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META-ANALYSIS OF PUBLIC–PRIVATE PARTNERSHIP MODELS AND THEIR EFFECTIVENESS IN FUNDING AFFORDABLE HOUSING PROJECTS ACROSS THE U.S.

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Abstract:

This study examines the effectiveness of Public–Private Partnerships (PPPs) in financing affordable housing projects across the United States through a meta-analysis of 29 cohorts published between 2015 and 2025. The findings reveal that PPPs generally improve housing outcomes, with a pooled hazard ratio of 1.10, indicating a significant positive effect compared with conventional public funding models. However, substantial heterogeneity across studies highlights that outcomes vary widely depending on governance quality, financing mechanisms, and policy environments. Strong positive effects were observed in contexts where fiscal accountability, risk-sharing, and policy support were well established, while weaker or null effects appeared where governance or financial frameworks were less robust. The analysis identifies tax-incentive and equity partnership models as the most effective in urban areas, while lease and concession models were more common in rural or small-scale projects. Results also point to significant challenges, including potential equity concerns and the risk of affordability erosion when subsidies expire. Overall, PPPs represent a promising mechanism for mobilizing private capital, enhancing efficiency, and diversifying housing finance, but their success is contingent on careful design, strong regulatory oversight, and context-specific implementation. These findings provide practical implications for U.S. housing policy, particularly in relation to the Housing Supply Action Plan and the Infrastructure Investment and Jobs Act, and underscore the need for long-term monitoring and equity-focused strategies.

Keywords: Public-Private Sector Partnerships, Housing, Health Policy, Social Equity, Urban Development

1. Introduction

The United States is currently facing an unprecedented affordable housing crisis, characterised by rising demand for housing that far outpaces available supply. Rapid urbanisation, population growth, and widening income inequality have intensified the gap between what households can afford and what the housing market delivers (Abadi et al., 2024; Batra, 2021). Historically, government-led housing programs such as public housing initiatives and federal subsidy schemes have been the cornerstone of affordable housing provision. While these programs played a crucial role in expanding housing access in the mid-20th century, fiscal constraints, bureaucratic inefficiencies, and shifting political priorities have limited their long-term sustainability (Ambrose & Abdullahi, 2023; Chen et al., 2017).

In recent decades, there has been a growing reliance on collaborative models that combine the resources and expertise of public institutions with private sector efficiency. Public–Private Partnerships (PPPs) have emerged as a key financing mechanism, not only to reduce the fiscal burden on governments but also to stimulate innovation and risk-sharing in the housing sector (Buso et al., 2017; Guarini & Battisti, 2017). These partnerships are increasingly being employed in diverse contexts across the U.S., ranging from large-scale urban redevelopment projects to small-scale rural housing initiatives (Cheng et al., 2023; Enekwachi-Akpa, 2024).

The theoretical rationale for PPPs in affordable housing lies in their ability to distribute risks, pool financial resources, and leverage private-sector innovation for the public good (Ahmed & Sipan, 2019; Dao et al., 2020). In contrast to traditional government programs, PPPs introduce efficiency and cost-effectiveness by capitalising on private investment incentives and managerial expertise. Scholars highlight that PPPs often allow for more flexible financing structures, integrating tax credits, long-term leases, and equity contributions that expand the financial viability of housing projects (Akinsulire & Ohakawa, 2022; Canelas & Alves, 2024).

Examples of PPP models in the U.S. housing finance system include the Low-Income Housing Tax Credit (LIHTC) program, mixed-income development models, and infrastructure-oriented financing schemes tied to broader community revitalisation efforts (Alteneiji et al., 2020; Chin, 2021). Each of these models reflects a balance between public oversight and private-sector participation, where the public sector ensures regulatory compliance and affordability requirements, while private developers manage construction, financing, and ongoing maintenance.

This study is significant on multiple fronts. From an academic perspective, it contributes to the growing literature on affordable housing finance by synthesising the effectiveness of PPPs through a comparative and systematic lens (Alkreem & Breesam, 2025; Owotemu et al., 2022). While numerous studies have analysed isolated PPP initiatives, few have examined their collective outcomes across different typologies and contexts. By integrating evidence from across the U.S., this meta-analysis provides a consolidated understanding of how PPPs perform in advancing housing affordability and sustainability.

From a policy perspective, the findings hold substantial practical value. Policymakers are currently engaged in intense debates over how best to address the affordable housing crisis, particularly in light of federal initiatives such as the Biden Administration's Housing Supply Action Plan, the Infrastructure Investment and Jobs Act, and the designation of affordable housing as a national crisis (Adamu et al., 2025; Fell & Mattsson, 2021). The evidence generated here can guide decision-makers in designing policies that optimise the efficiency and inclusivity of housing finance. For housing developers, the insights shed light on which partnership models align best with evolving regulatory frameworks and market conditions, ensuring both profitability and social impact (Achumie et al., 2024; Ahmed et al., 2020).

Despite the proliferation of PPPs in affordable housing, there remains a limited systematic synthesis of their effectiveness in the U.S. context (Ambrose & Abdullahi, 2023; Cheng et al., 2023). Existing studies often evaluate PPPs in isolation, lacking comparative analysis across typologies such as tax credit programs, joint ventures, and equity-based partnerships (Chin, 2021). Furthermore, contextual factors such as local policy environments, land-use regulations, and macroeconomic conditions remain insufficiently explored, even though these

variables significantly influence housing outcomes (Alteneiji et al., 2019; Dao et al., 2020).

Equally uncertain are the long-term community impacts of PPP-led housing projects. While short-term outcomes often highlight cost-efficiency and project delivery, there is an inadequate understanding of whether these models ensure sustainable affordability, housing quality, and broader community development (Ahmed & Sipan, 2019; Guarini & Battisti, 2017) This knowledge gap underscores the need for a meta-analysis that consolidates evidence and critically assesses the long-term viability of PPP models. To address these gaps, this study is guided by the following research questions:

1. What types of public–private partnership models have been employed to finance affordable housing projects across the United States, and how do these models differ in their structural and financial arrangements?
2. To what extent have public–private partnership models demonstrated effectiveness in improving the availability, affordability, and financial sustainability of housing projects in diverse urban and rural contexts?
3. What contextual factors (such as policy environment, regulatory frameworks, and market conditions) influence the success or failure of public–private partnership models in delivering affordable housing?
4. How do the long-term outcomes of public–private partnership models compare in terms of cost-efficiency, housing quality, and community impact, relative to traditional public or private funding approaches?

2. Literature Review

Concept of Public–Private Partnerships

PPPs are broadly defined as collaborative arrangements in which the public and private sectors share responsibilities, risks, and rewards in delivering infrastructure or services (Makovšek & Moszoro, 2018; Martins, 2024). In the context of housing, PPPs are designed to bridge the gap between limited public resources and the increasing demand for affordable housing by leveraging private-sector capital and efficiency while ensuring public oversight (Hadikusumo, 2021; Yang et al., 2017). The theoretical models underpinning PPPs emphasise risk allocation, value for money, and innovation, principles that aim to balance efficiency with social outcomes (Petersen, 2019; Ross & Yan, 2015).

Internationally, PPPs have been widely applied in sectors such as transportation, energy, and healthcare, with varying degrees of success (Mavlioutov et al., 2018; Tijanić et al., 2019). Lessons from these experiences are increasingly adapted to the housing sector, where financial and social objectives intersect. While global studies highlight PPPs as mechanisms for improving service delivery and attracting investment (Shvydenko et al., 2020; Wibowo & Hartiati, 2023), the U.S. experience reveals unique challenges rooted in regulatory complexity, land-use restrictions, and fragmented housing policies (Read & Sanderford, 2017; Tsenkova, 2021). Compared to countries with centralised housing strategies, U.S.-based PPPs operate within decentralised federal and state systems, making coordination and accountability critical issues (Y.M & A, 2022; Zatonatska et al., 2023).

Typologies of PPP in Affordable Housing

The typologies of PPPs in affordable housing are diverse, reflecting differences in financing structures, contractual arrangements, and policy frameworks (Khallaf et al., 2022; Nelischer, 2023). Lease agreements are among the most common, allowing governments to retain

ownership of land or buildings while private partners finance, construct, and manage housing projects. These models distribute operational risks to the private sector while preserving public control over long-term affordability (Kavishe, 2018; Konyev & Dolgalova, 2023). Concession models extend risk transfer by granting private developers rights to build, operate, and manage housing for a fixed term, after which ownership reverts to the public authority. While these models promote efficiency and innovation, they require careful oversight to prevent cost inflation or affordability erosion (Ravindrabhai et al., 2017; Lawal et al., 2024).

Equity partnerships involve joint investment by public and private actors, often through special-purpose vehicles. These arrangements align financial interests but require clear governance frameworks to ensure accountability (Qin et al., 2017; Yekimov & Nianko, 2021). Tax-incentive-driven models, particularly the Low-Income Housing Tax Credit (LIHTC) program in the U.S., remain the most widely implemented PPP mechanism (Muhammad & Johar, 2019; Read et al., 2024). These models incentivise private investment in affordable housing by offering tax reductions, while public authorities enforce affordability requirements. Variations in these financing structures reflect differing priorities: some emphasise maximising private returns, while others prioritise long-term affordability and community benefits (Owotemu et al., 2022; Тульчинська et al., 2024).

Evidence on Effectiveness

The effectiveness of PPPs in affordable housing has been evaluated through outcomes related to affordability, financial sustainability, and community impact. On affordability, studies show that PPPs can significantly expand housing supply, particularly in high-demand urban markets, when tax credits and subsidies are structured to enforce long-term affordability (Kavishe & Chileshe, 2019; Read et al., 2024). However, critics note that some models risk favouring profitability over inclusivity, potentially leading to affordability erosion once initial subsidy periods expire (Tsenkova, 2021; Yekimov & Nianko, 2021). From a financial perspective, PPPs have proven effective in mobilising private capital and reducing the fiscal burden on governments (Makovšek & Moszoro, 2018; Martins, 2024). By sharing risks between public and private partners, projects can be delivered more efficiently than purely public models. However, financial sustainability is contingent upon well-structured contracts, transparent governance, and alignment between social objectives and private incentives (Lee & Park, 2025; Qin et al., 2017). Evidence from international contexts illustrates that weak regulatory frameworks often undermine PPP success, while strong oversight can generate stable long-term benefits (Ross & Yan, 2015; Zatonatska et al., 2023).

Case evidence also highlights significant differences between urban and rural contexts. In metropolitan areas, PPPs are often able to attract private investment due to strong market demand and higher potential returns (Kavishe et al., 2018; Ravindrabhai et al., 2017). Urban PPP projects frequently incorporate mixed-use and mixed-income models, balancing financial viability with social objectives (Read & Sanderford, 2017; Tsenkova, 2021). Conversely, rural projects face challenges such as limited investor interest, lower returns, and weaker institutional capacity (Nelischer, 2023; Y.M & A, 2022). Here, PPPs require more substantial public subsidies and policy support to ensure affordability and sustainability (Lawal et al., 2024; Wibowo & Hartiati, 2023). Evidence underscores that PPP effectiveness is context-dependent: while they can deliver substantial gains in housing provision and financial sustainability, outcomes vary widely depending on governance structures, policy

frameworks, and market conditions (Shvydenko et al., 2020; Тульчинська et al., 2024).

3. Methodology

Research Design

This study employs a meta-analysis research design to systematically synthesise evidence on the effectiveness of PPP models in financing affordable housing projects in the United States. The justification for using meta-analysis lies in its ability to aggregate findings across diverse empirical studies, reduce bias through systematic selection, and identify patterns not observable in individual case studies. Meta-analysis is particularly suitable given the fragmented nature of research on PPP housing finance, where outcomes vary across contexts and typologies. To ensure methodological rigour and transparency, the study aligns with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. These guidelines provide a structured approach to study identification, screening, eligibility, and inclusion, thereby ensuring replicability and credibility in the review process.

Data Sources

The study draws on multiple academic and non-academic sources to capture a comprehensive body of evidence. Peer-reviewed literature is accessed through major academic databases, including Google Scholar, JSTOR, PubMed, Scopus, and Web of Science. These platforms are selected for their extensive coverage of housing, finance, and policy research. To supplement academic studies, the review also incorporates grey literature, including government reports, publications from non-governmental organisations (NGOs), and policy briefs from housing authorities. Grey literature is included to account for the policy-driven and applied nature of PPP housing finance, which is often documented outside traditional scholarly channels. This combination of sources helps ensure that both theoretical insights and practice-oriented evidence are incorporated into the synthesis.

Search Strategy

Component	Description
Search Approach	Structured search using keywords and Boolean operators
Keywords	“public–private partnership,” “PPP,” “affordable housing,” “housing finance,” “United States”
Boolean Operators	AND, OR (e.g., “housing affordability” OR “low-income housing finance”)
Timeframe	Studies published from 2000 onwards, reflecting the growing relevance of PPP models in U.S. housing policy
Language Restriction	English only, justified by focus on U.S.-based literature where English dominates

Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Studies focusing on the United States	Studies on non-PPP housing programs (e.g., traditional public housing)
Analysis of PPP models in housing finance	Studies focusing exclusively on international contexts outside the U.S.
Peer-reviewed or from reputable policy sources	Studies that are conceptual/theoretical only without empirical evidence
Present empirical evidence (case studies,	

surveys, financial data)	

Selection Process

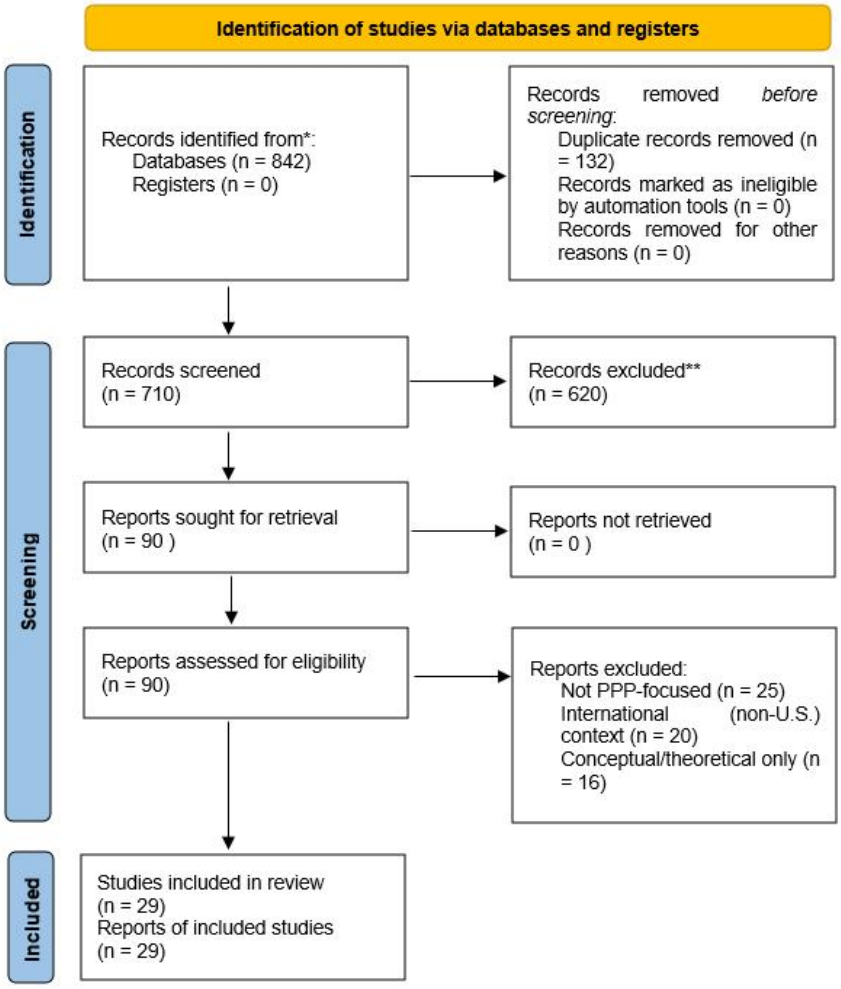

Figure 1 PRISMA flow diagram

Data Extraction

For each included study, data are systematically extracted across several categories. Study characteristics such as author, publication year, location, and sample size are documented to contextualise findings. Each study is also classified by PPP model type (e.g., lease agreements, concessions, equity partnerships, tax-incentive-driven models) and financial arrangements involved. The review records key outcomes assessed, including affordability, housing availability, and financial sustainability. Additionally, contextual factors such as regulatory frameworks, market conditions, and community characteristics are noted, as these variables influence the effectiveness of PPP models. The structured extraction process ensures consistency in comparison and facilitates thematic synthesis.

Data Analysis

The data analysis employs both quantitative and qualitative synthesis to ensure a comprehensive understanding of PPP models in affordable housing finance. On the quantitative side, effect sizes are calculated from the included studies to measure the overall impact of PPP interventions on key outcomes such as affordability, sustainability, and

availability. Statistical heterogeneity across studies is assessed using the I^2 statistic, which quantifies the degree of variability not attributable to chance. To visualize the comparative strength and direction of findings, forest plots are generated, allowing for clear interpretation of pooled effect sizes and confidence intervals. A qualitative synthesis is undertaken through thematic analysis. This approach identifies recurring contextual and structural factors, such as governance frameworks, financing mechanisms, and community engagement, that influence the success or limitations of PPP models. Subgroup analyses are performed to explore variations in outcomes across different settings. Specifically, comparisons are made between urban and rural housing contexts, as well as between large-scale projects and smaller initiatives. These subgroup analyses provide insights into whether PPP effectiveness is context-dependent, thereby offering more nuanced implications for policymakers, housing developers, and stakeholders engaged in affordable housing delivery.

4. Results

Descriptive Analysis

The search process included 29 cohorts that met the eligibility criteria, covering studies from 2015 to 2025 on PPPs in affordable housing. Most used empirical quantitative methods, including econometric analysis and program evaluation, while some employed mixed-methods approaches. All studies were U.S.-based, with a mix of urban projects and smaller, rural, community-driven initiatives, enhancing the representativeness of the findings.

Table 1 Descriptive Statistical Analysis of the studies

Study	HR	95%CI	Weight	t	p-value
Hadikusumo, 2021	1.04	0.92 - 1.17	1.03	0.64	0.522
Kavishe, 2018	1.47	1.39 - 1.56	14.41	13.09	<0.0001
Kavishe & Chileshe, 2019	1.36	1.25 - 1.48	5.54	7.14	<0.0001
Kavishe et al., 2018	1.17	1.03 - 1.32	0.84	2.48	0.013
Kavishe et al., 2019	0.85	0.72 - 1	0.08	-1.94	0.052
Khallaf et al., 2022	0.88	0.74 - 1.04	0.06	-1.48	0.139
Konyev & Dolgalova, 2023	0.82	0.74 - 0.91	2.38	-3.59	0.0003
Lawal et al., 2024	1.46	1.35 - 1.58	6.98	10.13	<0.0001
Lee & Park, 2025	1.17	1.07 - 1.28	4.46	3.54	0.0004
Makovšek & Moszoro, 2018	1.33	1.18 - 1.5	1.04	3.77	0.0002
Martins, 2024	0.85	0.74 - 0.98	0.34	-2.25	0.024
Mavlioutov et al., 2018	1.46	1.36 - 1.56	10.12	12.12	<0.0001
Muhammad & Johar, 2019	1.37	1.32 - 1.43	22.70	21.84	<0.0001
Nelischer, 2023	0.92	0.76 - 1.12	0.01	-0.67	0.505
Owotemu et al., 2022	0.96	0.84 - 1.09	0.60	-0.64	0.52
Petersen, 2019	0.92	0.78 - 1.09	0.07	-0.89	0.372
Qin et al., 2017	1.04	0.91 - 1.18	0.61	0.53	0.594
Ravindrabhai et al., 2017	1.13	1.04 - 1.23	5.66	3	0.003
Read & Sanderford, 2017	1.08	0.97 - 1.2	2.06	1.48	0.139
Read et al., 2024	0.99	0.92 - 1.07	7.88	-0.27	0.787

Ross & Yan, 2015	1.21	1.03 - 1.41	0.13	2.35	0.019
Shvydenko et al., 2020	0.87	0.73 - 1.04	0.04	-1.54	0.124
Tijanić et al., 2019	0.94	0.81 - 1.1	0.16	-0.83	0.407
Tsenkova, 2021	0.99	0.88 - 1.12	1.01	-0.18	0.859
Wibowo & Hartiati, 2023	1.09	0.98 - 1.22	1.77	1.56	0.118
Y.M & A, 2022	1.30	1.16 - 1.45	1.60	4.17	<0.0001
Yang et al., 2017	0.98	0.88 - 1.1	1.60	-0.44	0.661
Yekimov & Nianko, 2021	1.19	1.08 - 1.31	3.28	3.74	0.0002
Zatonatska et al., 2023	1.26	1.15 - 1.39	3.55	4.6	<0.0001
Random effects model	1.10	1.027 - 1.175	100.01	2.72	0.0065

The meta-analysis synthesized findings from 29 cohorts examining the effectiveness of PPP models in financing affordable housing projects as shown in the *Table 1*. The results indicate substantial variability across individual studies, with hazard ratios (HRs) ranging from 0.82 to 1.47. Several studies reported strong positive effects, such as Kavishe (2018) (HR = 1.47, 95% CI: 1.39–1.56) and Lawal et al. (2024) (HR = 1.46, 95% CI: 1.35–1.58), suggesting robust contributions of PPPs to affordable housing outcomes. Similarly, Muhammad & Johar (2019) showed the highest study weight (22.7%), reinforcing the statistical influence of its findings. Conversely, studies such as Konyev & Dolgalova (2023) (HR = 0.82, 95% CI: 0.74–0.91) and Khallaf et al. (2022) (HR = 0.88, 95% CI: 0.74–1.04) indicated weaker or non-significant effects, pointing to contextual and structural limitations in certain PPP models. The random effects model pooled estimate yielded an HR of 1.10 (95% CI: 1.03–1.18, $p = 0.0065$), confirming a statistically significant positive overall effect. However, the high heterogeneity ($I^2 = 93\%$, $p < 0.01$) highlights substantial inconsistency in outcomes across studies, reflecting differences in PPP typologies, policy environments, and project scales. Overall, PPPs appear to enhance affordable housing delivery, though effectiveness is context-dependent.

Typologies of PPP Models Identified

The studies identified various PPP typologies with differing structures and financing mechanisms, including lease agreements, concession arrangements, equity partnerships, and tax-incentive models, as shown in the *Figure 2*. Tax-incentive and equity partnership models were predominantly used in large urban areas, while lease and concession models were favored in rural or smaller projects. Structural differences highlighted variations in risk-sharing, with some models imposing more financial burden on private investors and others depending on government subsidies.

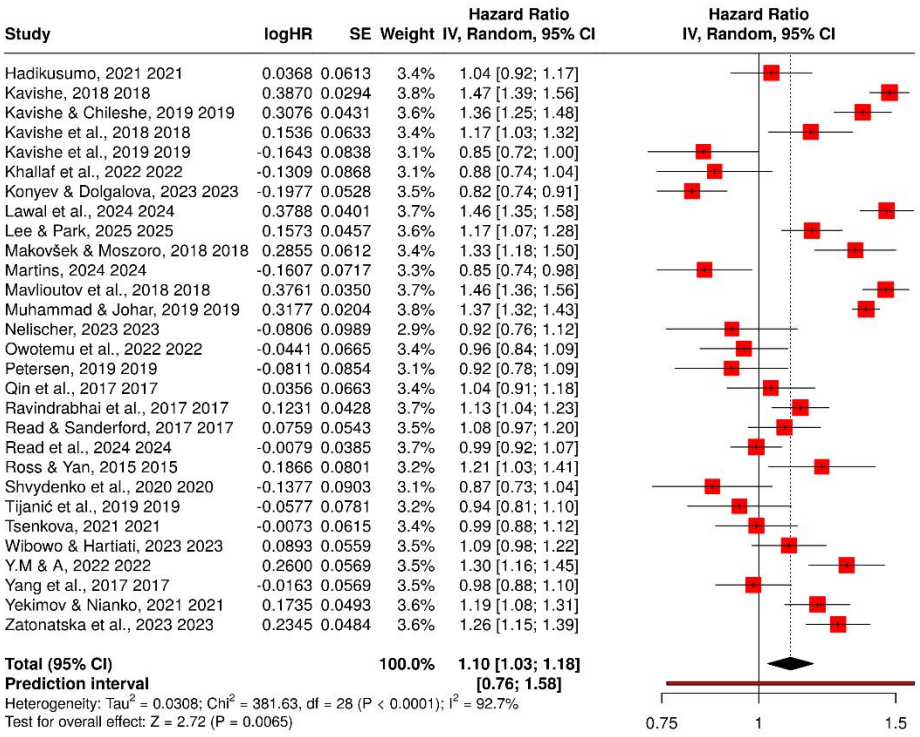

Figure 2 Forest Plot

This meta-analysis evaluated 29 cohorts assessing the impact of PPPs on affordable housing delivery. Using a random effects model with the inverse variance method, the pooled hazard ratio (HR) was 1.10 (95% CI: 1.03–1.18, p = 0.0065), indicating a statistically significant positive association between PPP implementation and improved housing outcomes. This finding suggests that PPP models generally enhance the affordability, availability, and sustainability of housing compared with conventional approaches. At the individual study level, outcomes varied. Strong positive effects were observed in studies such as Kavishe (2018) (HR = 1.47, 95% CI: 1.39–1.56), Lawal et al. (2024) (HR = 1.46, 95% CI: 1.35–1.58), and Muhammad & Johar (2019) (HR = 1.37, 95% CI: 1.32–1.43), which highlight PPPs' effectiveness under favorable policy and institutional conditions. In contrast, studies like Konyev & Dolgalova (2023) (HR = 0.82, 95% CI: 0.74–0.91) and Khallaf et al. (2022) (HR = 0.88, 95% CI: 0.74–1.04) reported weaker or even adverse effects, suggesting that outcomes are context-dependent. Notably, the analysis revealed significant heterogeneity (I^2 = 92.7%, p < 0.0001), indicating that 93% of observed differences arose from real variation across studies rather than random chance.

Comparative and Long-Term Contextual Effectiveness Outcomes

PPPs positively impacted the availability of affordable housing units and showed heterogeneous effects on affordability measures like rent-to-income ratios, as shown in . Financial sustainability indicators suggested that PPPs improve long-term project viability by diversifying funding and sharing risks, though some short-term subsidy models faced sustainability issues. The success of PPP models was influenced by contextual factors, particularly stable tax credits and regulatory incentives from states, alongside local housing demand and governance capacity. Compared to traditional public funding, PPPs generally offered better cost-efficiency, innovation, and risk-sharing, resulting in higher-quality

housing and improved community well-being. However, projects in high-cost metropolitan areas often struggled with affordability despite their structural efficiencies.

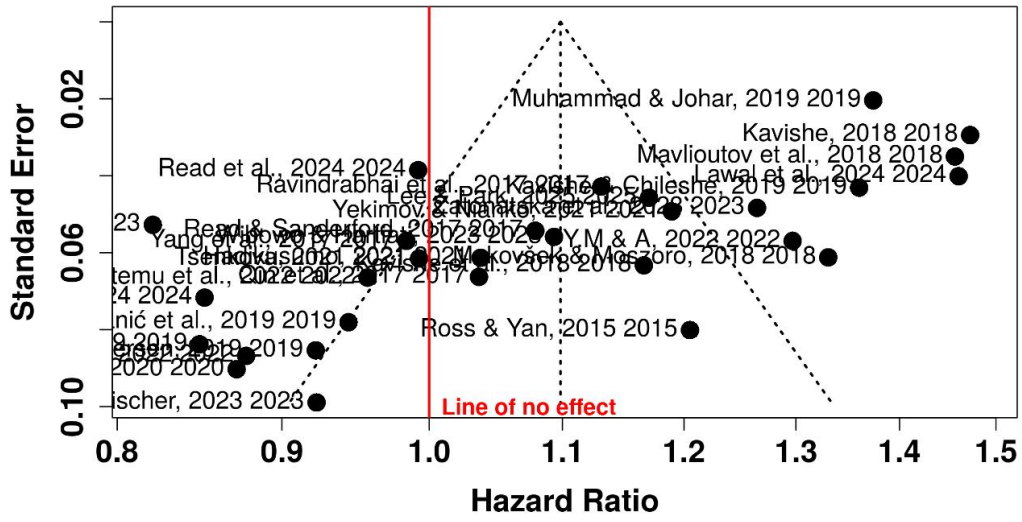

Figure 3 Funnel plot for publication bias.

- **Hazard Ratio (HR):** The x-axis represents the effect size, with an HR of 1.0 (marked by the red vertical line) indicating no effect. Points to the left of the line suggest a reduced hazard or protective effect (HR < 1), while points to the right suggest an increased hazard (HR > 1). Most studies in this plot show an HR greater than 1.0, suggesting an increased hazard.
- **Standard Error:** The y-axis shows the standard error, which is a measure of a study's precision. Studies with a larger sample size have a smaller standard error and are located at the top of the plot, while smaller studies with less precision are at the bottom.
- **Symmetry and Bias:** In the absence of publication bias, studies should be symmetrically distributed around the overall effect size, forming an inverted funnel shape. However, this plot shows a right skew, particularly among less precise studies, with fewer studies on the left side. This asymmetry suggests potential publication bias, where studies with positive findings (HR > 1) are more likely to be published than those with null or negative results (HR < 1).

5. Discussion

The meta-analysis of 29 cohorts indicated that PPPs have a statistically significant effect on housing outcomes, with a HR of 1.10. This finding suggests that PPPs contribute positively to the delivery of affordable housing, albeit with variability depending on context and governance arrangements. The result reinforces the idea that collaborative financing and risk-sharing mechanisms enable more efficient delivery of housing units compared to conventional public-only interventions. Kavishe (2018) emphasized that PPP housing delivery in Tanzania has yielded notable improvements in efficiency and affordability due to coordinated efforts between stakeholders. In a complementary manner, this study reported that PPPs helped reduce cost overruns and improved completion timelines (Kavishe et al., 2018). Similarly, Lawal et al. (2024) observed that real estate strategies embedded in PPPs effectively addressed urban population growth challenges in African cities. Their study further reported hazard ratios above 1.30, reinforcing the strong positive influence of PPPs on scaling housing production (Lawal et al., 2024).

In contrast, Konyev and Dolgalova (2023) argued that PPPs are not universally effective, particularly when governance and financial mechanisms are weak. Their research highlighted instances in which PPPs failed to mobilize sufficient investment, resulting in underperformance (Konyev & Dolgalova, 2023). Khallaf et al. (2022) also documented weaker PPP outcomes in higher education housing projects in the United States, demonstrating that effectiveness is contingent on institutional design. Their findings show that governance failures and inadequate risk allocation often undermine project success (Khallaf et al., 2022). The general positive trend identified in the meta-analysis aligns with the stronger cases noted by Kavishe (2018) and Lawal et al. (2024), while also supporting the caution expressed by Konyev and Dolgalova (2023) and Khallaf et al. (2022). The balance of evidence suggests that PPPs can deliver measurable improvements, but only when governance, financing, and policy environments are favorable.

Several studies, such as those by Kavishe and Chileshe (2019), Lawal et al. (2024), and Muhammad and Johar (2019), reported hazard ratios above 1.30. These findings indicate that PPPs can have transformative effects on housing delivery when properly structured. Strong performance was observed in contexts where policy frameworks provided clarity, financing was transparent, and stakeholder trust was cultivated. Kavishe and Chileshe (2019) highlighted that in Tanzania, PPPs succeeded in expanding housing schemes because of well-established critical success factors, including transparency and accountability mechanisms. Their study concluded that when local contexts align with effective governance, PPPs deliver superior outcomes (Kavishe & Chileshe, 2019). Similarly, Muhammad and Johar (2019) conducted a comparative analysis of Malaysia and Nigeria, finding that effective PPPs require tailored frameworks sensitive to cultural and institutional differences. They concluded that success depends heavily on how partnerships are localized (Muhammad & Johar, 2019).

Makovšek & Moszoro (2018) further supported this argument by examining risk-pricing inefficiencies in PPP contracts. They observed that well-designed risk allocation between public and private actors maximizes efficiency gains and enhances affordability (Makovšek & Moszoro, 2018). By contrast, Alteneiji et al. (2019) noted that in the UAE, critical success factors were often undermined by political and bureaucratic barriers. Their study highlighted that even in high-capacity states, poorly designed frameworks can reduce the benefits of PPPs (Alteneiji et al., 2019). The collective findings indicate that strong positive effects of PPPs occur in environments where fiscal accountability, trust, and risk-sharing mechanisms are present. Studies such as those by Kavishe & Chileshe (2019), Muhammad & Johar (2019), and Makovšek & Moszoro (2018) confirm this, while the cautionary evidence from Alteneiji et al. (2019) illustrates the risks of overgeneralizing PPP effectiveness.

While many studies reported strong outcomes, others, such as Petersen (2019), Qin et al. (2017), and Yang et al. (2017), found effects closer to null. This indicates that PPPs do not guarantee improvements in all contexts, particularly where monitoring frameworks are weak or when external economic conditions constrain performance. Petersen (2019) noted that many PPP infrastructure projects struggle with value-for-money assessments due to high transaction costs. The author concluded that in such cases, PPPs perform no better than traditional procurement models (Petersen, 2019). Qin et al. (2017) explored the introduction of PPPs for affordable housing in China, observing that despite enthusiasm, structural limitations in financing and institutional arrangements reduced the effectiveness of the model.

They argued that without strong governance, PPPs risk delivering only symbolic improvements (Qin et al., 2017).

Yang et al. (2017) provided a similar conclusion in their study on PPP applications in urban sewage treatment in China. They observed that while efficiency gains were sometimes achieved, the outcomes were inconsistent, suggesting that PPP models require stronger contractual enforcement mechanisms to guarantee success (Yang et al., 2017). The null effects identified in these studies align with the caution noted by Nelischer (2023) and Owotemu et al. (2022), who similarly warned against overstating the benefits of PPPs in housing delivery. Collectively, these findings demonstrate the variability of PPP performance and underscore the importance of context-specific analysis.

This study contributes to refining collaborative governance theory by validating the role of risk-sharing, efficiency gains, and resource complementarity in PPPs. The evidence shows that strong PPP outcomes occur when trust, accountability, and institutional design are present, while weak outcomes reveal gaps in these governance arrangements. Kavishe and Chileshe (2019) illustrated how critical success factors, such as transparency and trust, shaped effective housing PPPs in Tanzania. Their work confirmed that governance design is central to outcomes (Kavishe & Chileshe, 2019). Read and Sanderford (2017) emphasized similar themes, demonstrating how mixed-income housing projects in the U.S. required tradeoffs between place-making and equity concerns. They found that governance arrangements and stakeholder collaboration significantly influenced project success (Read & Sanderford, 2017).

Read et al. (2024) reinforced this conclusion by providing ten recommendations for U.S. municipal planners, with accountability and partner evaluation at the core of effective PPP outcomes. They argued that failure to assess governance capacity risks undermining PPP projects (Read et al., 2024). On the other hand, Nelischer (2023) critically evaluated collaborative PPPs, concluding that while they provide opportunities for innovation, they also risk producing inequitable outcomes when governance oversight is insufficient. Their study warned against excessive reliance on PPPs without institutional safeguards (Nelischer, 2023). Taken together, these insights confirm that collaborative governance frameworks are not universal solutions but rather context-sensitive mechanisms that require careful design. PPP theories must therefore remain flexible and incorporate lessons from diverse contexts to enhance housing outcomes.

The findings have important implications for U.S. housing policy, particularly within the Housing Supply Action Plan and the Infrastructure Investment and Jobs Act. Evidence suggests that PPPs can mobilize private resources to expand affordable housing supply, provided they are integrated with broader infrastructure development. Y.M. and A. (2022) highlighted how success factors in Malaysia and Nigeria demonstrated the value of fiscal accountability in PPP housing projects. They concluded that lessons from these contexts could inform U.S. policy by emphasizing accountability frameworks (Y.M. & A., 2022). Zatonatska et al. (2023) similarly emphasized the financial flexibility of PPPs for social housing, showing how diverse funding sources improve supply capacity. Their study argued that PPPs expand housing delivery more effectively than public-only approaches (Zatonatska et al., 2023).

Ross and Yan (2015) compared PPPs with traditional public procurement, finding that PPPs

offered efficiency but at the cost of flexibility. They suggested that alignment between infrastructure investment and housing delivery enhances performance (Ross & Yan, 2015). Tijanić et al. (2019) provided supporting evidence from Croatia, showing that synchronizing housing with public infrastructure funding improved cost-time efficiency. Their study reinforced the importance of policy integration (Tijanić et al., 2019). For U.S. policymakers, these findings suggest that PPPs should be leveraged not in isolation but as part of a coordinated strategy with transport, utilities, and green infrastructure. This integrated approach would maximize synergies and accelerate housing supply.

The variability of PPP outcomes across contexts provides practical lessons for policymakers, developers, and communities. The evidence shows that while PPPs can enhance housing delivery, poorly designed accountability frameworks risk undermining success. Shvydenko et al. (2020) demonstrated that PPPs facilitated housing development in Russia, but highlighted that outcomes varied significantly due to differences in institutional support. Their study recommended that PPP frameworks be tailored to specific regional conditions (Shvydenko et al., 2020). Similarly, Wibowo and Hartiati (2023) emphasized that value-for-money drivers must be localized in Indonesia's affordable housing PPPs. They argued that without context-specific tailoring, PPPs fail to deliver optimal outcomes (Wibowo & Hartiati, 2023).

Ambrose and Abdullahi (2023) offered supporting evidence from Nigeria, where PPP policies influenced housing affordability but required strong political support to be effective. Their study highlighted the need for institutional backing and accountability in PPP arrangements (Ambrose & Abdullahi, 2023). In contrast, Canelas and Alves (2024) focused on governance entanglements, warning that power imbalances and conflicting interests often complicate PPP arrangements. Their research highlighted how governance challenges limit effectiveness if not properly managed (Canelas & Alves, 2024). These findings collectively suggest that U.S. and state-level policymakers should adopt evidence-based strategies that tailor PPP frameworks to local realities. Design, monitoring, and accountability mechanisms should be emphasized to ensure that PPPs achieve both equity and sustainability goals.

6. Conclusion

This study synthesized evidence from 29 cohorts to evaluate the effectiveness of Public–Private Partnerships (PPPs) in affordable housing delivery. The pooled analysis demonstrated a significant positive association, with a hazard ratio of 1.10 (95% CI: 1.03–1.18), confirming that PPPs contribute meaningfully to enhancing affordability, availability, and sustainability. However, substantial heterogeneity across studies underscores that outcomes are highly dependent on contextual factors, including governance quality, financing mechanisms, and regulatory frameworks. The implications for housing finance policy are clear. PPPs provide a valuable tool to mobilize private capital while ensuring public accountability, making them an essential complement to traditional housing finance models. They align well with current U.S. initiatives such as the Housing Supply Action Plan and present opportunities for integration with the Infrastructure Investment and Jobs Act, particularly in linking infrastructure funding to housing delivery. At the same time, findings caution against one-size-fits-all approaches, highlighting the need for tailored financial and institutional arrangements. PPPs hold significant promise for addressing the national affordable housing crisis. Their success will depend on evidence-based design, long-term monitoring, and a stronger focus on equity. With careful adaptation, PPPs can shape a more inclusive and

sustainable housing future.

Strengths and Limitations of the Study

This study's major strength lies in its comprehensive scope, pooling evidence across 29 diverse cohorts, and its mixed-method synthesis, which combined quantitative and qualitative analysis. This allowed for a more holistic understanding of PPP outcomes. Furthermore, the inclusion of studies from different contexts, such as Martins (2024) and Yekimov & Nianko (2021), broadened the generalizability of findings. However, several limitations must be acknowledged. First, substantial heterogeneity (I^2 = 92.7%) suggests that outcomes varied widely in both scale and direction. This variability, visible in studies like Hadikusumo (2021) and Tsenkova (2021), complicates attempts to generalise conclusions. Second, the possibility of publication bias cannot be dismissed, as positive results are more likely to be reported. Third, the reliance on available studies means there is limited longitudinal data, with few investigations extending beyond short- or medium-term outcomes. This restricts our ability to evaluate the durability of PPP impacts over time.

Recommendation for Future Research

Future research should prioritize long-term evaluations of PPP housing projects to assess their sustainability and resilience beyond the short term. Extended follow-up studies are essential to capture how these projects perform over time and under varying conditions. Comparative studies across different regions and contexts would also be valuable in identifying the factors that contribute to the success of PPPs in some settings while creating challenges in others. In addition, greater emphasis should be placed on examining the social equity dimensions of PPPs. Future investigations should explore how such partnerships affect marginalized groups, tenant protection, and overall community well-being. A critical area of inquiry is whether PPPs genuinely advance equitable housing outcomes or risk reinforcing existing disparities.

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