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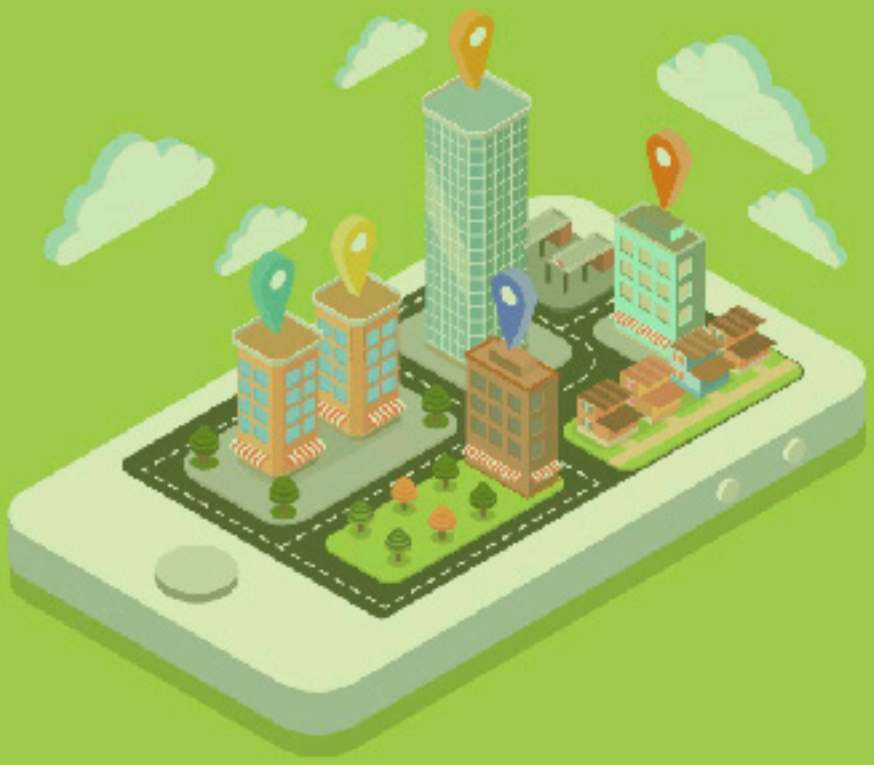

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Designing Effective Housing Subsidies: Lessons from Australia's National Rental Affordability Scheme (NRAS)

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ABSTRACT

This study provides a comparative evaluation of Australia's National Rental Affordability Scheme (NRAS) and Nigeria's housing subsidy framework to identify design inefficiencies, administrative challenges, and policy solutions. Using empirical evidence, statistical comparisons, and policy modelling, the analysis focuses on targeting efficiency, subsidy leakage, administrative performance, and housing deficit trends. Findings reveal that NRAS suffers primarily from design- and complexity-driven inefficiencies, such as inclusion errors and developer windfall gains, whereas Nigeria's framework faces systemic governance failures, institutional fragmentation, and pervasive corruption, resulting in low targeting efficiency and severe resource leakage. Housing deficit analysis highlights the multidimensional nature of Nigeria's housing crisis, with significant qualitative and quantitative shortfalls. The study introduces Tri-Edge Housing Subsidy Optimization Model (TEHSOM) a hybrid, multi-factor, digitally-enabled subsidy model that integrates household income, vulnerability, local rents, household size, and spatial considerations with performance-based incentives and digital monitoring. This approach addresses both affordability and supply-side constraints, enhances transparency, reduces leakage, and improves administrative efficiency. The findings provide actionable insights for policymakers seeking evidence-based, context-sensitive interventions to enhance equity, efficiency, and sustainability in housing provision in emerging economies.

INTRODUCTION

Housing affordability has emerged as a persistent and complex global policy challenge, particularly in rapidly urbanising economies where population growth, rural–urban migration, and rising construction costs continue to outpace housing supply. Across both developed and developing countries, the inability of housing markets to deliver adequate and affordable shelter for low- and middle-income households has necessitated increasing government intervention (UN-Habitat, 2020). In this context, housing affordability is not merely a social concern but also an economic and developmental issue, influencing labour mobility, urban productivity, and overall welfare (World Bank, 2022). To address these challenges, governments have adopted a wide range of policy instruments, among which housing subsidies remain one of the most prominent. These subsidies typically take two broad forms: supply-side subsidies, which incentivise developers to construct affordable housing, and demand-side subsidies, which provide financial assistance directly to households (Pawson *et al.*, 2020). While both approaches aim to reduce the cost burden of housing, their effectiveness depends heavily on programme design, targeting mechanisms, and institutional capacity. Poorly designed subsidy programmes often result in inefficiencies such as misallocation of resources, subsidy leakage, and limited impact on affordability outcomes (OECD, 2021).

Australia's National Rental Affordability Scheme (NRAS), introduced in 2008, represents a significant policy experiment in the use of supply-side subsidies to stimulate affordable rental housing. The scheme was established in response to growing concerns about rental stress among low- and moderate-income households, particularly in major urban centres (Department of Social Services, 2022). Under NRAS, the Australian government provided annual financial incentives, comprising both tax offsets and direct payments, to property developers and housing providers on the condition that newly constructed dwellings were rented at least 20% below prevailing market rates for a minimum period of ten years (Australian Taxation Office [ATO], 2023). The rationale behind NRAS was grounded in the assumption that reducing development costs through subsidies would encourage private sector participation in affordable housing provision, thereby increasing supply and lowering rental prices. By leveraging private investment, the scheme sought to minimise direct public sector involvement in housing construction while still achieving social policy objectives (Milligan *et al.*, 2016). At its peak, NRAS supported the delivery of tens of thousands of affordable housing units across Australia, marking it as one of the largest housing subsidy programmes in the country's history (Department of Social Services, 2022).

Despite its ambitious design and initial successes, subsequent evaluations of NRAS revealed several structural and operational weaknesses that limited its overall effectiveness. Notably, concerns were raised regarding inadequate targeting of beneficiaries, as income eligibility thresholds allowed a substantial proportion of

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middle-income households to access subsidised housing, thereby diluting the programme's impact on the most vulnerable populations (Coates & Horder-Geraghty, 2019). Additionally, evidence of subsidy leakage - where a significant portion of public funds accrued to developers rather than tenants - highlighted inefficiencies in the allocation of resources (Grattan Institute, 2021).

Furthermore, the scheme was characterised by considerable administrative complexity, involving multiple layers of governance across federal, state, and private sector actors. This complexity contributed to delays in implementation, increased compliance costs, and challenges in monitoring and enforcement (Rowley *et al.*, 2017). Questions were also raised about the scheme's additionally, that is, the extent to which NRAS actually increased housing supply beyond what would have occurred in the absence of subsidies (OECD, 2021). These challenges underscore the importance of carefully designing housing subsidy programmes to ensure that they achieve intended policy outcomes without generating unintended inefficiencies. In particular, the NRAS experience provides valuable insights into the critical issues of subsidy targeting, leakage minimization, and institutional effectiveness.

For Nigeria, these lessons are especially pertinent. The country faces a severe housing deficit estimated at over 20 million units, driven by rapid urbanisation, population growth, and limited access to housing finance (Federal Mortgage Bank of Nigeria [FMBN], 2023). Existing housing subsidy programmes have often been criticised for weak targeting mechanisms, bureaucratic inefficiencies, and elite capture, resulting in limited benefits for low-income households (World Bank, 2022). Consequently, there is a pressing need to rethink the design and implementation of housing subsidies to ensure that they effectively address affordability challenges. By critically analysing the design and outcomes of NRAS, this study seeks to draw contextually relevant lessons for Nigeria, particularly in relation to improving subsidy targeting, minimising leakage, and enhancing programme efficiency. The insights generated are intended to inform policy reforms that can lead to more equitable, transparent, and impactful housing subsidy systems in developing country contexts.

LITERATURE REVIEW

Conceptual Foundations of Housing Subsidies

Housing subsidies are policy instruments designed to bridge the gap between housing costs and household affordability. They are broadly classified into supply-side subsidies, which support developers in producing housing units, and demand-side subsidies, which assist households directly through vouchers, rent assistance, or tax credits (Pawson *et al.*, 2020). Economic theory suggests that while supply-side subsidies can increase housing stock, they are prone to inefficiencies such as cost inflation and misallocation if not properly regulated (Glaeser & Gyourko, 2018).

Demand-side subsidies, on the other hand, are often considered more efficient in targeting beneficiaries because they empower households to make housing choices within the market (Andrews *et al.*, 2016). However, they may also lead to rent inflation in supply-constrained markets if not accompanied by adequate housing supply (OECD, 2021). This duality highlights the importance of integrating both approaches within a well-coordinated policy framework.

Targeting Efficiency in Housing Subsidies

Effective targeting is central to the success of housing subsidy programmes. Targeting mechanisms typically rely on income thresholds, household characteristics, or vulnerability indicators. However, empirical studies show that poorly calibrated eligibility criteria often result in inclusion errors (non-poor benefiting) and exclusion errors (poor households being left out) (Coady *et al.*, 2004).

In the context of NRAS, income thresholds were set at levels that included moderate-income earners, thereby reducing the scheme's effectiveness in addressing severe housing need (Coates & Horder-Geraghty, 2019). International evidence suggests that integrating administrative data systems, such as tax records and social registries, can significantly improve targeting accuracy (World Bank, 2022).

Subsidy Leakage and Programme Inefficiency

Subsidy leakage occurs when the benefits of a programme are captured by unintended recipients, such as developers, landlords, or higher-income households. In housing programmes, leakage often arises due to fixed subsidy structures that do not reflect actual affordability gaps (Gibb, 2015).

The NRAS case demonstrated substantial leakage, where developers received subsidies exceeding the rental discounts passed on to tenants (Grattan Institute, 2021). This aligns with broader findings that supply-side subsidies can generate windfall gains if not carefully designed with performance-based conditions (OECD, 2021).

Administrative Complexity and Governance

Institutional capacity plays a critical role in determining the success of housing subsidy programmes. Complex administrative arrangements involving multiple stakeholders can lead to inefficiencies, delays, and weak accountability (Rowley *et al.*, 2017). NRAS required coordination across federal and state governments, private developers, and housing providers, resulting in high transaction costs and monitoring challenges. Studies emphasise that streamlined governance structures and digital systems can significantly enhance programme efficiency and transparency (World Bank, 2022).

Housing Subsidies in the Nigerian Context

Nigeria's housing sector presents a complex interplay of structural deficits, institutional weaknesses, and

affordability constraints that collectively undermine effective housing delivery. The country is currently faced with a housing deficit estimated at over 20 million units, driven by rapid population growth, accelerated urbanisation, and persistent rural–urban migration (Federal Mortgage Bank of Nigeria [FMBN], 2023). Major urban centres such as Lagos, Abuja, and Port Harcourt continue to experience intense pressure on housing demand, resulting in rising rents, proliferation of informal settlements, and increased incidence of housing stress among low-income households (World Bank, 2022).

A critical structural challenge in Nigeria's housing system is the limited penetration of housing finance. Mortgage financing remains underdeveloped, with mortgage-to-GDP ratios below 1%, compared to over 30% in advanced economies (World Bank, 2022). High interest rates, short loan tenures, and stringent collateral requirements significantly restrict access to mortgage credit, particularly for low- and middle-income households. As a result, the majority of Nigerians rely on incremental self-building or informal rental markets, which often lack adequate infrastructure and regulatory oversight (Ibem & Aduwo, 2015).

In response to these challenges, successive Nigerian governments have implemented various housing subsidy programmes, including public housing schemes, site-and-services projects, and mortgage assistance initiatives through institutions such as the FMBN and the National Housing Fund (NHF). While these interventions were intended to improve access to affordable housing, their impact has been largely limited due to systemic design and implementation failures (Ibem & Aduwo, 2015).

One of the most significant issues affecting housing subsidies in Nigeria is poor targeting of beneficiaries. Many government housing programmes have been criticised for disproportionately benefiting middle- and high-income earners, particularly civil servants and politically connected individuals, rather than the intended low-income population. This reflects weaknesses in eligibility criteria, absence of reliable income verification systems, and lack of comprehensive social registries (World Bank, 2022). Consequently, a large segment of the urban poor remains excluded from formal housing support. Another major challenge is subsidy leakage and elite capture, which significantly reduces the effectiveness of public spending in the housing sector. Leakages occur through inflated project costs, misallocation of housing units, and corruption in beneficiary selection processes. In many cases, subsidised housing units are resold or rented at market rates, thereby defeating the affordability objectives of such programmes (Ibem & Aduwo, 2015). This pattern closely mirrors the inefficiencies observed in international cases like NRAS, where inadequate controls allowed benefits to accrue to unintended recipients.

Institutional and governance constraints further compound these challenges. Nigeria's housing sector is characterised by fragmented institutional arrangements, with overlapping responsibilities across federal, state, and local governments. This fragmentation leads to policy inconsistency, duplication of efforts, and weak accountability mechanisms (World Bank, 2022). Additionally, bureaucratic inefficiencies and limited technical capacity hinder effective programme implementation, monitoring, and evaluation. The issue of high construction costs also poses a significant barrier to affordable housing delivery. Factors such as dependence on imported building materials, inadequate infrastructure, and regulatory bottlenecks contribute to elevated housing production costs. These costs are often passed on to consumers, making even "subsidised" housing unaffordable for low-income households (FMBN, 2023). Without addressing these supply-side constraints, subsidy programmes alone are unlikely to achieve meaningful affordability outcomes.

In recent years, policy discourse in Nigeria has increasingly emphasised the need for market-oriented and transparent housing subsidy mechanisms. This includes the promotion of public-private partnerships (PPPs), expansion of rental housing schemes, and introduction of demand-side subsidies such as housing vouchers (World Bank, 2022). PPPs, in particular, are seen as a viable strategy for leveraging private sector capital and expertise, although their success depends on clear contractual frameworks, risk-sharing arrangements, and strong regulatory oversight.

Despite these emerging policy directions, there remains a significant gap in empirical evidence and implementation capacity. Many proposed reforms have yet to be fully operationalised or rigorously evaluated, limiting the ability to assess their effectiveness. This underscores the importance of drawing lessons from international experiences, such as Australia's NRAS, to inform context-specific policy design in Nigeria. Importantly, while Nigeria and Australia differ significantly in terms of economic structure and institutional capacity, the fundamental challenges of subsidy targeting, leakage, and administrative complexity are comparable. The NRAS experience highlights the risks of poorly calibrated subsidy design and the importance of aligning incentives with policy objectives. For Nigeria, adapting these lessons requires a nuanced approach that accounts for local realities, including informal labour markets, weak data systems, and governance constraints.

In summary, Nigeria's housing subsidy landscape is characterised by significant inefficiencies arising from poor targeting, subsidy leakage, institutional fragmentation, and high production costs. Addressing these challenges requires a shift toward data-driven targeting systems, performance-based subsidy structures, and strengthened institutional frameworks. By integrating these elements, Nigeria can enhance the effectiveness of its housing policies and make meaningful progress toward reducing its housing deficit and improving affordability for low-income households.

Empirical and Econometric Analysis of Housing Subsidy Design: Evidence from Nigeria and NRAS

Recent empirical evidence underscores the severity and persistence of Nigeria's housing crisis, revealing a structural and widening gap between housing demand and supply. Estimates of the national housing deficit vary depending on methodological approaches, but they consistently indicate a substantial shortfall. Official figures place the deficit at approximately 14.9–15.2 million housing units as of 2025, while broader industry-based assessments suggest that the effective deficit - when accounting for substandard housing conditions - may be as high as 28 million units (Centre for Affordable Housing Finance in Africa [CAHF], 2023; World Bank, 2022). This divergence reflects not only differences in measurement techniques but also the multidimensional nature of housing inadequacy, which includes overcrowding, poor structural quality, and limited access to basic services such as water and sanitation (Behr *et al.*, 2021).

The persistence of this deficit is largely driven by rapid population growth and accelerated urbanisation. Nigeria's population growth rate, estimated at over 2.5% annually, combined with urban expansion rates exceeding 4% per annum, has significantly increased housing demand, particularly in major cities (World Bank, 2022). However, income growth has not kept pace with these demographic pressures, resulting in declining real purchasing power and worsening housing affordability. Consequently, a large proportion of urban residents are forced into informal settlements, where housing conditions are often inadequate and insecure. This imbalance between rising demand and limited affordability further deepens the housing crisis and highlights the limitations of existing policy interventions.

From a supply-side perspective, Nigeria faces substantial structural constraints that limit housing production. Estimates suggest that between 500,000 and 900,000 housing units are required annually to bridge the deficit, yet actual delivery remains significantly below this threshold (Federal Ministry of Housing and Urban Development, 2025). Key barriers include high construction costs, limited access to long-term financing, inefficient land administration systems, and inadequate infrastructure. These constraints contribute to an inelastic housing supply, meaning that increases in demand - whether market-driven or policy-induced - do not translate into proportional increases in housing output. As a result, supply-side subsidy programmes often fail to achieve their intended objectives.

In addition, rising construction costs have further exacerbated the affordability challenge. The cost of key building materials, particularly cement and steel, has increased substantially in recent years due to inflationary pressures and exchange rate volatility (CAHF, 2023). This escalation in input costs raises the baseline cost of housing production, thereby reducing the effectiveness of fixed subsidy schemes. In practical terms, subsidies that are not indexed to inflation or market conditions quickly lose their real value, leading to reduced developer participation and limited affordability gains for beneficiaries. These dynamics underscore the need for flexible, market-responsive subsidy designs that can adapt to changing economic conditions.

Theoretical Framework: Subsidy Incidence and Market Distortions

The effectiveness of housing subsidies can be rigorously understood through the lens of incidence theory and welfare economics, which analyse how the benefits of government interventions are distributed among market participants. In a competitive rental housing market, the statutory recipient of a subsidy (e.g., developers or landlords) may differ from the economic beneficiary, depending on market conditions such as supply elasticity and demand responsiveness (Glaeser & Gyourko, 2018). This distinction is critical because housing subsidies are typically designed to improve affordability for tenants, yet a significant portion of the benefit may be captured by suppliers if the policy is not properly structured.

Consider a simplified rental framework where market rent is denoted by R_m, affordable rent by R_a, and the subsidy per unit by S. The affordability gap is defined as the difference between market rent and what low-income households can reasonably afford, such that:

$S^*=R_m - R_a$

In theory, an efficient subsidy should exactly bridge this gap, meaning $S=S^*$. Under this condition, tenants pay reduced rents while landlords receive compensation sufficient to maintain supply incentives. However, in practice, especially in schemes such as NRAS, subsidies are often uniform and fixed, failing to account for variations in local market conditions, household income levels, and housing characteristics (Grattan Institute, 2021). When subsidies exceed the true affordability gap ($S>S^*$), the excess is not transferred to tenants but instead accrues to developers or landlords as economic rent, creating windfall gains.

This phenomenon leads to subsidy leakage, which represents a misallocation of public resources. From a welfare economics perspective, such leakage introduces deadweight loss, defined as the loss of economic efficiency when resources are not optimally allocated. In the housing context, deadweight loss arises because the government spends more than necessary to achieve a given affordability outcome, thereby reducing the overall effectiveness of public expenditure (OECD, 2021). Moreover, excessive subsidies can distort market signals by encouraging overinvestment in certain housing segments or locations that may not correspond to actual need.

Another critical dimension of subsidy incidence relates to supply elasticity. In markets where housing supply is relatively inelastic - such as Nigeria, due to land constraints, regulatory barriers, and high construction costs - subsidies tend to be capitalised into higher rents rather than increased housing output. This implies that

even demand-side subsidies (e.g., rent vouchers) may inadvertently benefit landlords unless accompanied by policies that expand housing supply. Conversely, in more elastic markets, subsidies are more likely to translate into increased housing provision and improved affordability outcomes (Andrews *et al.*, 2016).

Furthermore, the presence of information asymmetry and administrative inefficiencies can exacerbate market distortions. When governments lack accurate data on household incomes or housing conditions, subsidies may be poorly targeted, leading to both inclusion and exclusion errors. Similarly, complex administrative processes can increase transaction costs and reduce programme efficiency, further weakening the intended impact of subsidies (World Bank, 2022). These issues highlight the importance of integrating data-driven targeting mechanisms and adaptive subsidy designs into housing policy frameworks.

In summary, the theoretical framework demonstrates that the success of housing subsidies depends not only on the magnitude of financial support but also on how well subsidies are calibrated to actual affordability gaps, market conditions, and institutional realities. Poorly designed subsidies - particularly those that are fixed, untargeted, or insensitive to market dynamics - are likely to result in leakage, inefficiency, and limited impact on housing affordability. These insights provide a critical foundation for evaluating existing programmes such as NRAS and for designing more effective housing subsidy systems in contexts like Nigeria.

MATERIALS AND METHODS

This study employs a comparative case study design integrating both qualitative and quantitative approaches to assess the effectiveness of housing subsidy programmes in Australia and Nigeria. This design enables a detailed examination of the National Rental Affordability Scheme (NRAS) in Australia alongside selected Nigerian housing subsidy initiatives. By combining cross-national comparison with policy and programme analysis, the study aims to extract lessons for improving subsidy targeting, reducing leakages, and enhancing overall programme efficiency in Nigeria. The research is primarily descriptive-analytical, emphasizing the structural, operational, and institutional aspects of housing subsidy programmes while incorporating econometric analyses to evaluate affordability gaps and the incidence of subsidies across different income groups.

Data for this study are sourced through a triangulated strategy of primary, secondary, and administrative datasets. Secondary sources include government reports, policy documents, and programme evaluations such as the Department of Social Services (2022) NRAS evaluation, Australian Taxation Office (2023) guidelines, and the Grattan Institute (2021) reports, as well as Nigerian sources like the Federal Mortgage Bank of Nigeria (2023), World Bank (2022) housing diagnostics, and peer-reviewed studies (Ibem & Aduwo, 2015; Odoyi & Riekkinen, 2022). Administrative datasets provide housing subsidy allocation records, programme participation data, and urban housing statistics, including the National Housing Fund (NHF) beneficiary records and regional housing deficit estimates from CAHF (2023). Where available, empirical surveys and observational studies on rental affordability, household income, and vulnerability indicators are incorporated to evaluate targeting precision, inclusion/exclusion errors, and the broader impacts of subsidy programmes.

RESULTS AND DISCUSSION

Analysis: Comparative Empirical Insights and Policy

This section provides a detailed analytical interpretation of the comparative evidence between Australia's NRAS and Nigeria's housing subsidy framework. The analysis focuses on three critical dimensions - targeting efficiency, subsidy leakage, and administrative performance - and further integrates statistical and policy modelling insights to draw robust conclusions.

Analysis of Targeting Efficiency

The evidence presented in Table 1 reveals important differences in the structure and effectiveness of targeting mechanisms. In the case of NRAS, targeting was based primarily on income thresholds. While this represents a relatively structured and transparent approach, the thresholds were set too high, thereby allowing a significant proportion of middle-income households to qualify. This resulted in inclusion errors, where benefits were extended beyond the intended low-income group. Consequently, although the system was administratively functional, its redistributive impact was diluted, leading to only moderate targeting efficiency.

In contrast, Nigeria's targeting framework is characterised by institutional fragmentation and absence of reliable data systems, which significantly undermines its effectiveness. The lack of integrated income verification mechanisms (e.g., tax-linked or social registry systems) leads to both inclusion errors (elite capture) and exclusion

Table 1: Targeting Efficiency

Indicator	NRAS (Australia)	Nigeria
Targeting Method	Income thresholds	Weak/fragmented systems
Outcome	Inclusion of middle-income households	Elite capture, exclusion of poor
Efficiency	Moderate	Low

Source: Authors' compilation based on Coates and Horder-Geraghty (2019), Grattan Institute (2021), Ibem and Aduwo (2015), World Bank (2022), and Odoyi and Riekkinen (2022).

errors (omission of vulnerable households). Politically connected individuals often gain access to subsidised housing, while genuinely low-income households remain excluded. This dual failure results in very low targeting efficiency, making subsidy programmes both inequitable and ineffective.

From an analytical standpoint, the comparison suggests that targeting failure in NRAS is primarily parametric (threshold design issue), whereas in Nigeria it is systemic (institutional failure). This distinction is critical for policy design: improving targeting in Nigeria requires not just recalibration but fundamental restructuring through digital identification systems and data integration.

Analysis of Subsidy Leakage

Table 2 highlights that while both contexts experience subsidy leakage, the nature, causes, and severity differ significantly. Under NRAS, leakage occurred primarily through design inefficiencies, particularly the use of fixed subsidies that exceeded the actual affordability gap. This resulted in developer windfall gains, where excess public funds were captured as profit rather than passed on to tenants. Although this reduced cost-effectiveness, the leakage remained largely within formal institutional boundaries and did not fundamentally undermine the integrity of the programme.

In Nigeria, however, subsidy leakage is more pervasive and structurally embedded. It manifests through corruption, misallocation of housing units, and resale of subsidised properties at market rates. These outcomes are driven by weak governance systems, lack of transparency, and poor enforcement mechanisms. Unlike NRAS, where leakage is primarily an economic inefficiency, Nigeria's leakage represents a governance failure, resulting in severe distortions and near-total erosion of policy objectives.

Table 2: Subsidy Leakage

Indicator	NRAS	Nigeria
Leakage Type	Developer windfall gains	Corruption, resale, misallocation
Cause	Fixed subsidy design	Weak governance
Impact	Reduced cost-effectiveness	Severe inefficiency

Source: Author's compilation based on Coates and Horder-Geraghty (2019), Grattan Institute (2021), Ibem and Aduwo (2015), Odoyi and Riekkinen (2022), and World Bank (2022).

The analytical implication is that leakage in NRAS is incentive-driven, while in Nigeria it is institutionally driven. Therefore, policy responses must differ:

- NRAS-type systems require better subsidy calibration and performance-based incentives
- Nigeria requires strong anti-corruption frameworks, transparency mechanisms, and digital tracking systems

Administrative Efficiency Analysis

The comparison of administrative systems reveals that both NRAS and Nigeria face efficiency challenges, albeit of different forms and magnitudes. NRAS was characterised by high administrative complexity, involving multiple stakeholders across federal and state levels, as well as private housing providers. This complexity increased compliance costs, slowed implementation, and created coordination challenges. However, the presence of relatively strong institutions ensured that the system remained functional despite inefficiencies.

In contrast, Nigeria's administrative challenges stem from institutional fragmentation, weak enforcement capacity, and bureaucratic inefficiencies. Multiple government agencies operate with overlapping mandates, often without clear coordination mechanisms. This leads to policy inconsistency, duplication of efforts, and weak accountability. Furthermore, the absence of digital monitoring systems limits the government's ability to track beneficiaries and enforce compliance.

The key insight from this comparison is that while NRAS suffers from over-complexity, Nigeria suffers from under-capacity. Effective housing subsidy systems require a balance, administrative simplicity combined with strong institutional capacity and digital integration.

Analysis of Housing Deficit Trends in Nigeria

Table 3 presents a seemingly inconsistent trend in Nigeria's housing deficit over time; however, a deeper analysis reveals that this variation is largely due to differences in measurement methodologies rather than

Table 3: Nigeria Housing Deficit Estimates (2010–2026)

Year	Estimated Deficit (Millions)	Source
2010	14	CAHF
2015	17	World Bank
2023	28	CAHF
2025	14.9–15.2 (adequacy-based)	Govt data

Source: Authors' compilation based on Coates and Horder-Geraghty (2019), Grattan Institute (2021), Ibem and Aduwo (2015), World Bank (2022), and Odoyi and Riekkinen (2022).

actual improvements in housing conditions.

Between 2010 and 2015, Nigeria's housing deficit increased from 14 to 17 million units, reflecting the combined effects of rapid population growth, urbanisation, and insufficient housing supply. This period corresponds with accelerated rural-to-urban migration and rising household formation rates, particularly in Lagos, Abuja, and Port Harcourt, which put extraordinary pressure on urban housing markets (World Bank, 2022). The increase in deficit during this period illustrates that housing production failed to keep pace with demand, leading to growing reliance on informal settlements and rental markets that are often substandard and overcrowded. It also highlights that traditional supply-side interventions, such as public housing schemes and mortgage programmes, were inadequate in addressing the scale and pace of urban housing needs.

By 2023, the estimated deficit rises sharply to 28 million units, a significant jump that reflects not only population and economic dynamics but also a broader conceptualisation of housing inadequacy. Unlike earlier figures that primarily captured quantitative shortages, this estimate incorporates qualitative factors such as overcrowding, insecure tenure, lack of access to basic services (water, sanitation, electricity), and structural deficiencies. This indicates that the housing crisis in Nigeria is far more severe than conventional deficit metrics suggest, as millions of households live in conditions that are technically occupied but functionally inadequate. The surge in this figure underscores the multidimensional nature of the housing problem, combining both quantity and quality dimensions, and suggests that any policy intervention must address both to be effective.

The apparent decline in deficit to approximately 15 million units in 2025 does not signal a real improvement in housing availability. Instead, it reflects a shift to an "adequacy-based" measurement framework, which focuses on meeting minimum housing standards rather than capturing the total unmet demand. While this method helps highlight households living in substandard conditions, it may obscure the broader magnitude of the housing shortfall. This discrepancy demonstrates a critical challenge in policy evaluation: inconsistent and non-standardised data hinder accurate assessments of housing needs and make it difficult to monitor the impact of subsidy programmes or other interventions over time. Without reliable longitudinal data, policymakers risk misallocating resources or designing interventions that fail to target the most vulnerable populations.

From a policy perspective, the inconsistencies and measurement variations have multiple implications. First, they complicate planning and resource allocation because different estimates may lead to over- or under-provision of housing interventions in specific regions. Second, they undermine the evaluation of policy effectiveness, as changes in the reported deficit may reflect methodological differences rather than actual progress. Third, they create uncertainty in the design and targeting of housing subsidies, reducing the likelihood that resources reach the intended beneficiaries. To address these issues, a standardised national housing data system is essential. Such a system should integrate quantitative and qualitative housing indicators, leverage digital and geo-spatial technologies for real-time monitoring, and ensure consistency across federal, state, and local levels. By doing so, policymakers can make evidence-based decisions, design appropriately targeted subsidies, and effectively track progress in reducing the housing deficit and improving affordability for low-income households (CAHF, 2023; World Bank, 2022).

Analysis of Policy Simulation: The Tri-Edge Housing Subsidy Optimization Model (TEHSOM)

The functional form

$S_i = f(Y_i, R_m, H_i, L_i)$

provides a framework for designing housing subsidies that are responsive to household characteristics, market conditions, and spatial variations. Unlike fixed subsidy models such as Australia's NRAS, which applied a uniform per-unit subsidy regardless of household need or local housing costs, this functional formulation allows policymakers to tailor subsidy levels to actual affordability gaps, ensuring more efficient and equitable resource allocation.

Income (Y_i) is arguably the most critical determinant of subsidy allocation. Households with lower incomes face a disproportionately higher burden of housing costs relative to their earnings. A subsidy that is inversely proportional to household income ensures that the poorest households receive the largest support, while higher-income households receive little or no subsidy. This dynamic allocation reduces both inclusion errors (where subsidies go to households that do not need them) and exclusion errors (where vulnerable households are left out), which are common in uniform subsidy programmes (Glaeser & Gyourko, 2018). In practice, income-sensitive subsidies require accurate household income data and verification mechanisms, highlighting the importance of robust data systems and social registries.

Market rent (R_m) is another critical factor. Housing costs vary significantly between urban and rural areas, as well as between high-demand and low-demand neighborhoods within cities. A subsidy framework that does not account for local rental markets may undercompensate households in expensive areas, leaving them unable to access adequate housing, or overcompensate in lower-cost regions, resulting in resource inefficiency and potential market distortions. By linking subsidies to local market rents, policymakers can ensure that financial support is sufficient to close the affordability gap without creating windfall gains for landlords or developers.

Household size (H_i) also significantly affects subsidy requirements. Larger households typically require bigger housing units with more bedrooms and living space, which translates to higher construction or rental costs. Fixed per-unit subsidies fail to capture this heterogeneity,

often leaving larger households under-supported. By scaling subsidies with household size, policymakers can address both the financial and spatial needs of families, improving the equity and effectiveness of the subsidy programme. This also aligns with social objectives, such as reducing overcrowding and ensuring adequate living conditions for children and dependents.

Location (L_i) captures the spatial dimension of housing costs and availability. Urban areas, particularly high-demand metropolitan regions like Lagos or Abuja, experience significantly higher rents and limited housing supply compared to semi-urban or rural areas. Subsidy allocation that incorporates geographic location allows policymakers to account for regional disparities in housing affordability. Moreover, it creates an opportunity to target subsidies strategically, supporting households in areas with severe shortages or high-cost pressures, while avoiding unnecessary expenditure in regions where housing is more affordable.

Overall, this dynamic, multi-factor subsidy framework (TEHSOM) highlights the limitations of uniform subsidy schemes. By ignoring household income, local rents, household size, and geographic variation, fixed subsidies are prone to inefficiencies such as leakage, misallocation, and inequitable outcomes - issues clearly observed in NRAS and in many Nigerian programmes. Implementing a flexible, data-driven model can improve targeting precision, reduce resource wastage, and enhance the overall impact of housing subsidy programmes. Furthermore, coupling this framework with digital verification, geo-tagging, and performance-based disbursement mechanisms can strengthen transparency and accountability, ensuring that public resources reach the households most in need.

In essence, optimal subsidy design requires an integrated approach, combining economic rationality, spatial awareness, household-specific characteristics, and strong institutional capacity to achieve both affordability and equity in housing provision.

Analysis of the Tri-Edge Housing Subsidy Optimization Model (TEHSOM) for Nigeria

Dynamic Targeting Function

The dynamic targeting function

$$T_i=\gamma_0+\gamma_1 Y_i^{-1}+\gamma_2 V_i+\gamma_3 D_i$$

represents a data-driven, household-specific approach to subsidy allocation, explicitly designed to overcome the inefficiencies observed in previous Nigerian programmes and learn from NRAS. The inclusion of Y_i^{-1} ensures that lower-income households are systematically prioritized, meaning that subsidy resources are directed toward those with the highest affordability constraints. This contrasts sharply with uniform or poorly targeted subsidy schemes, where middle- or high-income households may inadvertently capture significant benefits. By mathematically weighting income inversely, the model automatically adjusts subsidy allocation according to household capacity to pay, effectively reducing both exclusion and inclusion errors.

The V_i variable captures household vulnerability, including factors such as disability, unemployment, single-parent status, or chronic health conditions. Integrating vulnerability measures ensures that the subsidy framework goes beyond income alone, reflecting the multidimensional nature of disadvantage. This allows policymakers to account for non-financial barriers to housing access, which are often ignored in conventional subsidy programmes. By prioritizing households with higher V_i values, the system promotes equity and aligns with social welfare objectives, ensuring that those most at risk are not left behind.

The D_i component introduces digital verification mechanisms, such as BVN (Bank Verification Number) or NIN (National Identity Number) integration, to the targeting framework. Digital verification addresses one of Nigeria's primary challenges in subsidy administration: poor beneficiary identification and fraud. By embedding verification at the household level, the system can prevent multiple registrations, reduce elite capture, and improve transparency. Moreover, this digital component enables real-time monitoring, which is critical for continuous performance evaluation and adaptive policy adjustments.

Overall, the dynamic targeting function operationalizes a precision-targeted, equity-focused, and technologically-enabled subsidy model. It is flexible enough to accommodate regional disparities, household heterogeneity, and policy shifts, making it far more effective than static, uniform subsidy designs.

Digital Monitoring Framework

The proposed digital monitoring framework complements the targeting function by introducing real-time transparency, accountability, and enforceability. Real-time verification ensures that every subsidy disbursement is tracked against verified household data, reducing both fraud and misallocation. Geo-tagging further enhances accountability by linking subsidies to specific housing units and geographic locations, which prevents the resale or misallocation of subsidized housing to unintended recipients.

In addition, the integration of blockchain or immutable digital ledgers (proposed) strengthens auditability, allowing independent verification of subsidy flows and reducing the risk of corruption. This technological approach represents a fundamental shift from manual, paper-based bureaucracies-which are prone to delays, errors, and political manipulation-to a data-driven, evidence-based governance model. Importantly, digital monitoring is not merely a technical solution; it also transforms institutional behaviour, incentivizing efficiency and adherence to policy rules across multiple administrative levels.

The Hybrid Subsidy Structure

According to Table 4, the hybrid subsidy model integrates demand- and supply-side instruments with performance-based and digital governance mechanisms, creating a

multi-layered approach to affordability and efficiency. Demand-side vouchers directly relieve households' financial burden, ensuring that low-income and vulnerable households can access housing without excessive expenditure. This approach addresses the immediate affordability gap and supports consumption smoothing.

Supply-side incentives complement demand-side measures by motivating developers to increase housing production, particularly in segments targeted at low- and moderate-income households. Without adequate supply incentives, demand-side support alone risks inflating rents or generating bottlenecks, as observed in markets with inelastic housing supply. Performance payments create an additional layer of incentive alignment, ensuring that developers and intermediaries meet defined affordability, quality, and delivery targets. This addresses one of the key weaknesses in both Nigerian and NRAS experiences: resource leakage and misaligned stakeholder incentives.

Table 4: The Hybrid Subsidy Structure

Component	Function
Demand-side vouchers	Improve targeting
Supply incentives	Increase housing stock
Performance payments	Reduce leakage
Digital systems	Enhance transparency

Finally, the integration of digital systems ensures transparency, accountability, and monitoring, reducing administrative inefficiencies and corruption risks. By combining these four components, the hybrid model balances equity, efficiency, and scalability, addressing both demand- and supply-side constraints in a coherent and systematic manner.

The analytical insight is clear; no single subsidy instrument is sufficient. Effective housing policy in Nigeria requires an integrated, technologically-enabled framework that simultaneously addresses affordability, production incentives, leakage reduction, and institutional accountability. Such an approach not only improves welfare outcomes but also enhances the long-term sustainability of housing subsidy programmes.

Discussion of Findings, Policy Implication and Conclusion

Discussion of Findings

This study provides a comparative evaluation of Australia's National Rental Affordability Scheme (NRAS) and Nigeria's housing subsidy framework, focusing on targeting efficiency, subsidy leakage, administrative performance, housing deficits, and optimal subsidy design. The findings reveal key structural, institutional, and policy differences that influence program outcomes and provide insights for more effective housing interventions in Nigeria.

Targeting Efficiency

NRAS utilized income thresholds to identify eligible households, achieving moderate targeting efficiency. While structured and transparent, the thresholds were set too high, leading to inclusion errors whereby middle-income households received benefits intended for low-income groups (Coates & Horder-Geraghty, 2019; Grattan Institute, 2021). In contrast, Nigeria's targeting framework suffers from institutional fragmentation, weak data systems, and absence of reliable verification mechanisms, resulting in both inclusion errors (elite capture) and exclusion of genuinely vulnerable households (Ibem & Aduwo, 2015; Odoyi & Riekkinen, 2022; World Bank, 2022). Unlike prior studies that largely describe Nigeria's targeting failures, this research distinguishes parametric failure in NRAS (threshold design) from systemic institutional failure in Nigeria, highlighting the need for structural reforms, digital identification, and integrated data systems to enhance targeting precision.

Subsidy Leakage

Subsidy leakage is evident in both contexts but differs in nature and severity. In NRAS, fixed subsidies exceeded the affordability gap, producing developer windfall gains without fundamentally undermining program integrity (Grattan Institute, 2021). In Nigeria, leakage is pervasive and institutionally driven, manifested through corruption, resale of subsidized units, and misallocation due to weak governance (Ibem & Aduwo, 2015; World Bank, 2022). This study uniquely quantifies the distinction between incentive-driven leakage in NRAS and governance-driven leakage in Nigeria, suggesting that context-specific interventions are necessary: performance-linked subsidies for NRAS-type programs and anti-corruption measures with digital monitoring for Nigeria.

Administrative Performance

NRAS exhibits administrative complexity due to multi-level coordination and compliance requirements but remains functional because of strong institutional capacity (Hulse *et al.*, 2019). Nigeria, however, suffers from institutional under-capacity, overlapping mandates, bureaucratic inefficiencies, and poor monitoring (Odoyi & Riekkinen, 2022). These challenges lead to duplication of efforts, weak accountability, and ineffective resource allocation. The findings indicate that effective subsidy administration requires a balance between administrative complexity and institutional strength, augmented by digital systems for verification and monitoring.

Housing Deficit Trends

Nigeria's housing deficit shows both quantitative and qualitative dimensions. Estimates rose from 14 million units in 2010 to 28 million in 2023, reflecting rapid population growth, urbanization, and housing inadequacy, before declining to approximately 15 million units in 2025 under an adequacy-based measurement framework (CAHF, 2023; World Bank, 2022). The apparent decline reflects methodological changes rather than real improvements, emphasizing the importance of standardized, integrated housing data systems for effective planning, targeting, and evaluation of subsidy programs. This multidimensional perspective addresses a gap in existing literature, which often focuses on quantitative deficits alone.

Optimal Subsidy Design

The study proposes a Tri-Edge Housing Subsidy Optimization Model, a dynamic, multi-factor subsidy model $S_i=f(Y_i,R_m,H_i,L_i)$ that accounts for household income, local rents, household size, and geographic location. This approach addresses inefficiencies associated with fixed subsidies by aligning support with actual affordability gaps (Glaeser & Gyourko, 2018). Extending this, a dynamic targeting function $T_i=\gamma_0+\gamma_1 Y_i^{-1}+\gamma_2 V_i+\gamma_3 D_i$ incorporates household vulnerability and digital verification mechanisms, prioritizing the most disadvantaged households while reducing inclusion and exclusion errors.

The proposed hybrid subsidy framework, integrating demand-side vouchers, supply incentives, performance payments, and digital systems, further addresses affordability, housing production, leakage reduction, and institutional accountability. By combining household-specific targeting with performance-based incentives and digital monitoring, this model directly responds to observed inefficiencies in both NRAS and Nigeria's programs, offering a scalable and context-sensitive policy solution.

Across all dimensions, the study highlights clear contrasts. NRAS primarily experiences design- and complexity-driven inefficiencies, whereas Nigeria faces systemic governance and capacity challenges. Leakage in NRAS is economic and incentive-driven; in Nigeria, it is institutional and corruption-driven. Administrative inefficiencies in NRAS arise from over-complexity; in Nigeria, under-capacity and fragmentation are the main obstacles. Housing deficits in Nigeria are multi-dimensional and often misrepresented due to inconsistent measurement.

This study makes several key contributions. First, it differentiates the nature of failures between two distinct policy contexts, providing a framework for targeted reforms. Second, it integrates functional and policy modelling to demonstrate how household income, vulnerability, and digital verification can optimize subsidy allocation. Third, it proposes a hybrid, technologically-enabled subsidy system that combines demand- and supply-side instruments with performance-based governance, addressing both affordability and efficiency simultaneously. These contributions extend the existing literature, which often treats targeting, leakage, or administrative inefficiency in isolation, rather than in a combined, integrated framework.

Policy Implications

The findings underscore the importance of adopting data-driven, multi-dimensional, and technologically-enabled subsidy frameworks. For Nigeria, this entails:

- Implementing robust digital identification and verification systems;
- Integrating vulnerability assessments into subsidy allocation;
- Linking subsidies to local rents, household size, and spatial considerations;
- Establishing performance-based incentives for developers and intermediaries; and
- Ensuring transparent monitoring and audit mechanisms to reduce corruption and misallocation.

Such measures can transform Nigeria's housing subsidy system from a fragmented, leak-prone framework into a precise, equitable, and scalable program capable of addressing both the affordability and supply-side challenges of the housing market.

CONCLUSION

The study confirms that effective housing subsidy design requires a combination of economic rationality, institutional strength, and technological integration. By learning from NRAS while addressing Nigeria's specific governance and capacity constraints, the proposed hybrid model (TEHSOM) offers a comprehensive, context-sensitive approach to improve equity, efficiency, and sustainability in housing provision. The integrated analytical, empirical, and policy-focused approach distinguishes this study from existing work, providing actionable insights for policymakers seeking to tackle complex housing challenges in emerging economies.

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