector workers in a resource-constrained environment. The CEA compared the fixed capitation model with plausible alternatives such as fee-for-service or no formal capitation, estimating costs per health outcome unit (e.g., cases or DALYs averted) to assess whether health gains were achieved at acceptable additional costs [31-33]. COI studies quantified the economic burden of illness on households and the potential savings from improved primary care access, documenting direct medical costs, indirect costs from lost productivity, and intangible costs, thereby highlighting the economic rationale for risk pooling and preventive care. The Theory of Risk and Insurance was invoked to explain how cross-payer pooling of funds mitigated uncertain health expenditures, redistributed financial risk from vulnerable

households to a broader insurance base, and stabilized household consumption in the face of illnesses common to Bayelsa's diverse population. Taken together, these analytical lenses were used to assess operability, affordability, equity, and the potential health and economic benefits of the Bayelsa health financing model within its particular socio-economic and geographic context. The Cost-Benefit Analysis was grounded in the principle that all costs and benefits of the fixed ₦570 per member per month capitation across payers could be quantified in monetary terms to determine net social value. Costs included the fixed capitation payments to primary health centres, administrative expenses of fund collection from government, partners, and private entities, and potential implementation costs such as information systems, auditing, and grievance mechanisms [31,34,35]. Benefits comprised avoided out-of-pocket expenditures for enrollees (farmers, fishermen, traders, artisans, and public-sector workers), reductions in catastrophic health spending, improved health outcomes through maintained access to primary care, and productivity gains from a healthier population. In practice, analysts identified direct fiscal costs (capitation payments, administrative costs) and indirect social benefits (reduced income loss due to illness, minimized poverty risk from health shocks, and improved school and work productivity). The social discount rate was chosen to reflect societal time preference and intertemporal opportunity costs, enabling the aggregation of multi-year effects into present value terms. Researchers compared total costs with total quantified benefits to estimate net present value and determine whether the programme yielded a positive net social value for Bayelsa State and Nigeria at large. The CBA also included distributional analysis to examine how benefits and costs fell across different groups—farmers, fishermen and women, artisans, petty traders, and public sector workers—checking equity implications of the fixed capitation. Sensitivity analyses tested how results shifted with changes in key assumptions: the capitation rate, utilization rates at PHCs, inflation, discount rate, and potential exposure to underfunding for high-utilization communities. The overarching conclusion indicated that, given the intent to protect poor and vulnerable populations and to simplify multi-payer financing, the fixed ₦570 capitation could yield net social benefits if administrative costs remained modest, claims processing stayed reliable, and the rate kept pace with inflation and utilization trends. The Cost-Effectiveness Analysis evaluated the relative costs and health outcomes of the fixed ₦570 per member per month capitation model against a reference scenario, such as a hypothetical fee-for-service (FFS) system or no formal capitation financing. The analysis focused on primary health centre services accessible to Bayelsa's population, including farmers, fishermen and women, artisans, petty traders, and a minority in formal government employment. First, researchers measured costs from the payer and system perspectives: per-member monthly capitation payments (₦570), administrative and supervision costs, costs of essential medicines and supplies delivered through PHCs, and information technology and auditing expenditures. They then estimated health outcomes linked to primary care access, such as utilization rates of preventive services, management of common illnesses, immunization coverage, and reductions in avoidable morbidity and mortality, using local epidemiological data and proxy indicators where necessary. The effectiveness endpoint typically used was a health outcome unit such as cases averted, disability-adjusted life years (DALYs) averted, or quality-adjusted life years (QALYs) gained through sustained primary care engagement and improved disease management [36-38]. The analysis calculated the incremental cost-effectiveness ratio (ICER) by dividing the difference in total costs between the capitation model and the comparator by the difference in health outcomes: ICER = (Cost_capitation – Cost_comparator) / (Effect_capitation – Effect_comparator). If the capitation model yielded similar or better health outcomes at lower or comparable costs relative to the comparator, it was deemed cost-effective. The analysis also considered affordability for Bayelsa's fiscally constrained environment, potential reductions in catastrophic health expenditures for poor households, and the distribution of cost-effectiveness across subgroups (farmers, fishermen and women, artisans, petty traders). Sensitivity analyses tested robustness to changes in utilization, unit costs, mortality/morbidity estimates, and discount rates. Moreover, the CEA suggested that, under plausible assumptions, the fixed ₦570 capitation could be cost-effective if it maintained adequate service delivery, minimized administrative losses, and achieved substantial improvements in primary care utilization for the poor and vulnerable segments of Bayelsa's population, thereby delivering meaningful health gains per unit cost within a resource-constrained Nigerian context. The Cost-of-Illness Studies Theory examined how health conditions, access to care, and utilization patterns among Bayelsa State's population—farmers, fishermen and women, artisans, petty traders, and a minority in formal government employment—influenced demand for primary health care under the fixed ₦570 capitation. It recognized that illness incidence, seasonality (e.g., fishing and farming cycles), and financial barriers shaped whether enrollees sought care at PHCs [35,39]. The theory posited that health shocks triggered catastrophic spending in the absence of adequate risk pooling, whereas a predictable capitation payment across payers could dampen financial volatility for households and encourage timely care-seeking, preventive visits, and adherence to treatment. This illness-centred perspective interacted with the Theory of Risk and Insurance, which held that individuals and households faced uncertain health-related financial burden and that pooling resources across multiple payers (government, partners, and private entities) reduced the variance of out-of-pocket expenditures [40,41]. In a Bayelsa context marked by widespread informal employment and variable cash flow, risk pooling via a fixed capitation functioned as a form of social insurance: it shifted the financial risk of illness from vulnerable households to a larger, blended payer base, smoothing consumption and protecting livelihoods. Illness studies underscored that health events were not evenly distributed; exposure to illness depended on occupation, geography, and seasonality, which in turn affected PHC utilization and costs borne by households. The risk and insurance framework argued that a fixed per-member capitation across all payers created a predictable premium-like flow, enabling

cross-subsidization and redistribution of risk from poor and vulnerable enrollees to the pooled fund. The combined lens suggested that with appropriate governance, monitoring, and timely reimbursements, the scheme could maintain access to essential primary care for farmers, fishermen and women, artisans, and petty traders, while mitigating the financial shock of illness. It also implied that inclusivity (ensuring coverage for those in the informal economy) and affordability of the fixed rate were critical to sustaining demand for preventive and curative services, thus improving health outcomes and productivity within a resource-constrained Bayelsa setting. In a nutshell, illness studies highlighted the drivers of health service demand and financial hardship due to illness among Bayelsa's diverse population, and the *Theory of Risk and Insurance* explained how a cross-payer capitation design served as a social insurance mechanism to pool risk, stabilize household finances, and promote access to primary health care within the Bayelsa health insurance scheme. In Bayelsa State, the social health insurance scheme, which paid a fixed capitation of ₦570 per member per month across all payers, faced decisions by insurers, providers, and consumers (farmers, fishermen and women, artisans, petty traders, and a few in formal government employment) that warranted a Markov Decision Model (MDM) framing to capture dynamics over time under uncertainty. The scenario unfolded in a sequence of past-period states, actions, transitions, and rewards, with a policy that aimed to maximize expected welfare under budget, access, and quality constraints. The system occupied discrete health and financial positions at each period, such as: healthy and insured, minor illness with outpatient needs, chronic condition requiring ongoing management, hospitalization risk, and financially constrained with limited liquidity. Additional state components included administrative readiness (adequate capitation funds available), provider capacity (stock of medicines and staff), and payer mix (proportions of government, partners, and private contributions). At each state, each actor made decisions that could be represented as actions in the MDM. For insurers, actions included adjusting reimbursement timing, modulating provider payment rules within the fixed capitation framework, and reallocating reserves. For providers, actions encompassed service delivery intensity (e.g., preventive visits, diagnostics, referral thresholds), procurement purchases, and adherence to capitation constraints. For consumers, actions included seeking care at PHCs, delaying care, choosing traditional remedies, or adjusting enrolment/renewal status. Across all actors, there were policy-level actions such as revising the capitation rate (if permissible), enhancing risk pooling, and implementing accountability measures. The model captured the probabilities of moving from one state to another given and chosen action. For example, choosing to emphasize preventive care could shift a population from a "healthy with regular care" state to a lower-probability "acute episode" state, while delays in care could increase progression to chronic or hospitalization states. Transitions also reflected external uncertainties: disease incidence, supply chain disruptions, seasonal variations in fishery and farming communities, and fluctuations in enrolment or payment timeliness by different payers. Each state-action pair yielded rewards (or costs) reflecting outcomes such as health gains (improved utility from better health and productivity), reduced catastrophic expenditures, and preserved financial sustainability for the capitation pool. Costs included administrative expenses, misalignment between utilization and capitation funding, potential underfunding of high-need patients, and averted costs from avoided hospitalizations due to effective primary care. The policy defined a rule mapping each observed state to an action or a distribution over actions. The optimal policy aimed to maximize the expected discounted sum of rewards over the horizon, balancing affordability (staying within the fixed ₦570 capitation), equity in access, and quality of care for the poor and vulnerable populations. The model included a time-preference parameter to value present benefits over future ones, reflecting the willingness to trade off current spending against anticipated health and economic gains in Bayelsa's resource-constrained environment. The Markov Decision Model allowed stakeholders to analyze how, under the fixed capitation, insurers could optimally allocate funds across providers, how providers could schedule services to maintain primary care access without exhausting resources, and how consumers could decide when to seek care given fluctuating cash flows and expectations of service quality [34,42]. It highlighted that favourable decisions emerged when the multi-payer pooling and uniform capitation reduced volatility in household expenditures, supported timely and appropriate care, and preserved provider viability while maintaining affordability. The model also suggested that improvements in data systems, timely reimbursements, and targeted subsidies for high-need groups could shift transition probabilities toward healthier states and more cost-effective outcomes, reinforcing the case for sustaining cross-payer collaboration within the Bayelsa health insurance framework.

## Conceptual Framework

Bayelsa State presented a complex and compelling case for examining the operability of multi-payer mechanisms within the Bayelsa State Social Health Insurance Scheme. Bayelsa State's Health Insurance Scheme introduced a fixed capitation of ₦570 per member per month that applied uniformly across all payers, including government, development partners, and private entities, to fund enrollees at primary health centres. This design proved operable in Bayelsa given the state's poor and vulnerable population for several interlinked reasons. First, the fixed capitation creates a predictable and affordable financing stream. In a context where household cash flow is highly irregular and many residents live below the poverty line, a uniform monthly payment per enrollee simplifies budgeting for both funders and PHCs. The predictability of funding minimizes revenue volatility, enabling PHCs to plan procurement, staffing, and service delivery with greater assurance. This stability is crucial for sustaining essential primary care services in communities that rely on limited, often irregular, income. The fixed rate provided administrative simplicity that reduces transaction costs and administrative burden. By standardizing the capitation rate across all payers, the scheme minimizes disputes over payer-specific rates and reduces the complexity of reconciliations, claims processing, and rate

negotiations. This simplicity accelerates enrolment, reimbursement cycles, and service delivery at the PHC level, ensuring that vulnerable populations receive timely access to care rather than facing delays due to bureaucratic entanglements. The fixed rate supports risk pooling and financial protection for the poor. When funds are pooled into a single capitation stream, fluctuations in utilization among low-income enrollees can be absorbed within the pooled resource. This mechanism helps shield households from catastrophic out-of-pocket expenditures that might occur with fee-for-service models, thereby improving financial protection and reducing impoverishing health shocks among vulnerable populations. The approach aligns incentives toward preventive care and efficient service delivery. Capitation payments, being fixed per member, encourage PHCs to emphasize preventive services, early detection, and effective chronic disease management. For a population with limited access to care, this could translate into more consistent primary care utilization, better management of common conditions, and fewer unnecessary hospital referrals, ultimately improving health outcomes in a resource-constrained environment. The model fosters broad-based participation and shared responsibility among multiple payers. By establishing a common capitation benchmark, the scheme distributed financial responsibility across government, development partners, and private entities, encouraging collaboration and reducing the likelihood that any single payer bears disproportionate cost burdens. This shared financing arrangement is particularly important in Bayelsa, where fiscal resources are constrained and where pooling from various sources could expand coverage without overburdening any single actor. The fixed rate is compatible with Bayelsa's socio-economic and geographic realities. The state faces rural dispersion, limited healthcare infrastructure, and varied access to services. A uniform capitation rate allows PHCs in distant or underserved areas to budget for essential medicines, logistics, and staffing within a stable funding envelope, supporting equity in access across urban and rural communities. The approach provides a basis for ongoing governance, monitoring, and iterative improvement. A single, fixed rate simplifies performance monitoring, financial reporting, and transparency. It enables clear indicators for reimbursement timely, service delivery quality, and enrolment progress, creating opportunities to adjust the rate or introduce refinements (such as risk sharing or targeted subsidies) as utilization patterns evolve and as cost data become more robust. In summary, the operability of a fixed ₦570 capitation per member per month across all payers in Bayelsa State rested on its capacity to deliver predictable financing, administrative efficiency, financial protection for the poor, incentivize efficient primary care, promote cross-payer collaboration, and align with the state's unique socio-economic and geographic context. This design supported broader coverage for vulnerable populations while maintaining fiscal sustainability within a constrained fiscal environment. Across the 105 accredited primary health centres (PHCs) dispersed over eight local government areas (LGAs), the program had established a monthly capitation payment structure that applied uniformly to all payers, with a fixed rate of ₦570 per member per month (PMPM). The enrolment profile under NPHCDA Gateway and NHIA Gateway consisted of 14,668 males and 25,917 females, while additional enrolment came from UNICEF/GAVI, which accounted for 10,000 enrollees, and GAC/CHAI, which enrolled 7,128 individuals. The Bayelsa Equity Fund represented a major payer stream, covering 119,894 formal sector enrollees and 2,492 informal sector enrollees. In this landscape, the Basic Emergency Obstetric Care program targeted women requiring obstetric fistula care and those presenting with preeclampsia/eclampsia, hemorrhage, prolonged obstructed labor, sepsis, and post-abortion complications, with overarching aims to reduce facility-based maternal case fatality and morbidity, to diminish out-of-pocket expenditures for the poor and vulnerable, and to improve the quality of maternal care. The operation began by identifying and accrediting the PHCs as the frontline interface for enrollees within a monthly capitation scheme. The ₦570 PMPM was identified as the central funding envelope intended to cover a defined core package of primary care services. This design generated a pooled risk environment across a heterogeneous enrollee base and necessitated cross-subsidization mechanisms to sustain basic emergency obstetric care coverage and ensure uniform quality of care across the eight LGAs. The multi-payer architecture was framed as a governance landscape in which social health insurance scheme enrollees, international and domestic donors, and equity fund streams coalesced under a unified capitation envelope, yet maintained payer-specific enrolment rules, eligibility verification procedures, and reimbursement timelines. These elements required alignment with national social health insurance scheme guidelines to ensure coherence, accountability, and continuity across payer groups. Capitation was depicted as the principal financing abstraction. It mandated rigorous budgeting, cost containment, preventive care emphasis, and efficient resource use within the constraints of a uniform PMPM. The fixed rate created a pooled risk pool across enrollees and mandated cross-subsidization across payer streams to sustain basic emergency obstetric care coverage and consistent maternal care quality. It was acknowledged that pure capitation diminished fee-for-service incentives unless complemented by basic emergency obstetric care subsidies or performance-based elements designed to reinforce quality, emergency readiness, and timely management of obstetric emergencies. Service delivery capacity at the PHCs required robust human resources, essential commodities, and equipment to deliver preventive, curative, and basic emergency obstetric care services. Basic emergency obstetric care introduced a specialized service mix for obstetric conditions necessitating trained personnel, emergency care capabilities, clearly defined referral pathways, and ongoing evaluation of timeliness and outcomes. Equity considerations were embedded through financial protection aims intended to shield the poor and vulnerable from catastrophic expenditures and to enhance access across payer streams and geographic coverage across eight LGAs, with basic emergency obstetric targeted care directed at high-risk obstetric conditions. Incentives influenced provider behaviour toward preventive and population-level care within the capitation budget, and basic emergency obstetric care subsidies or performance payments were anticipated to strengthen quality and emergency readiness. Quality

of care was assessed through dimensions of safety, effectiveness, timeliness, patient-centeredness, and equity, with anticipated outcomes including reductions in maternal morbidity and mortality, diminished out-of-pocket costs for high-need populations, and improved patient satisfaction arising from consistent PHC-based basic emergency obstetric care and maternal health services. The mechanisms of operability encompassed risk pooling and cross-subsidization across NPHCDA Gateway, NHIA Gateway, UNICEF/GAVI, GAC/CHAI, and the Bayelsa Equity Fund to subsidize high-need populations. Meticulous resource alignment and budgeting at the PHC and LGA levels were guided by enrolment projections and basic emergency obstetric care caseloads. Enrolment management and portability were supported by harmonized registries and interoperable information systems to sustain continuity of care. Standardized service packages with integrated basic emergency obstetric care components across payer streams with clear clinical protocols, and monitoring and accountability were implemented through indicators disaggregated by payer, facility, and service type to capture per-enrollee cost, basic emergency obstetric care uptake, maternal outcomes, emergency treatment times, and user satisfaction. Equity-focused targeting ensured subsidies and enhanced capitation allocations reinforced facility readiness, workforce capacity, and supply chains necessary to manage obstetric emergencies. The operability of the multi-payer's mechanism hinged on several underlying assumptions: that the ₦570 PMPM funded the core PHC package including basic emergency obstetric care given the expected enrollee mix, that administrative capacity existed at PHCs and LGAs to manage multisector financing flows and reporting, and that basic emergency obstetric care-trained personnel and functioning referral networks were available. Risks included potential underfunding due to rising enrollee numbers, misalignment of payer-specific procedures, and delays in reimbursements that could disrupt cash flow and service delivery. The implications of these dynamics suggested that effective governance, transparent enrolment data, timely disbursements, and robust data systems would bolster financial protection for the poor and vulnerable, improve basic emergency obstetric care capacity and maternal outcomes, and demonstrate efficiency gains through cross-payer collaboration without compromising quality. Policy relevance emphasized harmonization of enrolment data, payer rules, timely disbursements, investments in human resources and supply chains, and transparent performance reporting to sustain equity and maternal health gains across the eight LGAs in a multisector payer environment. The analysis aligned with global best practices such as proportionate universal health coverage, capitation design with risk adjustment where feasible, basic emergency obstetric care readiness standards, formal mechanisms for cross-subsidization, interoperable health information systems, and continuous quality improvement programs. In summary, the multi-payer's mechanism demonstrated that a well-governed multi-payer configuration could be operable and potentially transformative for maternal health outcomes in Bayelsa State if funding flows were timely, service delivery was adequately capacitated, and performance feedback loops were continuously strengthened to adapt to evolving enrolment and obstetric care needs. The overarching objective remained reducing maternal mortality and morbidity and protecting the poor from impoverishing health expenditures within eight LGAs and across all payer streams. The submission recommended a policy agenda for scaling and harmonizing multi-payer capitation arrangements, including explicit risk pooling, standardized basic emergency obstetric care protocols, rigorous cost-effectiveness analyses, and a comprehensive monitoring framework to guide scalable implementation and inform ongoing dialogue with policymakers, practitioners, and scholarly communities about operability, challenges, and opportunities in multisector, multi-payer financing arrangements for primary health care and essential maternal health services in Bayelsa State and comparable settings. The scenario described a primary health centre that served a catchment population of 10,000 and was located across both rural and urban geographies. Provider services encompassed communicable and non-communicable diseases, including diabetes mellitus, screening for hypertension, malaria diagnosis and treatment, diarrhea management, pneumonia care, immunization services, antenatal care (ANC), deliveries, and laboratory services utilizing rapid diagnostic tests (RDT) and microscopy. The facility functioned as a frontline interface within a multi-payer social health insurance scheme framework, where service platforms, utilization patterns, and payer mechanisms collectively shaped health outcomes in Bayelsa State. The service platform at the centre operated on an integrated, modular basis, delivering preventive, curative, and emergency care within a primary health centre setting. Routine immunizations and ANC visits anchored community outreach, while deliveries were managed under standardized obstetric protocols supported by basic emergency obstetric care linkages to higher-level facilities when necessary. Laboratory services relied on RDTs and microscopy to inform timely diagnosis and treatment for malaria, HIV, and other infections, and non-communicable disease screening for hypertension and diabetes informed early intervention and referral decisions. This platform benefited from a capitation financing mechanism under NPHCDA Gateway, NHIA Gateway, wherein a fixed monthly PMPM rate was intended to cover a defined core package of primary care services across all payers, thereby creating a pooled risk environment that could sustain essential services at the PHC level even when payer mix shifted or enrolment numbers fluctuated seasonally. Service utilization within this multi-payer context showed patterns consistent with both preventive and curative expectations. ANC visits and immunizations registered steady attendance, outreach and community health education improved adherence to preventive regimens, and facility-based deliveries occurred within basic emergency obstetric care-informed pathways that prioritized emergency readiness and timely referral. Screening for hypertension and diabetes identified individuals at higher risk, enabling lifestyle counseling and pharmacotherapy where indicated. Malaria case management relied on RDTs and microscopy to guide treatment, reducing overtreatment and supporting targeted use of antimalarial drugs. Diarrheal and pneumonia cases were addressed promptly with rehydration

solutions, antibiotics when indicated, and supportive care, while diarrheal prevention campaigns and vaccination efforts contributed to declines in incidence within the catchment population. Laboratory capacity enhanced diagnostic precision, shortened turnaround times, and informed appropriate treatment decisions, all of which collectively improved patient trust and service uptake. Utilization remained sensitive to payer-related reimbursement timeliness and the facility's ability to maintain adequate drug stocks, staffing levels, and functional referral linkages to higher-tier facilities when obstetric complications or severe cases arose. From a governance perspective, the facility operated within a multi-payer environment in which NPHCDA Gateway, NHIA Gateway capitation payments, UNICEF/GAVI and GAC/CHAI contributions, and Bayelsa Equity Fund disbursements converged to fund core services and basic emergency obstetric care readiness at the PHC level. Cross-subsidization mechanisms and enrolment portability across payer streams were essential to sustain service provision, particularly during periods of rising demand or enrolment shifts. Performance monitoring captured indicators such as per-enrollee cost, utilization of ANC and delivery services, basic emergency obstetric care readiness metrics, vaccination coverage, and laboratory turnaround times, with disaggregated data by payer and service type supporting accountability and informing resource allocation decisions at the facility level and within the LGA. Quality improvement activities targeted safety, timeliness, effectiveness, patient-centeredness, and equity, reinforcing adherence to clinical guidelines for obstetric care, infection prevention, and the management of chronic diseases, while community engagement and feedback loops contributed to refining outreach strategies for at-risk populations. The outcomes of operating within this scenario indicated several notable implications. Financial protection for the poor and vulnerable improved when capitation funds were effectively pooled and disbursed in a timely manner, reducing out-of-pocket expenditures for essential services such as ANC, deliveries, and immunizations. Maternal and child health indicators benefited from enhanced basic emergency obstetric care readiness and timely referrals, contributing to safer deliveries and better emergency management. Early detection of hypertension and diabetes through screening promoted preventive care and chronic disease management, potentially reducing long-term complications. Malaria control benefits emerged from accurate diagnosis and appropriate treatment guided by RDTs and microscopy, while immunization coverage expanded through integrated outreach and clinic-based services. Nonetheless, challenges persisted in ensuring consistent drug supply, retaining skilled staff in both rural and urban settings, and maintaining smooth inter-payer coordination to prevent service disruptions during payment cycles. In summary, the primary health centres demonstrated that a well-coordinated multi-payer financing arrangement, supported by a robust provider platform and integrated service mix, could yield meaningful improvements in access, quality, and health outcomes for a catchment population of 10,000 across PHC per ward, provided that governance remained coherent, reimbursement cycles stayed timely, and data-informed management continuously guided optimization of service delivery and utilization.

## Materials and Methods

### Study Design

The study employed a retrospective, observational design conducted in Bayelsa State, focusing on primary health centres (PHCs) that served a catchment population of 10,000 and spanned both rural and urban wards. It analyzed existing records to evaluate healthcare utilization under a multi-payer capitation financing framework. The study period encompassed prior years during which capitation payments were disbursed by NPHCDA Gateway, NHIA Gateway and other payers such as UNICEF/GAVI, GAC/CHAI, and the Bayelsa Equity Fund, allowing examination of how payers composition correlated with service use. Data sources included routine facility records, enrolment registers, payment receipts, service utilization logs for general attendances, antenatal care, facility-based deliveries, immunization uptake, malaria testing and treatment, chronic disease screening, and laboratory results via rapid diagnostic tests (RDT) and microscopy. The sampling strategy targeted all PHCs within the included LGAs to capture variability across rural and urban settings, payer mixes, and seasonal demand patterns. Analytical approaches planned for regression analyses and time-series descriptions to explore associations between payers' mix, capitation flows, and utilization metrics, while accounting for potential confounders such as facility size, staffing levels, stockouts, and referral linkages. Ethical considerations were incorporated by ensuring the use of de-identified data and adherence to relevant approvals and data protection requirements.

### Study Area

Bayelsa State is located in the southern part of Nigeria, in the Niger-Delta region. It is bordered by Rivers State to the West and Delta State to the East with a long span of Atlantic Ocean at the south. The capital city is Yenagoa. Bayelsa has a population of about 2,537,400 with a landscape area of 9,391 $km^2$ [43]. Demographic data for Bayelsa State indicates that most of the population belongs to the Ijaw ethnic group, which is the dominant ethnic group in the state. Other minority ethnic groups include the Ogbia, Nembe, and Epie-Atissa. The main languages spoken in Bayelsa State are Ijaw, Epie-Attisa, Isoko, Urhobo and English. Bayelsa State has a predominantly Christian population, with Christianity being the major religion practiced in the state. However, there are also adherents of other religions, including traditional Africans religions and Islam. The economy of Bayelsa State is predominantly petroleum resources, as the state is in the oil-rich Niger Delta region. Bayelsa has one of the largest crude oil and natural gas deposits in Nigeria, with the Oloibiri Oilfield being the site of the country's first oil discovery. Other mineral raw materials found in the state include salt, agro raw materials include cassava, plantain, rice, and fish.

### Study Population

The study population consisted of residents served by the primary health centres (PHCs) across Bayelsa State, with each PHC covering

a catchment population of 10,000 and operating in both rural and urban wards. It included individuals who accessed provider services at these PHCs, encompassing both communicable and non-communicable diseases such as diabetes mellitus screening and management, hypertension screening, malaria diagnosis and treatment, diarrhea care, pneumonia management, immunizations, antenatal care (ANC), deliveries, and laboratory services using rapid diagnostic tests (RDT) and microscopy. The population also comprised patients whose care was financed under the multi-payer capitation framework, including NPHCDA Gateway, NHIA Gateway enrollees and participants enrolled through UNICEF/GAVI, GAC/CHAI, and the Bayelsa Equity Fund, reflecting the diverse payer mix that influenced patterns of healthcare utilization within the PHCs. The study population thus represented individuals who interacted with the PHCs during the retrospective period and whose utilization data and payer information were available in routine records.

## Sampling Technique

The study employed a retrospective sampling approach, selecting facilities and records from the existing PHC network in Bayelsa State. A census strategy was implemented at the facility level, wherein all 105 primary health centres that served the eight local government areas were included to capture the full spectrum of payer mixes and service utilization. Within each PHC, all available routine records spanning the defined retrospective period were retrieved, including enrolment registers, capitation disbursement ledgers, service utilization logs (general attendances, ANC visits, immunizations, deliveries, and basic emergency obstetric care-related indicators), malaria diagnostic records (RDT and microscopy results), and laboratory worksheets. Purposive elements were incorporated to ensure representation of both rural and urban wards, thereby preserving geographic heterogeneity in access and utilization. Where records were incomplete or missing critical payer information, cases were documented as missing data and sensitivity analyses were planned to assess potential biases introduced by data gaps. De-duplication procedures were applied to enrolment and service-use entries to avoid double-counting individuals who appeared across multiple facilities within the catchment area. Quality checks were performed to verify consistency between facility logs and payer receipts, ensuring alignment of service provision with financing flows under NPHCDA Gateway, NHIA Gateway, UNICEF/GAVI, GAC/CHAI, and the Bayelsa Equity Fund. Where feasible, a stratified approach was used to examine differences in utilization by payer type, service category (preventive, curative, and basic emergency obstetric care-related), and ward type (rural versus urban), to illuminate differential impacts of the multi-payer capitation environment on access and use of primary health care services. Ethical considerations were observed through the use of de-identified records and adherence to approvals for secondary data analysis.

## Selection Criteria

### Inclusion Criteria

a) The study included primary health centres (PHCs) that operated within Bayelsa State and served a catchment population of about 10,000 residents, with facilities located in both rural and urban wards.
b) The PHCs selected for the retrospective analysis provided a broad spectrum of services consistent with the profile described, including prevention, curative care for communicable and non-communicable diseases (such as diabetes mellitus screening, hypertension screening, malaria testing and treatment, diarrhea management, pneumonia care), immunizations, antenatal care (ANC), deliveries, and laboratory services using rapid diagnostic tests (RDT) and microscopy.
c) Records from these PHCs were available for the defined retrospective period, including enrolment registers, capitation disbursement ledgers, service utilization logs (general attendances, ANC visits, immunizations, deliveries, basic emergency obstetric care indicators), malaria diagnostic records (RDT and microscopy), and laboratory records.
d) The payers mix represented an intersection of NHIS Gateway, NPHCDA Gateway, UNICEF/GAVI, GAC/CHAI, and Bayelsa Equity Fund, consistent with the multi-payer framework under investigation
e) Data used in the study were de-identified and sourced from routine administrative and clinical records, with appropriate approvals for secondary data use in place.

### Exclusion criteria

a) PHCs that did not fall within the defined catchment area of 10,000 residents or that operated exclusively in either all-rural or all-urban wards were excluded.
b) Facilities lacking essential service domains (e.g., without comprehensive ANC, deliveries, basic emergency obstetric care linkage, or laboratory services using RDT and microscopy) were excluded.
c) Records that were irretrievably incomplete or inaccessible for the entire retrospective period, including missing enrolment data, payer information, or key utilization indicators, were excluded from the analysis.
d) PHCs with unreliable or inconsistent data streams (e.g., failure to document capitation receipts, service utilization, or basic emergency obstetric care events) were excluded to minimize measurement error.
e) Instances where ethical approvals or data-use permissions were not granted or where data could not be adequately de-identified were excluded from inclusion in the study.

## Method of Data Collection

The data were collected retrospectively from existing routine records maintained at the primary health centres across Bayelsa State. Enrolment registers, capitation disbursement ledgers, and service utilization logs—including general attendances, antenatal care (ANC) visits, immunization records, deliveries, and basic emergency obstetric care indicators—were retrieved from facility archives. Malaria diagnostic records (rapid diagnostic tests and microscopy), laboratory registers, and basic emergency obstetric care-related documentation were extracted to capture diagnostic

and emergency care events. Payer information was gathered from social health insurance scheme, UNICEF/GAVI, GAC/CHAI, and the Bayelsa Equity Fund ledgers to enumerate the multi-payer composition over the study period. Where available, monthly summaries of capitation payments, stock records, and referral logbooks were included to contextualize utilization patterns within financing flows. Data abstraction followed a standardized form that captured facility identifiers, ward location (rural or urban), patient-level de-identified utilization counts, service categories (preventive, curative, emergency), and relevant timestamps. Quality control entailed double-entry of a subset of records by independent abstractors, reconciliation against payment receipts, and consistency checks between utilization counts and payer disbursements. Ethical approvals and data-use permissions were confirmed prior to data extraction, and all data were de-identified to ensure confidentiality.

## Validity and Reliability Test

### Validity Test

The study assessed validity by evaluating the extent to which the data and analyses accurately reflected the underlying constructs of interest. Content validity was established by ensuring that the data collection instruments and retrospective records captured the full range of relevant variables, including payer mix (social health insurance scheme, UNICEF/GAVI, GAC/CHAI, Bayelsa Equity Fund), service utilization indicators (general attendances, ANC attendance, immunization uptake, deliveries, basic emergency obstetric care indicators), and laboratory diagnostics (RDT and microscopy). Construct validity was addressed by aligning utilization measures with the conceptual framework of multi-payer capitation effects on access, affordability, and service delivery within PHCs serving both rural and urban wards. Criterion validity was considered through triangulation with external sources where available, such as payment ledgers and referral logs, to corroborate the alignment between recorded utilization and financing flows. Face validity was ensured through expert review of data abstraction forms and coding schemes to confirm their plausibility for capturing the intended phenomena. Internal validity was pursued by adjusting for potential confounders identified in the retrospective records, including facility size, staffing levels, stockouts, and temporal changes in capitation disbursements, and by employing sensitivity analyses to assess the robustness of observed associations between payer mix and utilization patterns. External validity was discussed in terms of the study's generalizability to similar PHCs within Bayelsa State and to comparable multi-payer settings, with clear delineation of the sampling frame and study period to facilitate cautious extrapolation. Ethical validity was maintained by ensuring data were de-identified, approvals for secondary data use were documented, and data handling complied with applicable data protection guidelines.

### Reliability Test

The study evaluated reliability by implementing standardized data collection and abstraction procedures to ensure consistent measurement across facilities and time. A uniform data abstraction form was used to extract information from routine records, with explicit definitions for all variables (e.g., payer type, enrolment status, service category, basic emergency obstetric care events, and laboratory results). Double-entry verification was performed on a subset of records by an independent abstractor to assess consistency, and inter-rater reliability metrics were calculated to quantify agreement on key variables. Reconciliation checks were conducted between utilization counts and corresponding payer disbursements to detect discrepancies, and any inconsistencies were resolved through re-review of source documents. Routine data quality checks examined completeness, plausibility, and coding accuracy, while audit trails were maintained to track data provenance and transformations. To address potential measurement error due to missing or incomplete records, sensitivity analyses were planned and, where feasible, imputation strategies or complete-case analyses were considered to gauge the impact on study conclusions. Overall, reliability was sought through meticulous standardization, cross-checks, and documentation to ensure that findings regarding the impact of multiple payers on PHC utilization were reproducible under similar retrospective conditions.

## Data Management and Analysis

The study employed a structured approach to data management and analysis using Microsoft Excel for data entry, organization, and initial cleaning; XLMiner Analysis ToolPak was utilized within Excel to conduct descriptive statistics, basic exploratory analyses, and select time-series or regression-ready computations where appropriate; and Mendeley Reference Manager was used to organize literature, generate citations, and manage the reference library for reporting. Data management activities started with the creation of a centralized data dictionary that defined all variables, coding schemes, and permissible values (e.g., payer type, ward type, service category, basic emergency obstetric care indicators, and utilization metrics). Data were extracted from routine facility records, enrolment registers, capitation ledgers, service utilization logs, laboratory records, and payer disbursement documents and then entered into secure, de-identified datasets in Excel workbooks. Quality control checks were performed through double-entry verification on a subset of records, range and consistency checks, and reconciliation between utilization counts and corresponding payments to ensure internal consistency. Any discrepancies were documented and resolved by cross-referencing source documents. To prepare data for analysis, the team performed data cleaning steps such as handling missing values, standardizing variable formats (dates, categorical codes, and payer labels), and creating derived variables (e.g., monthly utilization rates, basic emergency obstetric care event counts, and payer-mix proportions). Time-series alignment was conducted to synchronize utilization data with capitation disbursement timelines across the study period. Data were securely stored with restricted access, and access logs were maintained to ensure confidentiality and auditability. Descriptive analyses were conducted to characterize the study population, facility characteristics, payer mix, and service utilization patterns, including frequencies, means, medians, and standard deviations.

Inferential analyses were planned to examine associations between payer mix and utilization outcomes, adjusting for potential confounders such as ward type (rural vs. urban), facility size, and seasonality; appropriate statistical methods (e.g., regression models, difference-in-differences approaches, or time-series analyses) were implemented in line with data availability and study design. Model assumptions were checked using diagnostic plots and statistical tests, and sensitivity analyses were performed to assess the robustness of findings to missing data and potential data quality issues. Report generation proceeded by exporting cleaned analytic datasets and results into narrative tables and figures, ensuring reproducibility by documenting the exact Excel formulas, and procedural notes. The analysis outputs were interpreted within the context of the multi-payer capitation framework, basic emergency obstetric care presence, and the Bayelsa State health system, with limitations acknowledged in terms of data quality, potential residual confounding, and generalizability. All outputs were prepared for inclusion in the final report and for dissemination to stakeholders, while references were managed in Mendeley to facilitate accurate citation and version control.

## Timeline for the Study

**Research planning and proposal**: In July 2025, the research team completed the initial planning and drafted the project proposal, outlining the study rationale, objectives, scope, and methodological approach.

**Institutional ethical approval**: In August 2025, the study secured ethical approval from the Bayelsa State Primary Health Care Board, with reference number PHCB/AD/171/Vol.1/p.19, allowing the retrospective data collection to proceed under approved governance and data protection safeguards.

**Data collection preparation**: In September 2025, the team prepared for data collection by developing standardized abstraction tools, training data collectors, and establishing data governance protocols to ensure de-identified, secure, and consistent data handling.

**Data collection**: Between October and November 2025, data were extracted from routine facility records, enrolment registers, capitation ledgers, service utilization logs, laboratory records, and payer disbursement documents across the PHC network.

**Report writing and dissemination**: From December 2025 to January 2026, the study team drafted and refined the final report, prepared dissemination materials, and shared findings with stakeholders through policy briefs, presentations, and potential manuscript submissions.

## Ethical Considerations

**Institutional consent:** The study obtained institutional consent from the Ethics Committee of the Bayelsa State Primary Health Care Board, with reference number PHCB/AD/171/Vol.1/p.19, prior to data collection. The approval confirmed that the study design, data handling procedures, and confidentiality safeguards were appropriate for the use of de-identified routine records in a retrospective analysis, and it authorized the continuation of the project under the specified governance and data protection requirements.

## Institutional consent from Bayelsa Health Insurance Authority

The study secured institutional consent from the Bayelsa Health Insurance Authority, with number BHIA/ADMIN/Vol.1/P34, which validated access to payer-related data and ensured alignment with statutory obligations for using information generated under multi-payer financing arrangements. The consent documented the permissions for data extraction, allowed linkage of enrolment and disbursement records to service utilization data, and stipulated responsibilities for safeguarding privacy, data security, and ethical reporting in accordance with applicable laws and organizational policies.

## Results and Discussion

**Table 1:** Sociodemographic characteristics of enrollees.

| LGA | Male | Female |
|---|---|---|
| Brass LGA | 3084 | 5659 |
| Sagbama LGA | 5602 | 9901 |
| Nembe LGA | 3166 | 6117 |
| Southern Ijaw LGA | 4960 | 8896 |
| Ogbia LGA | 4449 | 8792 |
| Yenagoa LGA | 4767 | 9944 |
| KOLGA | 3343 | 5761 |
| Ekeremor LGA | 3256 | 5937 |

Table 1, showed the socio-demographic characteristics of the enrollees that revealed a notable gender distribution across various Local Government Areas (LGAs). In Brass LGA, a total of 8,743 individuals were enrolled, comprising 3,084 males and 5,659 females, indicating a higher female representation. Sagbama LGA exhibited a similar trend, with a total enrolment of 15,503, where males constituted 5,602 and females 9,901. This pattern continued in Nembe LGA, which recorded 9,283 enrollees, with 3,166 males and 6,117 females, further emphasizing the prevalence of female enrollees. Southern Ijaw LGA had an enrolment of 13,856, with male enrollees numbering 4,960 and female enrollees 8,896, suggesting a consistent female majority. In Ogbia LGA, the total enrolment reached 13,241, with 4,449 males and 8,792 females. Yenagoa LGA showed a total of 14,711 enrollees, consisting of 4,767 males and 9,944 females, reinforcing the trend of higher female enrolment across the state. KOLGA presented a total of 9,104 enrollees, with 3,343 males and 5,761 females, while Ekeremor LGA had 9,193 enrollees, with 3,256 males and 5,937 females. These findings collectively illustrated a consistent pattern of greater female participation in the enrolment process across all LGAs, reflecting potential socio-cultural dynamics that favour female engagement in the studied context.

In examining the multi-payer capitation model implemented across the Local Government Areas (LGAs) as shown in table 2, it became evident that funding sources such as the NPHCDA Gateway, NHIS Gateway, Bayelsa Equity Fund, CHAI, and UNICEF played crucial roles in enhancing healthcare accessibility and delivery. The distribution of funds reflected the varying needs and socio-demographic characteristics of each LGA. For instance, areas with

higher populations, such as Sagbama LGA, benefitted significantly from these diverse funding streams, which aimed to address the healthcare demands of their larger populace. In contrast, LGAs with smaller populations, like KOLGA, received proportionately lower funding, potentially impacting the comprehensiveness of healthcare services available to residents. The interplay between these funding sources facilitated a more equitable allocation of resources, ensuring that both rural and urban communities had access to essential health services. Moreover, the involvement of organizations like CHAI and UNICEF highlighted a concerted effort to bolster maternal and child health initiatives across the LGAs, which were critical in LGAs with high female and child demographics, as noted in the sociodemographic characteristics. This multi-faceted approach to funding not only aimed to fill gaps in service delivery but also fostered collaboration among various stakeholders, ultimately contributing to improved health outcomes across the state. In summary, the multi-payer capitation model demonstrated a strategic alignment of resources to meet the specific healthcare needs of each LGA, reflecting a commitment to enhancing public health infrastructure and equity in healthcare provision.

The service utilization data (Table 3) from primary healthcare centres for the years 2023, 2024, and 2025 revealed notable trends in the provision of essential health services. In 2023, a total of 647,467 general attendance visits were recorded, which increased significantly to 909,602 in 2024, and further surged to 1,033,692 in 2025, indicating a growing reliance on primary healthcare services over these years. Diabetes Mellitus screenings showed a gradual increase, with 1,031 cases in 2023 rising to 1,190 by 2025. Similarly, the screening of hypertensive cases experienced an upward trajectory, starting at 3,601 in 2023 and reaching 3,963 in 2025, reflecting an enhanced focus on chronic disease management. Deliveries attended by skilled birth attendants demonstrated a consistent demand, with 5,131 deliveries in 2023, which increased to 7,942 in 2025, underscoring the importance of skilled care during childbirth. Antenatal care (ANC) attendance also illustrated growth, from 56,314 in 2023 to 68,789 in 2025, suggesting improved maternal health initiatives. Family planning services, integral for reproductive health, were accessed by 28,767 individuals in 2023, rising to 38,472 in 2025, indicating an increasing awareness and utilization of family planning methods. Immunization services, including Penta 3 and BCG, were vital components of primary healthcare, with Penta 3 vaccinations increasing from 60,991 in 2023 to 65,369 in 2025, while BCG immunizations rose from 48,335 to 52,754 in the same period. These figures reflected a commitment to reducing vaccine-preventable diseases among children. Treatment for diarrhea with Oral Rehydration Solutions (ORS) and zinc, as well as pneumonia treatment with amoxicillin, were provided to 2,835 and 865 cases respectively in 2023, both of which showed minor fluctuations in subsequent years. Malaria treatment and diagnosis were critical in the healthcare landscape, with treatments using ACT increasing from 60,917 in 2023 to 107,890 in 2025, while those treated with artesunate also saw an increase from 2,646 to 5,264. Diagnoses through microscopy and Rapid Diagnostic Tests (RDT) were utilized, with RDTs showing a marked increase from 17,852 in 2023 to 29,850 in 2025, reflecting advancements in malaria diagnostic capabilities. Overall, the data from the primary healthcare centres highlighted a positive trend in service utilization, indicating improvements in healthcare access and the effectiveness of health interventions over the studied period.

In examining the relationship between enrolment status and service utilization in primary healthcare centres across various Local Government Areas (LGAs) as shown in Figure 1, a histogram was constructed to visualize the data presented. The analysis revealed distinct patterns of service utilization corresponding to

**Table 2:** Multi-payers' capitation from 2023-2025.

| Payer | Brass LGA | Ekeremor LGA | KOLGA LGA | Nembe LGA | Ogbia LGA | Sagbama LGA | Southern Ijaw LGA | Yenagoa LGA |
|---|---|---|---|---|---|---|---|---|
| NPHCDA Gateway | 13565370 | 16841710 | 15939750 | 18947250 | 16541250 | 19401920 | 22254750 | 25208360 |
| NHIS Gateway | 22239069 | 39326315 | 57562110 | 60744239 | 61490010 | 40135265 | 55911850 | 76012524 |
| Bayelsa Equity Fund | 7770810 | 6483630 | 6183110 | 5861742 | 8450550 | 18424330 | 9524153 | 7391620 |
| CHAI | 91200 | 1613052 | 6032615 | 7207876 | 5249000 | 9209520 | 1921775 | 4610160 |
| UNICEF | 5242410 | 3197130 | 5679765 | 4113690 | 5458080 | 5839860 | 8316760 | 5294160 |

**Table 3:** Service utilization of enrollees in primary healthcare centres.

| Year | General attendance | Diabetes Mellitus | Screened hypertensive cases | Deliveries | ANC attendance | Family planning | Penta 3 | BCG | Diarrhea treated with ORS and Zinc | Pneumonia treated with amoxycillin | Malaria treated with ACT | Malaria treated with artesunate | Malaria treated with other antimalaria drugs | Malaria diagnosed with microscopy | Malaria diagnosed with RDT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2025 | 1033692 | 1190 | 3963 | 7942 | 68789 | 38472 | 65369 | 52754 | 4118 | 757 | 107890 | 5264 | 6816 | 29850 | 62273 |
| 2024 | 909602 | 1943 | 5354 | 10105 | 75194 | 40284 | 77821 | 62732 | 4105 | 712 | 111745 | 5601 | 5871 | 31312 | 41084 |
| 2023 | 647467 | 1031 | 3601 | 5131 | 56314 | 28767 | 60991 | 48335 | 2835 | 865 | 60917 | 2646 | 5878 | 17852 | 20168 |

Data source: DHIS2

the number of enrolled individuals in each LGA. The histogram illustrated that Sagbama LGA, with the highest enrolment of 15,503 individuals, did not exhibit a proportional increase in service utilization, recording a total of 110,275 services utilized. This indicated a significant disparity between enrolment numbers and actual service use, suggesting potential barriers that hindered effective service engagement despite a high enrolment status. Conversely, Yenagoa LGA, which had an enrolment of 14,711, showed a much higher service utilization of 126,672. This LGA peaked in service utilization relative to its enrolment, indicating that a greater proportion of enrolled individuals were utilizing healthcare services. This trend suggests effective outreach or service delivery mechanisms that encouraged higher engagement among its population. In a similar vein, Ogbia LGA, with an enrolment of 13,241, had a service utilization of 67,680. Although the service utilization was moderate, it was lower than what might be expected given the enrolment figures. In contrast, Southern Ijaw LGA, with an enrolment of 13,856, demonstrated a lower service utilization rate of 77,630, further reinforcing the notion that higher enrolment does not automatically translate to higher service use. The remaining LGAs, including Brass, Nembe, KOLGA, and Ekeremor, presented varying levels of service utilization relative to their enrolment figures. Notably, Brass LGA had an enrolment of 8,743 but a relatively high service utilization of 215,743, indicating an anomaly where the services utilized far exceeded the enrolment count, which might suggest that individuals from outside the LGA were accessing these services or that multiple services were utilized per enrollee. Overall, the histogram indicated that while enrolment figures provided an initial insight into the potential demand for healthcare services, the actual utilization patterns varied significantly across the LGAs. The peaks in service utilization observed in Yenagoa and the discrepancies seen in Sagbama and Ogbia suggest that additional qualitative factors, such as accessibility, awareness, and the quality of services provided, played crucial roles in influencing service engagement in primary healthcare centres.

The time series data for service utilization (Figure 2) in primary healthcare centres from 2023 to 2025 reveals distinct patterns and trends in patient engagement over this period. An analysis of the monthly figures indicates that each year exhibited notable fluctuations in service utilization, with specific months

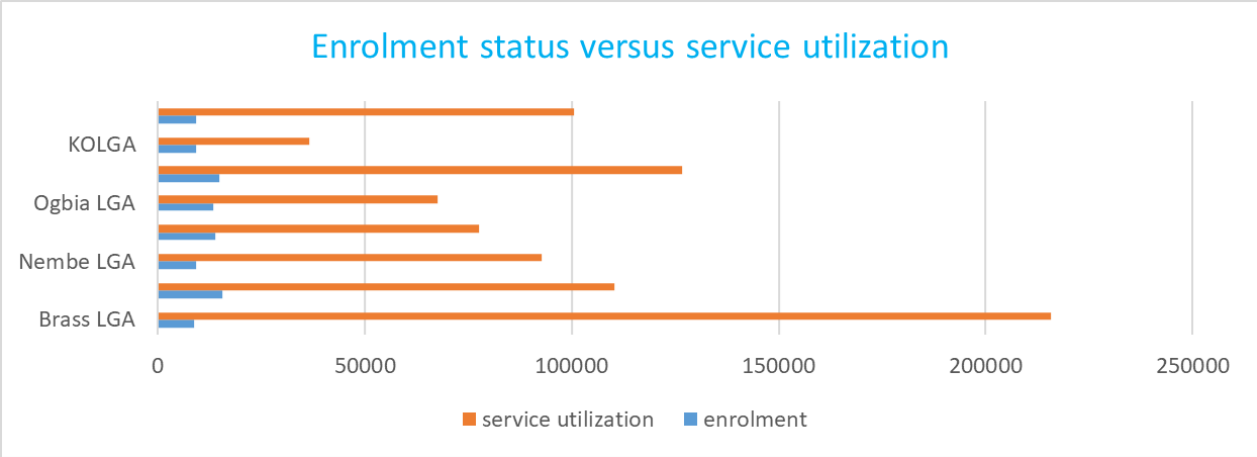


**Figure 1:** Influence of enrolment status with service utilization.

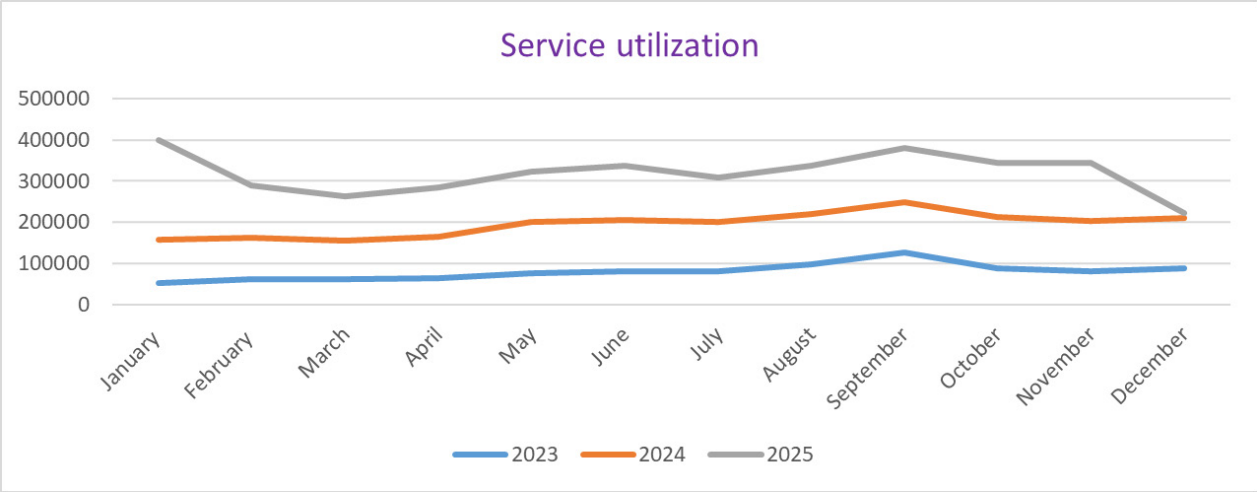


**Figure 2:** Time series for service utilization.

demonstrating peaks that merit further examination. In 2023, service utilization peaked in September with a total of 127,115 visits. This surge could be attributed to seasonal factors or specific health campaigns that might have encouraged higher engagement during that month. Following this peak, the numbers showed a decline, with October and November experiencing lower utilization rates of 89,088 and 80,900, respectively, before a slight increase in December. The year 2024 followed with an overall upward trend in service utilization. It reached its highest point in January with 106,647 visits, which might suggest that the beginning of the year often coincided with increased health-seeking behaviour, potentially due to New Year resolutions or preventive health measures following the holiday season. The monthly figures for 2024 appeared to stabilize compared to 2023, with less dramatic fluctuations observed throughout the year. In 2025, service utilization continued to rise, with January again showing the highest usage at 240,444 visits. This significant increase compared to both previous years suggests an escalation in demand for healthcare services, possibly due to demographic changes, expanded services, or increased public awareness regarding health issues. Overall, the analysis indicates that while each year had distinct peaks—September 2023, January 2024, and January 2025—the trend across the three years was one of increasing service utilization, highlighting a growing reliance on primary healthcare centres over this timeframe. The peaks in utilization likely reflect a combination of external factors, including public health initiatives, seasonal health trends, and broader socioeconomic influences impacting healthcare access and engagement.

The analysis of the capitation payment pattern in primary healthcare centres, as delineated in the time series data for 2023, 2024, and 2025, revealed a significant fluctuations and trends in funding over the observed years (Figure 3). In 2023, the capitation payments exhibited a notable increase, particularly in the latter half of the year. The most striking peak occurred in June, with a staggering payment of 33,688,380, which represented an extraordinary spike compared to previous months. This peak was followed by substantial payments in July and August, suggesting a strong response to healthcare needs during the mid-year period, likely influenced by seasonal healthcare demands or specific initiatives implemented at that time. The data shows that the capitation payments fluctuated significantly throughout the year, with notable decreases in January and February, followed by a steady increase that culminated in higher disbursements towards the middle and end of the year. In 2024, the capitation payments exhibited a different pattern. The figures for this year remained relatively stable, with the highest monthly payment recorded in December at 5,090,850. This pattern indicated a more consistent and less volatile funding approach compared to the previous year, suggesting that the healthcare financing system might have adapted to provide more predictable funding levels throughout the year. The highest payment in December could reflect an end-of-year allocation or adjustment that is common in fiscal practices. The time series for 2025 presented a dramatic shift in the capitation payment structure. The year commenced with payments that were significantly higher than those in both 2023 and 2024, with March recording the highest figure of 54,736,839. This marked a substantial rise in funding, indicating a possible overhaul or expansion of healthcare services or an increase in patient enrolment in primary care programs. The monthly payments for 2025 consistently remained elevated, suggesting a sustained investment in primary healthcare that demonstrated the importance of continued financial support for healthcare initiatives. Overall, the analysis of the capitation payment patterns across these three years highlighted distinct peaks and transitions in funding strategies, reflecting the evolving dynamics of healthcare financing in primary care settings. The peak observed in June 2023, followed by the more stable payments in 2024 and the substantial increases in 2025, illustrated the healthcare system's responsiveness to changing demands and the necessity for adaptive financial planning in primary healthcare delivery.


**Figure 3:** Time series for capitation payment.

## Discussion

The relationship between enrolment figures and the multi-payer capitation model significantly influenced service utilization in primary healthcare centres. This interaction was particularly evident in various Local Government Areas (LGAs) were demographic characteristics shaped healthcare demands and delivery. Past scholarship has highlighted that a robust enrolment process can enhance healthcare access and utilization [1]. As such, the enrolment figures within the LGAs under review not only reflected the demographic landscape but also set the stage for evaluating healthcare service delivery patterns. The enrolment data revealed a consistent trend of higher female representation across all LGAs, which was indicative of broader socio-cultural dynamics that favoured women's engagement in health services. In Brass LGA, for instance, women constituted approximately 64.6% of the total enrolment, a pattern mirrored in Sagbama, Nembe, Southern Ijaw, Ogbia, Yenagoa, KOLGA, and Ekeremor LGAs. This significant female majority suggested a potential increase in maternal and child health service utilization, as women typically drive family health decisions [44,45]. The increased enrolment of women might have led to a corresponding rise in the demand for services such as antenatal care, skilled birth attendance, and family planning, which are crucial for promoting maternal and child health. Moreover, the introduction of the multi-payer capitation model provided a framework for funding that was responsive to the diverse needs of the populations served. The capitation model facilitated the pooling of resources from various sources, including the NPHCDA Gateway, NHIS Gateway, Bayelsa Equity Fund, CHAI, and UNICEF, which collectively aimed to enhance healthcare accessibility and delivery. This strategic alignment of resources was essential in addressing the healthcare demands of LGAs with larger populations, such as Sagbama, which received proportionately more funding. Research has indicated that equitable funding distribution could lead to improved health outcomes, particularly in resource-constraint areas [46,47]. The impact of these funding streams became apparent in the service utilization data from primary healthcare centres. Over the years 2023 to 2025, there was a notable increase in general attendance visits, rising from 647,467 in 2023 to 1,033,692 in 2025. Such an increase indicated a growing reliance on primary healthcare services, which could be attributed to improved access facilitated by both the enrolment figures and the multi-payer funding model. Scholars have found that increased healthcare access is often associated with higher service utilization rates, particularly in preventive and primary care settings [20,48]. Additionally, specific health services demonstrated marked increases in utilization, with deliveries attended by skilled birth attendants rising from 5,131 in 2023 to 7,942 in 2025. This trend underscored the importance of skilled care during childbirth and reflected the efficacy of targeted maternal health initiatives, which were likely bolstered by the higher female enrolment figures. Similarly, antenatal care attendance grew from 56,314 in 2023 to 68,789 in 2025, indicating an increasing awareness and utilization of maternal health services. The multi-payer capitation model further contributed to a focus on chronic disease management, as evidenced by the gradual increase in diabetes and hypertension screenings. The data indicated that diabetes screenings rose from 1,031 cases in 2023 to 1,190 by 2025, while hypertensive case screenings increased from 3,601 to 3,963 over the same period. The capitation model's ability to provide financial incentives for preventive care likely played a critical role in these trends, aligning with findings from prior research that emphasizes the importance of financial mechanisms in shaping healthcare service delivery patterns [34,35,41]. Moreover, the increasing utilization of family planning services, which rose from 28,767 individuals in 2023 to 38,472 in 2025, illustrated a growing awareness of reproductive health within the communities served. The enhanced access to family planning resources, supported by the multi-payer funding model, likely contributed to this trend, emphasizing the interconnectedness of funding, enrolment, and service utilization. In a nutshell, the interplay between enrolment figures and the multi-payer capitation model had a profound impact on service utilization in primary healthcare centres. The data indicated a positive trend in healthcare access and service uptake, especially regarding maternal and child health services, chronic disease management, and preventive care. By aligning resources strategically and enhancing enrolment, the LGAs were able to foster improved health outcomes, emphasizing the importance of these interconnected systems in public health delivery. The evolution of healthcare financing mechanisms has been a focal point of discussion in health policy, with capitation payment systems gaining traction as a means to enhance efficiency and accessibility in primary healthcare settings. In 2023, the primary healthcare centres experienced a significant surge in service utilization, with the highest recorded visits peaking in September at 127,115. This increase was closely linked to the adoption of a multi-payer capitation model that incentivized primary care providers to focus on preventive services and early intervention strategies. Research has indicated that capitation payment systems encourage providers to manage patient care proactively, ultimately leading to a rise in service utilization during specific months [48]. This phenomenon was particularly evident in September, when health campaigns and seasonal health trends likely contributed to increased patient engagement. The decline in service utilization observed in the subsequent months of October and November, with visits decreasing to 89,088 and 80,900 respectively, suggested a seasonal pattern influenced by external factors such as weather changes and holiday distractions. The financial structure underpinning the capitation model also demonstrated notable fluctuations throughout 2023. The capitation payments surged in the latter half of the year, with a striking peak in June at 33,688,380. This spike appeared to correlate with the increased service utilization, reflecting a healthcare system responsive to seasonal demands and specific health initiatives. The significant investment made during this period was consistent with findings from previous studies that emphasized the role of adaptive financial planning in meeting the needs of a dynamic patient population. The fluctuations in capitation payments indicated a need for healthcare systems to balance funding availability with service demand, a challenge that is often exacerbated in a multi-payer environment where varying payment rates and structures

could complicate financial sustainability. As the healthcare landscape transitioned into 2024, the service utilization patterns began to stabilize, with an overall upward trend observed throughout the year. January marked a high point in service utilization at 106,647 visits, suggesting that the beginning of the year often aligns with increased health-seeking behaviour, possibly spurred by New Year resolutions and post-holiday health initiatives. The capitation payments during 2024 exhibited a shift towards greater stability, with the highest monthly payment recorded in December at 5,090,850. This consistency in funding suggested that the healthcare financing system was adapting to provide more predictable funding levels, thus enabling primary healthcare centres to better plan and allocate resources [49,50]. The less volatile nature of the capitation payments in 2024 likely facilitated improved patient access to services, resulting in heightened utilization rates throughout various months of the year. The year 2025 marked a dramatic shift in both service utilization and capitation payment structures. The service utilization figures skyrocketed, with January recording an unprecedented 240,444 visits, highlighting an escalating demand for healthcare services. This surge can be attributed to a combination of factors, including demographic changes, expanded services, and increased public awareness regarding health issues. The rise in demand was further reflected in the capitation payments, which commenced the year at significantly higher levels than in both preceding years, with March recording the highest payment of 54,736,839. This substantial increase in funding pointed towards a potential overhaul of healthcare services, indicating an expansion of coverage or an increase in patient enrolment in primary care programs. Such findings were corroborated by literature suggesting that well-structured capitation models could lead to enhanced service delivery and patient engagement, particularly in response to shifts in public health priorities. Overall, the analysis of the impact of multi-payer capitation on service utilization in primary healthcare centres from 2023 to 2025 revealed distinct patterns influenced by both funding dynamics and external factors. The peaks in service utilization—observed in September 2023, January 2024, and January 2025—reflected a growing reliance on primary healthcare services, facilitated by a capitation payment system that encouraged preventive care and efficient service delivery. The evolving capitation payment patterns, particularly the significant fluctuations in 2023 and the stabilization observed in 2024, underscored the necessity for adaptive financial planning within primary care settings to respond to changing healthcare demands. Additionally, the notable increases in both service utilization and capitation payments in 2025 illustrated the critical role of financial investments in sustaining healthcare initiatives and enhancing patient engagement. As healthcare systems continue to navigate the complexities of multi-payer environments, the insights gleaned from this analysis will be invaluable in shaping future policies aimed at optimizing service delivery and improving health outcomes for diverse populations.

## Conclusion

The study assessed the impact of a multi-payer capitation model on service utilization patterns and enrolment dynamics in primary health centres across Bayelsa State, Nigeria. The findings revealed that the introduction of the capitation system significantly influenced healthcare access and service delivery over the study period from 2023 to 2025. Overall, there was a marked increase in general attendance visits, with figures rising from 647,467 in 2023 to 1,033,692 in 2025. This trend highlighted a growing reliance on primary healthcare services, underscoring the effectiveness of the capitation model in enhancing healthcare accessibility. The analysis also demonstrated that specific health services, particularly maternal and child health interventions, experienced substantial increases in utilization. Antenatal care attendance surged from 56,314 to 68,789, while deliveries attended by skilled birth attendants rose from 5,131 to 7,942 within the same timeframe. These increases suggested that the capitation model successfully incentivized healthcare providers to focus on essential services, thereby improving health outcomes for vulnerable populations, particularly women and children. Moreover, the study identified disparities in service utilization relative to enrolment numbers, indicating potential barriers to effective engagement among enrolled individuals. For instance, despite high enrolment figures in certain Local Government Areas, service utilization did not always correlate positively, suggesting that factors such as accessibility, quality of services, and community outreach efforts played crucial roles in influencing patient engagement. Fundamentally, the multi-payer capitation model was found to positively impact service utilization in primary healthcare centres, particularly in the domains of maternal and child health services and chronic disease management. However, the study emphasized the need for enhanced coordination among payers, improved outreach strategies, and continuous monitoring of service delivery to further optimize engagement and health outcomes. Continued investment in the capitation framework was deemed essential for sustaining healthcare access and improving health outcomes in Bayelsa State. Overall, the research provided valuable insights that could inform policy reforms aimed at strengthening primary healthcare systems within multi-payer environments.

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