ESTOA

CITY and TERRITORY

Research Article
2027 January - June

Evaluating the socio-economic determinants of housing affordability within the context of Egypt's 4th generation cities Evaluación de los determinantes socioeconómicos de la asequibilidad de la vivienda en el contexto de las ciudades de cuarta generación en Egipto

ROLA KAMAL ALI
Mansoura University, Egypt
rolakamalali86@gmail.com

ESRAA MOHAMED ELAZAB
Mansoura University, Egypt
esraaelazab@mans.edu.eg

SHERIEF AHMED SHETA
Mansoura University, Egypt
sheriefsheta@mans.edu

AHMED MOHAMED THABET ALIELDIN
Mansoura University, Egypt
ahmedm.thabet@mans.edu.eg

ABSTRACT As Egypt develops its 4th generation cities, housing affordability remains a critical determinant of urban well-being. This paper evaluates the relationship between housing affordability, socio-economic variables, and housing determinants across three housing mixes in and near the New Administrative Capital (NAC): middle-income housing (R3), luxury housing (R5), and social housing (Capital Gardens City: CG). The paper assesses the effect of nine independent variables on housing affordability by using multiple linear regression (MLR). The results demonstrate that affordability was most strongly associated with cost reduction and payment facilities across all housing levels. However, localized drivers emerge: the ownership system is pivotal in R5 and CG, while household size and employment type are significant in R3. In CG, marital status and income provide additional layers of influence. These findings underscore that affordability is a multidimensional, varied, local-context phenomenon. Finally, policy implications are proposed to enhance the sustainability of new urban housing markets.

RESUMEN A medida que Egipto desarrolla sus ciudades de cuarta generación, la asequibilidad de la vivienda sigue siendo un determinante crítico del bienestar urbano. Este artículo evalúa la relación entre la asequibilidad de la vivienda, las variables socioeconómicas y los determinantes habitacionales a través de tres combinaciones de viviendas en la Nueva Capital Administrativa (NAC) y sus alrededores: vivienda para ingresos medios (R3), vivienda de lujo (R5) y vivienda social (Capital Gardens City: CG). El artículo evalúa el efecto de nueve variables independientes sobre la asequibilidad de la vivienda mediante el uso de regresión lineal múltiple (MLR). Los resultados demuestran que la asequibilidad está asociada de manera más significativa con la reducción de costes y las facilidades de pago en todos los niveles de vivienda. Sin embargo, surgen factores determinantes localizados: el sistema de propiedad es fundamental en R5 y CG, mientras que el tamaño del hogar y el tipo de empleo son significativos en R3. En CG, el estado civil y los ingresos proporcionan capas adicionales de influencia. Estos hallazgos subrayan que la asequibilidad es un fenómeno multidimensional, variado y de contexto local. Finalmente, se proponen implicaciones políticas para mejorar la sostenibilidad de los nuevos mercados de vivienda urbana.

Received: 18/03/2026
Reviewed: 10/07/2026
Accepted: 12/08/2026
Published: 08/10/2026

KEYWORDS socio-economic determinants, housing affordability, housing determinates, demographic variables, economic variables

PALABRAS CLAVE determinantes socioeconómicos, variables demográficas, variables económicas, determinantes de la vivienda, asequibilidad de la vivienda

CC BY NC SA

Cómo citar este artículo/How to cite this article: Ali, R. K., Sheta, S. A., Elazab, E. M., Alieldin, A. M. T. (2027). Evaluating the socio-economic determinants of housing affordability within the context of Egypt's 4th generation cities. *Estoa. Revista de la Facultad de Arquitectura y Urbanismo*, *16*(31), e6698. https://doi.org/10.18537/est.v016.n031.a09

1. Introduction

Communities and cities are fundamentally shaped by people and their housing settlements (Lee and Chan, 2024). Consequently, in social research and social policy, the connection between housing and subjective well-being is becoming more and more important (Chan and Wong, 2021). Within this discourse, sustainable housing is defined as an integrated concept that integrates affordability, safety, inclusivity, and health-promoting architecture with environmental performance, making it a significant socioeconomic determinant (Rana, 2025). While housing affordability remains a central pillar of political discourse and policy creation (Yang and Chen, 2014), it should be recognized that different cultural and geographic locations have different perspectives on and objectives for sustainable housing, which highlights the necessity of culturally responsive frameworks in both policy and implementation (Rana, 2025). In many urban contexts, the inflated housing price, demographics, and economies have challenged housing affordability for residents to some degree. In developing countries, affordability is traditionally defined as the ability to retain 30% of household income for other essential needs after housing expenditures (Barrett, 2023; Kajdanek et al., 2025). As access to decent, reasonably priced homes is essential for urban stability (Yang and Chen, 2014), Egypt's strategic shift toward 4th Generation Cities (e.g., the New Administrative Capital and Capital Gardens City) has introduced new challenges. These challenges regarding housing affordability have emerged amidst rapid economic fluctuations and a transitioning housing market. Therefore, this study aims to bridge the research gap concerning the suitability of these smart cities for diverse economic groups by providing a rigorous analysis of the factors influencing housing costs.

The paper addresses a fundamental question: Which socio-economic and demographic variables most significantly impact affordability within each housing level? To address this gap, the methodology employs Multiple Linear Regression (MLR) to measure the relative impact of two sets of independent variables: Demographic Variables (age, gender, marital status, and household size) and Economic Variables (income, employment type, ownership system, cost reduction, and payment facilities). This study argues that affordability is not a monolithic concept; rather, it is influenced by variables whose relative weights shift depending on the urban context and the socio-economic status of the residents. The findings aim to guide policymakers toward evidence-based, flexible housing strategies that enhance spatial equity in newly developed smart cities. The contribution of this research lies in its comparative approach. Three distinct districts were selected to represent the social hierarchy: Social Housing (CG), Middle-income Housing (R3), and Luxury Housing (R5). Since the right to housing should be the cornerstone of governments (Mazzucato and Farha, 2024), policy should inevitably focus on standardized aggregates and investigate the possibilities of utilizing the ideas of happiness and well-being as the pillars of housing policy (Clapham, 2010; Rana, 2025). Ultimately, the findings aim to guide policymakers, architects, and planners toward evidence-based, flexible interventions that enhance spatial equity, social cohesion, and the interdisciplinary scholarly discourse on urban sociology.

1.1. Literature review & theoretical framework

Housing affordability has evolved from a purely economic concept into a multidimensional framework encompassing household financial capacity, housing market conditions, and equitable access to urban opportunities. According to Stone's residual income approach, affordability should not be assessed solely by the ratio between housing costs and income, but by households' ability to meet housing expenses while maintaining adequate resources for other essential living needs (Stone, 2006). Nevertheless, most empirical studies continue to operationalize affordability primarily through the relationship between housing costs and household income (Barrett, 2023). When housing expenditures exceed households' financial capacity, families are compelled to reduce non-housing consumption, negatively affecting overall well-being and living standards (Acolin and Reina, 2022). Furthermore, housing provision itself may improve socio-economic conditions by expanding access to adequate housing and enhancing affordability outcomes (Ismail and Wilhelmsson, 2024). These perspectives

indicate that affordability should be understood as an interaction between household characteristics and housing market conditions rather than as a single financial indicator. Building upon this perspective, previous literature consistently identifies demographic characteristics as important determinants of housing affordability. Life-cycle theory explains that housing needs and tenure decisions evolve as households progress through different stages of family formation (Potter and Rossi, 1956; Clark and Dieleman, 1996). Consequently, affordability varies according to household composition and socio-demographic characteristics. Existing studies identify age, marital status, household size, gender, income, and occupation as factors associated with housing demand and affordability (Sani, 2015; Kim, 2024; Chang, 2024; Alasmari, 2026; Alhajri, 2026). Rather than acting independently, these variables reflect differences in household needs, financial responsibilities, and housing preferences throughout the life course.

Economic perspectives further suggest that affordability is influenced not only by household income but also by institutional and market mechanisms that determine households' access to housing. Housing finance theory emphasizes that access to financing arrangements and secure tenure substantially affects affordability beyond income alone (Dewilde and Ronald, 2017). Previous studies have shown that household income, employment stability, tenure arrangements, housing type, housing prices, and neighbourhood characteristics shape households' capacity to obtain adequate housing (Archer, 2022; Korir and Boiywo, 2024; Hassan et al., 2025). Likewise, payment facilities and cost-reduction mechanisms have been identified as major factors supporting affordability, particularly for low- and middle-income households (World Bank, 2023; Saleh et al., 2025). Collectively, these findings indicate that affordability depends on both household financial capacity and the institutional mechanisms that facilitate access to housing. Based on these theoretical perspectives, this study adopts nine explanatory variables representing the two principal dimensions repeatedly identified in previous literature. The demographic dimension comprises age, gender, marital status, household size, income, and employment type, reflecting variations in household characteristics and financial capacity. The economic dimension includes housing unit type, ownership system, cost reduction, and payment facilities, representing market and financing conditions that influence access to housing. Together, these variables operationalize the multidimensional concept of housing affordability established by the life-cycle, housing finance, and affordability literature.

Beyond household economics, housing affordability also has broader implications for socio-spatial equity. Lefebvre's (1996) concept of the Right to the City argues that equitable access to urban space is fundamental to achieving inclusive urban development. Similarly, Soja (2013) conceptualizes spatial justice as the equitable distribution of urban resources and opportunities, while Fainstein (2010) argues that a just city depends upon fairness in access to urban services and opportunities. From this perspective, improving housing affordability extends beyond reducing financial burdens; it contributes to reducing socio-spatial inequalities by enabling broader access to adequate housing within well-planned urban environments. Accordingly, affordability represents not only an economic outcome but also an important component of spatial justice. These theoretical perspectives are particularly relevant in the Egyptian context. Historically, housing provision has developed through both formal and informal systems (Soliman, 1989), with informal housing largely emerging because formal housing remained inaccessible to many low-income households (Elrefaie, 2024). Despite successive legislative reforms and mortgage finance initiatives, housing finance mechanisms continue to play a central role in shaping households' access to housing, although affordable housing finance remains limited for many low- and middle-income households (Hassan, 2022). Previous analyses also indicate an imbalance in housing supply, characterized by insufficient provision for middle-income households alongside substantial investment in higher-end residential developments (Adly, 2022). Within this context, Egypt's fourth-generation cities incorporate a range of housing typologies, including social, middle-income, and high-income housing, within a common planning framework (Shalaby et al., 2022). This diversity provides an appropriate empirical setting for examining whether the demographic and economic determinants of housing affordability are consistently associated with affordability across different housing typologies. Given Egypt's substantial demand for affordable housing, particularly among middle- and lower-income households (Ahmed et al., 2018), evaluating affordability within this planned urban environment also contributes to broader sustainable development objectives, particularly SDG 11 (Sustainable Cities and Communities), while supporting the objectives of SDGs 1, 3, 4, 8, and 10.

Although previous studies consistently demonstrate that demographic and economic characteristics are associated with housing affordability, most examine these determinants either individually or within a single housing market. Consequently, limited empirical evidence explains whether the relative importance of affordability determinants differs across multiple housing typologies developed within the same planned urban environment. This limitation is particularly evident within Egypt's fourth-generation cities, where different housing categories are intentionally designed to accommodate diverse socio-economic groups under a unified planning framework. To address this gap, this paper employs Multiple Linear Regression (OLS) to examine the

Variable	Dimension	Theoretical basis	Supporting literature	Theoretical rationale
Age	Demographic	Life-cycle theory	Potter and Rossi (1956); Clark and Dieleman (1996); Kim (2024)	Represents changes in housing needs and affordability across different life stages.
Gender	Demographic	Household characteristics	Alhajri (2026)	Reflects socio-demographic differences associated with housing affordability.
Marital status	Demographic	Life-cycle theory	Chang (2024)	Represents household formation and changing housing needs.
Household size	Demographic	Life-cycle theory	Sani (2015); Alhajri (2026)	Reflects household composition and housing demand.
Household income	Economic	Residual income approach	Stone (2006); Barrett (2023); Korir and Boiywo (2024)	Represents household financial capacity to meet housing costs.
Employment type	Economic	Housing finance theory	Dewilde and Ronald (2017); Korir and Boiywo (2024)	Reflects employment stability and access to financial resources.
Type of housing unit	Economic	Housing market perspective	Hassan et al., (2025)	Represents variation in housing characteristics within the market.
Ownership system	Economic	Housing finance theory	Dewilde and Ronald (2017); Archer (2022)	Reflects tenure arrangements associated with housing accessibility.
Cost Reduction and Payment Facilities	Economic	Housing finance theory	World Bank (2023); Saleh et al. (2025)	Represents financial support mechanisms associated with housing affordability.

Table 1: Summarizes the theoretical basis, supporting literature, and rationale for selecting each variable. (2025)

association between nine theoretically derived demographic and economic variables and housing affordability across three housing typologies within Egypt's fourth-generation urban development model: R3 (middle-income housing), R5 (high-income housing), and Capital Gardens City (CG) (social housing). This comparative approach enables the identification of the variables most strongly associated with housing affordability within each housing typology, providing empirical evidence on whether affordability mechanisms differ across housing categories developed within the same planned urban context. The selection of the study variables was guided by the theoretical framework and previous empirical studies. The theoretical basis, supporting literature, and rationale for including each variable are presented in Table 1.

1.2. Conceptual framework and study model

The conceptual framework illustrated in Figure 1 outlines the interdisciplinary approach adopted in this study to evaluate housing affordability within NAC & CG Cities. The model is structured into five integrated components: urban districts, independent variables, MLR analysis, the dependent variable, and theoretical umbrella (SDGs).

2. Materials and Methods

2.1. Study context and participants

The study included 154 respondents from three fourth-generation housing developments representing different housing typologies: Middle-Income (R3), Luxury (R5), and Social Housing (CG). As these developments are still in the early stages of occupancy, the sample reflects the current resident population of the selected study areas. The participants' demographic, socioeconomic, and housing characteristics provide the basis for examining the factors associated with housing affordability. Figure 2 presents the demographic characteristics (age, gender, marital status, and household size), while Figure 3 summarizes the economic and housing characteristics, including income, employment type, housing unit type, and ownership system.

As shown in Figure 2, respondents in R3 and R5 were predominantly aged 36–50 years (64.9% and 40.8%, respectively), whereas CG exhibited a younger profile, with 50.0% of participants aged 25–35 years. Males constituted the majority across all three areas, particularly in R3 (78.9%). While married respondents predominated in R3 and R5, CG was characterized by a higher proportion of single participants and smaller household sizes. Regarding economic determinants, Figure 3 reveals that income levels and ownership systems play a pivotal role in shaping housing affordability in the New Administrative Capital. For instance, household income significantly varies, with 38.6% of R3 residents earning between 10,000–20,000 EGP, whereas the majority of R5 residents (M=2.84) exceed the 20,000 EGP threshold. Employment patterns further distinguish the districts; private sector employees dominate CG at 62.5%, while self-employment is most prevalent in R5 at 38.6%. Notably, the 'Ownership' system remains the primary tenure model across all three housing levels, with the highest rate observed in R5 at 77.6%.

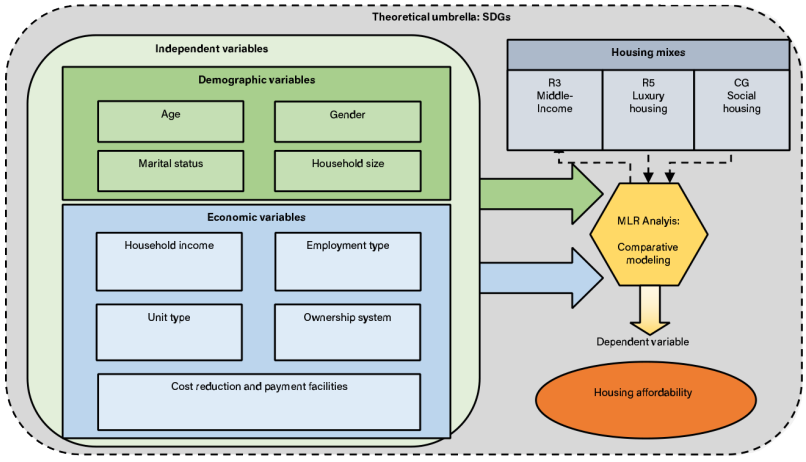


Figure 1: The conceptual framework of housing affordability determinants. (2025)

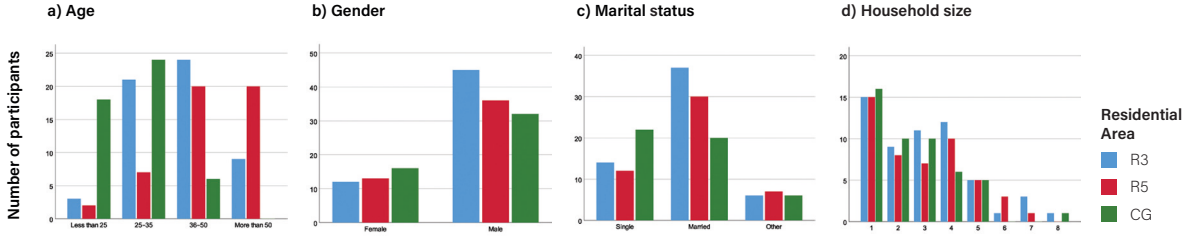


Figure 2: Demographic characteristics of respondents by study area: R3 (n = 57), R5 (n = 49), and CG (n = 48): a) age; b) gender; c) marital status; and d) household size. Authors based on SPSS results (2025)



Figure 3: Economic determinants and housing characteristics of respondents by study area: R3 (n = 57), R5 (n = 49), and CG (n = 48): a) average household income; b) employment type; c) housing unit type; d) ownership system; e) cost reduction and payment facilities; and f) housing affordability. Authors based on SPSS results (2025)

2.2. Instruments and data

2.2.1. Questionnaire design

The questionnaire was developed based on the study's conceptual framework and relevant literature. It consisted of two sections comprising 13 items. The first section collected respondents' demographic and socioeconomic characteristics, including age, gender, marital status, household size, average household income, employment type, housing unit type, ownership system, and residential area. The second section assessed housing affordability through questions on perceived housing affordability, the availability of housing support and payment facilities, and an open-ended question inviting respondents to propose measures for improving housing affordability.

For statistical analysis, all responses were numerically coded in IBM SPSS Statistics. A consistent coding scheme was applied to dichotomous and three-point items (Yes = 3, To some extent = 2, No = 1). Categorical variables were coded using predefined categories, including ownership system (1 = Owned, 2 = Rented, 3 = Other), gender (1 = Male, 2 = Female), and marital status (1 = Single, 2 = Married, 3 = Divorced/Widowed). Continuous variables (age, household size, and monthly household income) were categorized prior to regression analysis.

2.2.2. Questionnaire validation and pilot testing

The questionnaire was reviewed by five experts to assess its content validity, including three specialists in architecture and urban planning, one sociologist, and one banking professional with expertise in financial matters. A pilot test involving 13 adults outside the study areas was subsequently conducted to evaluate the clarity and comprehensibility of the questionnaire. Based on the feedback, the monthly household income question was converted from an open-ended to a three-category format (less than EGP 10,000; EGP 10,000–20,000; and more than EGP 20,000), while the divorced and widowed categories were merged into a single response option. No further modifications were required before the main survey.

2.2.3. Sampling and data collection

A total of 154 valid responses were collected from residents of three fourth-generation housing developments: R3 (n = 57), R5 (n = 49), and CG (n = 48). Eligible participants were adults (18 years or older), including both homeowners and tenants residing in the selected neighborhoods. Data were collected through a structured Google Forms questionnaire using a combination of on-site recruitment and online distribution. Participation was voluntary and anonymous. To enhance sample representation across the study context, responses were obtained from the three housing typologies with relatively balanced sample sizes.

2.3. Data analysis

This study employed a quantitative comparative analytical approach. Multiple Linear Regression (MLR) using the Ordinary Least Squares (OLS) method was applied to examine the relationship between housing affordability and nine independent variables. All statistical analyses were conducted using IBM SPSS Statistics version 25 (IBM Corp., Armonk, NY, USA). Although housing affordability was measured on a three-point Likert-type scale, OLS regression was considered appropriate because parametric methods have been shown to be robust for ordinal Likert-type data in explanatory research (Labovitz, 1970; Norman, 2010; Field, 2024). The adequacy of the regression models was further confirmed through diagnostic testing, including significant overall ANOVA results ($p < 0.001$), multicollinearity assessment using the Variance Inflation Factor (VIF), and satisfactory explanatory power ($R^2 = 0.63–0.73$). These diagnostic procedures indicated that the fitted models were sufficiently stable and interpretable for explanatory analysis (Hair et al., 2010; Field, 2024).

2.3.1. Model specification

To evaluate the factors influencing housing affordability in Egypt's 4th generation cities, a regression model was developed. Socio-economic and housing determinants-related variables were incorporated as independent variables in this model (Table 2).

Category (*Y*)	Variables (*X*)	Code
Demographic variables	Age	X_1
	Gender	X_2
	Marital status	X_3
	Household size	X_4
Economic variables and housing determinants	Average household income	X_5
	Type of employment	X_6
	Type of housing unit	X_7
	Ownership system	X_8
	Cost reduction and payment facilities	X_9

Table 2: Socio-economic and housing determinants coding. (2025)

The Model: Housing Affordability (*Y*)

Housing affordability was used to evaluate the variables based on housing determinants, following the general form:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_9 X_9 + \epsilon$$

Where:

- Y = Housing affordability (perception of whether housing cost is affordable relative to income)
- $X_1 .. X_9$ = Independent variables, including housing determinants

2.3.2. Reliability

To evaluate the relationship between the independent determinants and housing affordability, Multiple Linear Regression (MLR) was performed. The analysis followed a multi-stage refinement process to ensure the robustness and reliability of the statistical outputs:

- **Addressing multicollinearity:** During the initial stage, diagnostic tests revealed the presence of multicollinearity among several independent variables. To mitigate this, variables demonstrating high inter-correlations, specifically cost reduction and payment facilities, were standardized into Z-scores ($Z= (x-\mu)/\sigma$.) This standardization procedure centered the data, thereby reducing variance inflation and stabilizing the regression coefficients.
- **Full model:** The initial multiple linear regression model included all nine predictors derived from the conceptual framework and informed by prior literature. To ensure methodological transparency, the complete results of the full model are provided in Appendices 7, 8, and 9 as technical references.
- **Model refinement:** A manual backward elimination procedure was employed to derive a more parsimonious regression model. Beginning with the full model, the predictor with the highest non-significant p-value was removed sequentially, one variable at a time, and the model was re-estimated after each iteration. Following each elimination step, adjusted R^2, regression coefficients, and multicollinearity diagnostics (VIF) were evaluated to ensure that the removal of a predictor did not materially reduce the model's explanatory power or compromise overall model stability. The elimination process continued until a stable parsimonious model was obtained. Details of each elimination step are presented in Appendix Table 10. The refined model is presented and discussed in the main text, whereas the complete results of the full model are provided in Table 7 to Table 9 for comparison and methodological transparency.

3. Results

3.1. Residential area R3

The refined MLR model for R3, presented in Table 3, was statistically significant (R = 0.791, R^2 = 0.626, F = 21.740, Sig = 0.000). Four variables were statistically significant: cost reduction and payment facilities (B = 1.317, Sig = 0.000), household size (B = 0.077, Sig = 0.011), type of employment (B = 0.202, Sig = 0.004), and ownership system (B = 0.498, Sig = 0.008).

Model Summary

Model	R	R Square	Adjusted R square	Std. Error of the estimate
R3	.791[a]	0.626	0.597	0.387

ANOVA[a]

Model		Sum of squares	Df	Mean square	F	Sig.
R3	Regression	13.043	4	3.261	21.740	.000[b]
	Residual	7.799	52	0.150		
	Total	20.842	56			

Coefficients[a]

Model		Unstandardized coefficients		Standardized coefficients	T	Sig. Tolerance	Collinearity statistics	
		B	Std. Error	Beta			VIF	
R3	(Constant)	0.127	0.366		0.346	0.731		
	Household size	0.077	0.029	0.227	2.653	0.011	0.980	1.021
	Type of employment	0.202	0.068	0.261	2.983	0.004	0.937	1.068
	Ownership system	0.498	0.181	0.362	2.756	0.008	0.416	2.402
	Cost reduction and payment facilities	1.317	0.174	0.975	7.570	0.000	0.434	2.306

Table 3: Affordability of MLR test for R3. Authors from SPSS (2025)

3.2. Residential area R5 (New Garden City)

The results showed that R was 0.854, R^2 was 0.729, and F = 61.812 (Sig = 0.000), as presented in Table 4. Ownership system (B = 0.967, Sig = 0.000) and cost reduction and payment facilities (B = 2.431, Sig = 0.000) were the findings.

3.3. Capital Gardens City (CG)

The refined MLR model for CG, presented in Table 5, was statistically significant (R = 0.819, R^2 = 0.671, F = 17.163, Sig = 0.000). Five variables were retained in the model. Ownership system (B = 1.117, Sig = 0.000) and cost reduction and payment facilities (B = 1.767, Sig = 0.000) were statistically significant, while average household income (B = 0.487, Sig = 0.015) and marital status (B = 0.310, Sig = 0.009) were positively associated with housing affordability. Age approached statistical significance (B = −0.255, Sig = 0.059).

3.4. Predictive equations for housing affordability

Based on the refined regression models in this sample (Tables 2, 3, 4), the following predictive equations were derived for *Affordability* across the three residential areas:

$$Y_{R3} = 0.127 + 0.077\,X_4 + 0.202\,X_6 + 0.498\,X_8 + 1.317\,X_9$$

$$Y_{R5} = -0.457 + 0.967\,X_8 + 2.431\,X_9$$

$$Y_{CG} = -1.325 - 0.255\,X_1 + 0.310\,X_3 + 0.487\,X_5 + 1.117\,X_8 + 1.767\,X_9$$

Model summary								
Model	R	R Square	Adjusted R square	Std. Error of the estimate				
R5	.854[a]	0.729	0.717	0.380				
ANOVA[a]								
Model		Sum of squares	Df	Mean square	F	Sig.		
R5	Regression	17.878	2	8.939	61.812	.000[b]		
	Residual	6.652	46	0.145				
	Total	24.531	48					
Coefficients[a]								
Model		Unstandardized coefficients		Standardized coefficients	T	Sig. Tolerance	Collinearity statistics	
		B	Std. Error	Beta			VIF	
R5	(Constant)	-0.457	0.376		-1.215	0.230		
	Ownership system	0.967	0.225	0.570	4.296	0.000	0.335	2.988
	Cost reduction and payment facilities	2.431	0.258	1.252	9.437	0.000	0.335	2.988

Table 4: Affordability of MLR test for R5. Authors from SPSS (2025)

Model summary								
Model	R	R Square	Adjusted R square	Std. Error of the estimate				
CG	.819[a]	0.671	0.632	0.450				
ANOVA[a]								
Model		Sum of squares	Df	Mean square	F	Sig.		
CG	Regression	17.400	5	3.480	17.163	.000[b]		
	Residual	8.516	42	0.203				
	Total	25.917	47					
Coefficients[a]								
Model		Unstandardized coefficients		Standardized coefficients	t	Sig. Tolerance	Collinearity statistics	
		B	Std. Error	Beta			VIF	
CG	(Constant)	-1.325	0.512		-2.590	0.013		
	Age	-0.255	0.131	-0.229	-1.942	0.059	0.560	1.784
	Marital status	0.310	0.114	0.290	2.727	0.009	0.693	1.444
	Average household income	0.487	0.192	0.327	2.532	0.015	0.470	2.129
	Ownership system	1.117	0.269	0.691	4.149	0.000	0.282	3.543
	Cost reduction and payment facilities	1.767	0.365	0.999	4.846	0.000	0.184	5.431

Table 5: Affordability of MLR test for CG. Authors from SPSS (2025)

4. Discussion and Conclusions

4.1. Discussion

Overall, the findings reveal both shared and housing-specific patterns of association across the three housing typologies, supporting the comparative objective of the study. The following sections discuss the results for each residential area in light of the theoretical framework and relevant literature.

4.1.1. Residential Area R3

The strong association of cost reduction and payment facilities with housing affordability is consistent with the housing finance perspective, which links affordability not only to household income but also to financing arrangements and tenure mechanisms (Dewilde and Ronald, 2017). It also agrees with previous studies emphasizing the importance of financial support mechanisms for housing affordability (The World Bank, 2023; Saleh et al., 2025). Within the Egyptian context, this finding may reflect the widespread reliance on installment-based housing finance and subsidized payment schemes (Hassan, 2022). Employment type was also positively associated with housing affordability, supporting previous evidence that employment stability influences households' financial capacity and access to housing finance (Ronald and Dewilde, 2017; Korir and Boiywo, 2024). Likewise, ownership system aligns with studies highlighting the role of tenure arrangements in housing accessibility (Archer, 2022). Household size was positively associated with affordability, consistent with Life-cycle Theory, which suggests that housing needs and financial priorities vary with household composition (Potter and Rossi, 1956; Clark and Dieleman, 1996), although this association was weaker than that of financing-related variables.

4.1.2. Residential Area R5

The R5 model identified ownership system and cost reduction and payment facilities as the only variables significantly associated with housing affordability, with the latter showing the largest coefficient. This finding is consistent with the housing finance perspective (Dewilde and Ronald, 2017) and previous studies indicating that financing arrangements remain central to housing transactions in Egypt, including higher-end residential developments (Adly, 2022; Hassan, 2022). The significance of ownership system alongside financing-related support suggests that institutional and financial factors remain closely associated with perceived housing affordability in R5.

4.1.3. Capital Gardens City (CG)

Similar to the R3 and R5 models, ownership system and cost reduction and payment facilities showed the strongest associations with housing affordability. This supports the housing finance perspective, which links affordability not only to household income but also to financing arrangements and tenure conditions (Dewilde and Ronald, 2017), and is consistent with previous studies emphasizing the role of housing finance mechanisms in the Egyptian housing market (Hassan, 2022).

Unlike R3 and R5, average household income was significantly associated with housing affordability in CG. This finding is consistent with Stone's (2006) residual income approach and previous empirical evidence highlighting household income as an important correlate of affordability, particularly among lower-income households (Korir and Boiywo, 2024). Given that CG represents the social housing typology, this result is consistent with its socioeconomic context.

Marital status was also positively associated with housing affordability, supporting Life-cycle Theory, which suggests that housing demand and affordability vary across stages of household formation (Potter and Rossi, 1956; Clark and Dieleman, 1996), and is consistent with the findings of Chang (2024). Although age did not reach statistical significance ($p = 0.059$), its proximity to the threshold suggests that age-related differences in housing affordability warrant further investigation. Overall, compared with R3 and R5, CG model indicates that housing affordability in the social housing typology is associated with a broader combination of demographic, economic, and financing-related factors.

Dependent variable	Independent variables	Case studies			Effect	SDGs	Suggested policy Implications
		R3	R5	CG			
Housing affordability	Age			✓	Negative effect: younger residents in CG (low-income)	10, 11	Youth-targeted housing schemes (small units, subsidized loans)
	Marital status			✓	Family households face affordability pressures	1, 11	Family-oriented housing support (discounts, subsidies for dependents)
	Average household income			✓	Higher household income was positively associated with housing affordability	1,10, 11	Linking housing prices to income levels; progressive financing programs
	Household size	✓			Larger household size was negatively associated with housing affordability due to higher costs	3,11	Design flexible housing sizes; targeted support for large families
	Type of employment	✓			Employment type was positively associated with affordability regardless of sector	8, 10	Expand job opportunities and ensure income security programs to sustain affordability
	Ownership system	✓	✓	✓	Positively associated with affordability via stability and security	11	Rent-to-Own models; installment-based ownership schemes
	Cost reduction & payment facilities	✓	✓	✓	Positively associated with affordability	1,11	Expand subsidies, flexible loans, public–private financing

Table 6: Housing affordability variables: SDGs & policy mapping. (2025)

4.2. Mapping of variables to SDGs and policy implications

Based on the MLR findings, Table 6 links the significant determinants of housing affordability in R3, R5, and CG to the relevant SDGs and their policy implications for the studied fourth-generation housing developments.

The comparative findings indicate that housing affordability is associated with both common and housing-specific factors. While ownership system and cost reduction and payment facilities were consistently associated with affordability across the three housing typologies, demographic and economic characteristics varied according to the socio-economic profile of each housing category. Employment type and household size were associated with affordability in R3, whereas household income and marital status were associated with affordability in CG. These differences suggest that housing affordability policies may benefit from combining broad financing measures with interventions tailored to the characteristics of different household groups.

The SDG mapping presented in Table 3 translates these empirical findings into policy-relevant directions. The consistent association of financing-related variables across all housing typologies highlights the potential role of flexible payment schemes, installment-based ownership models, and public–private financing mechanisms in supporting housing affordability. At the same time, housing policies that consider household income, employment stability, family composition, and the needs of younger households may contribute to more inclusive access to housing. Collectively, these policy directions are aligned with SDG 11 (Sustainable Cities and Communities) while also supporting the objectives of SDGs 1 (No Poverty), 8 (Decent Work and Economic Growth), and 10 (Reduced Inequalities).

4.3. Conclusion

Overall, this study provides comparative evidence on the demographic and economic factors associated with housing affordability across three housing typologies within the New Administrative Capital and Capital Gardens City. The findings indicate that financing-related variables were consistently associated with housing affordability across the three housing categories, whereas the significance of demographic characteristics varied according to the socio-economic profile of each housing typology. These findings contribute to the housing affordability literature by providing comparative empirical evidence from a planned urban context in Egypt and by extending understanding of how affordability associations may vary across different housing typologies within the same planning framework. More broadly, the study contributes to discussions on housing affordability, socio-spatial equity, and sustainable urban development by offering evidence that may inform future research and housing policy.

5. Limitations

This study has several limitations. First, the sample comprised 154 respondents across three recently developed residential areas (R3 = 57, R5 = 49, and CG = 48). As these developments are still relatively new, the number of occupied units limited the sample size. Although the initial regression model included nine theoretically justified predictors, the sample size should be considered when interpreting the full model. Accordingly, the results of the full model should be interpreted with appropriate caution. Therefore, a refined model was developed to improve parsimony while maintaining explanatory performance. Second, the cross-sectional design identifies statistical associations at a single point in time and does not support causal inference.

Third, housing affordability was measured using a three-point ordinal, perception-based variable, which reflects residents' perceived affordability rather than objective financial measures. Fourth, the findings are specific to the selected housing typologies within the New Administrative Capital (NAC) and Capital Gardens City (CG) and should not be generalized to other urban contexts without further empirical validation. Finally, the gender distribution was unbalanced, particularly in R3, where males represented 78.9% of respondents. Future studies with larger, more balanced samples across multiple planned cities are recommended to further validate these findings.

6. Recommendations

Based on the empirical findings, the following recommendations are proposed to improve housing affordability in Egypt's fourth-generation cities:

- Expand financial support mechanisms: Prioritize long-term installment plans, affordable mortgage programs, and payment facilities, as these factors showed the strongest association with housing affordability across the study areas.
- Adopt context-specific housing policies: Tailor interventions to local housing conditions rather than applying uniform policies. In R3, greater attention should be given to housing design that accommodates larger households, while in CG, support measures should better address the needs of younger residents and different household structures.
- Diversify housing tenure options: Introduce alternative tenure models, such as rent-to-own and shared equity schemes, to improve affordability and provide greater flexibility across different housing typologies.
- Promote employment-oriented urban development: Encourage mixed-use developments that increase access to employment opportunities and help reduce household expenditure associated with commuting.
- Support evidence-based housing policy: Establish a data-driven monitoring framework to periodically evaluate housing affordability and update housing finance policies in response to changing socioeconomic conditions.

7. Acknowledgements

The authors acknowledge the support of their academic institutions, which provided guidance and resources during the completion of this paper.

Conflict of Interests. The authors declare no conflict of interests.
© Copyright: Rola Kamal Ali, Sherief Ahmed Sheta, Esraa Mohamed Elazab, Ahmed Mohamed Thabet Alieldin, 2027.
© Copyright of the edition: *Estoa*, 2027.

8. Bibliographic references

Acolin, A., & Reina, V. (2022). Housing cost burden and life satisfaction. *Journal of Housing and the Built Environment*, *37*, 1789-1815. https://doi.org/10.1007/S10901-021-09921-1

Adly, A. (Ed.). (2022). *Tarakum la yanfa': Siyasat al-tatwir al-'aqari fi Misr* [Accumulation is useless: Real Estate development policies in Egypt]. Friedrich-Ebert-Stiftung, Egypt Office.

Ahmed, O. A., Khalifa, M., & Abdel Rahman, A. S. (2018). *The affordability of the provided housing units in Egypt: Case study of the National Housing Program (NHP).* SSRN. https://doi.org/10.2139/SSRN.3163562

Alasmari, F. (2026). Affordability, preferences, and barriers to multifamily housing for young families in Riyadh, Saudi Arabia. *Buildings*, *16*(1), 167. https://doi.org/10.3390/buildings16010167

Alhajri, M. F. (2026). The relationship between socio-demographic factors and housing affordability in Saudi Arabia. *International Journal of Housing Markets and Analysis*, *19*(2), 377–402. https://doi.org/10.1108/IJHMA-08-2024-0121

Archer, T. (2022). The mechanics of housing collectivism: How forms and functions affect affordability. *Housing Studies*, *37*(1), 73–102. https://doi.org/10.1080/02673037.2020.1803798

Barrett, P. (2023). Intersections between housing affordability and meanings of home: A review. *Kōtuitui: New Zealand Journal of Social Sciences Online*, *18*(1), 27–44. https://doi.org/10.1080/1177083X.2022.2090969

Chan, S. M., & Wong, H. (2021). Housing and subjective well-being in Hong Kong: A structural equation model. *Applied Research in Quality of Life*, *17*, 1745–1766. https://doi.org/10.1007/s11482-021-10000-4

Chang, M. (2024). Changing marital transitions and homeownership among young households. *Review of Economic Dynamics*, *52*, 46–63. https://doi.org/10.1016/j.red.2023.11.002

Clapham, D. (2010). Happiness, well-being and housing policy. *Policy & Politics*, *38*(2), 253–267. https://doi.org/10.1332/030557310X488457

Clark, W. A. V., & Dieleman, F. M. (1996). *Households and housing: Choice and outcomes in the housing market*. Transaction Publishers. https://books.google.com.eg/books?id=HEHIYehDbgUC

Dewilde, C., & Ronald, R. (2017). *Housing wealth and welfare*. Edward Elgar Publishing. https://doi.org/10.4337/9781785360961

Elrefaie, M. (2024). Land market dynamics in Egypt. In: Soliman, A.M., Keivani, R. (eds). *Innovations for Land Management, Governance, and Land Rights for Sustainable Urban Transitions*. Springer, Cham. https://doi.org/10.1007/978-3-031-59671-1_12

Fainstein, S. S. (2010). *The Just City*. Cornell University Press.

Field, A. (2024). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications. https://books.google.com.eg/books/about/Discovering_Statistics_Using_IBM_SPSS_St.html?id=Nf3TEAAAQBAJ

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Pearson. https://www.drnishikantjha.com/papersCollection/Multivariate%20Data%20Analysis.pdf

Hassan, A. M. Q. (2022). The role of real estate financing in reducing the housing problem in Egypt in the light of international experiences. *Journal of the High Institute for Qualitative Studies*, *2*(4), 1093-1152. https://hiss.journals.ekb.eg/article_315945.html

Hassan, M. M., Shaharudin, M. D. A., & Zamani, N. L. (2025). The relationship between housing type, housing prices, and strategic location on housing affordability in Malaysia. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, *10*(8), e003570. https://doi.org/10.47405/mjssh.v10i8.3570

Ismail, M., & Wilhelmsson, M. (2024). Redefining Stockholm: Examining the consequences of urban development on socioeconomic factors and affordability. *Journal of Housing and the Built Environment*, *39*(3), 1209–1229. https://doi.org/10.1007/S10901-024-10115-8

Kajdanek, K., Hübscher, M., & Schroll, L. (2025). Provision of affordable housing in new large-scale housing projects in second-tier cities in Central and Eastern Europe. Comparing the cases of Lausanne (CH), Leipzig (GER), and Wrocław (PL). *Journal of Housing and the Built Environment*, 40, 1273–1304. https://doi.org/10.1007/S10901-025-10204-2

Kim, J. (2024). Aging, housing prices, and young adults' homeownership. *Cities*, *149*, 104914. https://doi.org/10.1016/j.cities.2024.104914

Korir, S. C., & Boiywo, J. (2024). Effect of household income on the affordability of housing in Nakuru East and Nakuru West sub-counties, Nakuru County, Kenya. *European Journal of Economic and Financial Research*, *8*(4). https://doi.org/10.46827/EJEFR.V8I4.1778

Labovitz, S. (1970). The assignment of numbers to rank order categories. *American Sociological Review*, *35*(3), 515–524. https://doi.org/10.2307/2092993

Lee, K. E., & Chan, W. V. (2024). *Inclusive housing management and community wellbeing: A case study of Hong Kong*. Palgrave Macmillan Singapore. https://doi.org/10.1007/978-981-97-2132-0

Lefebvre, H. (1996). The right to the city. In E. Kofman & E. Lebas (Eds. & Trans.), *Writings on cities* (pp. 63–181). Blackwell.

Mazzucato, M., & Farha, L. (2024). *The right to housing: A mission-oriented and human rights-based approach* (Working Paper Series IIPP WP 2023-07). UCL Institute for Innovation and Public Purpose. https://www.ucl.ac.uk/bartlett/public-purpose/publications/2023/may/right-housing-mission-oriented-and-human-rights-based-approach

Norman, G. (2010). Likert scales, levels of measurement and the 'laws' of statistics. *Advances in Health Sciences Education*, *15*(5), 625–632. https://doi.org/10.1007/S10459-010-9222-Y

Potter, R. G., & Rossi, P. H. (1956). Why families move. *The Milbank Memorial Fund Quarterly*, *34*(2), 216. https://doi.org/10.2307/3348417

Rana, K. (2025). Sustainable housing as a social determinant of health and wellbeing. *Sustainability*, *17*(16), 7519. https://doi.org/10.3390/su17167519

Saleh, A. F., Ab Majid, R., Ab Rahim, N., Lazi, K. A., & Awang, N. A. (2025). Urban housing affordability: Analyzing the impact of affordable housing schemes on housing prices. *Planning Malaysia*, *23*(39), 76-90. https://doi.org/10.21837/pm.v23i39.1897

Sani, N. M. (2015). Relationship between housing affordability and house ownership in Penang. *Jurnal Teknologi (Sciences & Engineering)*, *75*(9), 65–70. https://doi.org/10.11113/JT.V75.5236

Shalaby, H., Ahmed, N., & Elshanwany, H. (2022). The role of housing projects in Egypt toward solving the low-income housing problem. *The Egyptian International Journal of Engineering Sciences and Technology*, *40*(1), 71–82. https://doi.org/10.21608/eijest.2022.115699.1124

Soja, E. W. (2013). *Seeking spatial justice*. University of Minnesota Press.

Soliman, A. M. (1989). Housing mechanisms Egypt: A critique. *The Netherlands Journal of Housing and Environmental Research*, *8*(1), 183-194. https://doi.org/10.1177/095624789600800116

Stone, M. E. (2006). What is housing affordability? The case for the residual income approach. *Housing Policy Debate*, *17*(1), 151–184. https://doi.org/10.1080/10511482.2006.9521564

World Bank. (2023). *Summary and highlights of the 9th Global Affordable Housing Conference*. World Bank Group. http://documents.worldbank.org/curated/en/099062123024511492

Yang, Z., & Chen, J. (2014). *Housing affordability and housing policy in urban China*. Springer. https://doi.org/10.1007/978-3-642-54044-8

9. Appendix

9.1. Full Model: R3

The preliminary MLR analysis for R3 (Table 7) produced a statistically significant model (R = 0.815, R^2 = 0.664, F = 10.318, Sig = 0.000), explaining 66.4% of the variance in housing affordability. Three variables were statistically significant (Sig < 0.05): household size (B = 0.080, Sig = 0.012), type of employment (B = 0.188, Sig = 0.014), and cost reduction and payment facilities (B = 1.246, Sig = 0.000).

Model summary				
Model	R	R Square	Adjusted R Square	Std. Error of the estimate
R3	.815[a]	0.664	0.600	0.386

ANOVA[a]						
Model		Sum of squares	df	Mean square	F	Sig.
R3	Regression	13.838	9	1.538	10.318	.000[b]
	Residual	7.004	47	0.149		
	Total	20.842	56			

Coefficients[a]								
Model		Unstandardized coefficients		Standardized coefficients	t	Sig.Tolerance	Collinearity statistics	
		B	Std. Error	Beta			VIF	
R3	(Constant)	0.112	0.464		0.241	0.810		
	Age	-0.005	0.091	-0.007	-0.056	0.955	0.497	2.013
	Gender	0.185	0.140	0.125	1.320	0.193	0.800	1.249
	Marital status	-0.110	0.099	-0.105	-1.113	0.271	0.803	1.245
	Household size	0.080	0.031	0.237	2.600	0.012	0.861	1.161
	Average household income	0.038	0.123	0.040	0.307	0.760	0.431	2.318
	Type of employment	0.188	0.073	0.244	2.561	0.014	0.790	1.266
	Type of housing unit	0.131	0.076	0.172	1.728	0.090	0.725	1.378
	Ownership system	0.328	0.197	0.239	1.667	0.102	0.347	2.880
	Cost reduction and payment facilities	1.246	0.183	0.923	6.791	0.000	0.387	2.581

Table 7: Affordability Preliminary Analysis (Full Model) of MLR test for R3. Authors from SPSS (2025)

9.2. Full Model: R5

The preliminary MLR analysis for R5 (Table 8) also produced a statistically significant model (R = 0.869, R^2 = 0.756, F = 13.419, Sig = 0.000), explaining 75.6% of the variance in housing affordability. Only ownership system (B = 0.884, Sig = 0.001) and cost reduction and payment facilities (B = 2.340, Sig = 0.000) were statistically significant; all remaining variables were non-significant (Sig > 0.05).

Model summary				
Model	R	R Square	Adjusted R Square	Std. Error of the estimate
R5	.869[a]	0.756	0.700	0.392

ANOVA[a]						
Model		Sum of squares	df	Mean square	F	Sig.
R5	Regression	18.543	9	2.060	13.419	.000[b]
	Residual	5.988	39	0.154		
	Total	24.531	48			

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig. Tolerance	Collinearity Statistics	
		B	Std. Error	Beta			VIF	
R5	(Constant)	0.322	0.723		0.446	0.658		
	Age	-0.039	0.080	-0.046	-0.491	0.626	0.718	1.393
	Gender	-0.173	0.136	-0.108	-1.276	0.210	0.871	1.148
	Marital status	0.086	0.109	0.074	0.783	0.438	0.694	1.440
	Household size	0.018	0.038	0.043	0.479	0.635	0.760	1.316
	Average household income	-0.242	0.170	-0.127	-1.428	0.161	0.796	1.256
	Type of employment	0.031	0.109	0.028	0.281	0.780	0.642	1.558
	Type of housing unit	0.069	0.102	0.065	0.675	0.504	0.669	1.494
	Ownership system	0.884	0.244	0.521	3.621	0.001	0.302	3.309
	Cost reduction and payment facilities	2.340	0.286	1.206	8.195	0.000	0.289	3.458

Table 8: Affordability Preliminary Analysis (Full Model) of MLR test for R5. Authors from SPSS (2025)

9.3. Full Model: CG

The preliminary MLR analysis for CG (Table 9) yielded a statistically significant model (R = 0.835, R^2 = 0.698, F = 11.250, Sig = 0.000), explaining 69.8% of the variance in housing affordability. Four variables were statistically significant (Sig < 0.05): marital status (B = 0.299, Sig = 0.020), average household income (B = 0.643, Sig = 0.004), ownership system (B = 1.162, Sig = 0.000), and cost reduction and payment facilities (B = 1.666, Sig = 0.000). Age approached statistical significance, whereas housing unit type was excluded because all surveyed dwellings were social apartment units, leaving no variation in this variable; all other variables were non-significant.

Model Summary				
Model	R	R Square	Adjusted R square	Std. error of the estimate
CG	.835[a]	0.698	0.636	0.448

ANOVA[a]						
Model		Sum of squares	df	Mean square	F	Sig.
CG	Regression	18.081	8	2.260	11.250	.000[b]
	Residual	7.835	39	0.201		
	Total	25.917	47			

Coefficients[a]								
Model		Unstandardized coefficients		Standardized coefficients	t	Sig. Tolerance	Collinearity statistics	
		B	Std. Error	Beta			VIF	
CG	(Constant)	-1.170	0.564		-2.075	0.045		
	Age	-0.254	0.131	-0.228	-1.929	0.061	0.554	1.806
	Gender	-0.066	0.162	-0.042	-0.409	0.685	0.721	1.386
	Marital status	0.299	0.123	0.279	2.430	0.020	0.586	1.706
	Household size	0.027	0.049	0.056	0.537	0.594	0.711	1.407
	Average household income	0.643	0.213	0.432	3.020	0.004	0.379	2.636
	Type of employment	-0.196	0.135	-0.160	-1.448	0.156	0.636	1.573
	Ownership system	1.162	0.300	0.718	3.871	0.000	0.225	4.443
	Cost reduction and payment facilities	1.666	0.377	0.942	4.417	0.000	0.171	5.863

Table 9: Affordability Preliminary Analysis (Full Model) of MLR test for CG. Authors from SPSS (2025)

9.4. Regression model refinement using manual backward elimination

The manual backward elimination process was conducted to refine the regression models and assess their stability across the R3, R5, and CG areas, as presented in Table 10.

Step	Predictor removed	Adjusted R^2	Δ Adjusted R^2	Overall Model significance	Maximum VIF
		R3			
Full	None	0.664	–		2.880
1	Age	0.664	-		2.878
2	Average household income	0.663	−0.001		2.860
3	Marital status	0.654	−0.009	$p < 0.001$	2.746
4	Gender	0.641	−0.013		2.722
5	Type of housing unit	0.626	−0.015		2.402
Final	—	**0.626**	**−0.038**		**2.402**
		R5			
Full	None	0.756	–		3.458
1	Type of employment	0.755	−0.001		3.284
2	Household size	0.754	−0.001		3.243
3	Age	0.753	−0.001		3.234
4	Type of housing unit	0.752	−0.001	$p < 0.001$	3.213
5	Marital status	0.745	−0.007		3.157
6	Gender	0.738	−0.007		3.114
7	Average household income	0.729	−0.009		2.988
Final	—	**0.729**	**−0.027**		**2.988**
		CG			
Full	None	0.698	–		5.863
1	Gender	0.696	−0.002		5.481
2	Household size	0.694	−0.002	$p < 0.001$	5.471
3	Type of employment	0.671	−0.023		5.431
Final	—	**0.671**	**−0.025**		**5.431**

Table 10: Manual backward elimination process and model stability assessment for the R3, R5, and CG Regression Models. Authors based on SPSS regression outputs (2025)