

Analysis of the demand and accessibility of households to housing in Algeria

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Received: 21/03/2025

Accepted: 16/05/2025

Published: 03/06/2025

Abstract:

In this article, we propose to analyze the demand for and access to housing by households in Algeria. We also aim to identify the factors that may influence them, based on data from a survey conducted with a sample of 700 households in the Bejaia province. First, we will review the main empirical studies related to the determinants of housing application. Second, we will attempt to model the determinants of housing demand and property access using a binary logistic regression model.

The results of this study show that relatively young household heads, those with lower levels of education, households residing in urban municipalities, and those cohabiting are more likely to apply for housing. The probability of owning a property is higher for households residing in rural municipalities.

Keywords: Algeria; Binary logistic regression; Housing access;Housing application.

Jel Classification Codes: R21, P25.

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1. INTRODUCTION

Algeria has been experiencing a housing crisis for several years, resulting from a growing demand from its citizens and exacerbated by social changes. The government has taken a number of measures, including allocating large sums of money to the sector and expanding the range of programs aimed at finding solutions compatible with the purchasing power of the various segments of the population (Belhadj & Hakmi, 2022, p337).

However, attempts to adapt the housing stock to the reality of demand have not had any noticeable effect on alleviating the crisis. An assessment of housing needs based on the number of households has highlighted the need to build 10 million dwellings between 2010 and 2040 (Cherif ali, 2013, p16). A report by the World Bank (BM, 2017, p28) on the economic situation in Algeria also highlighted the high housing prices, which are considered high in relation to income levels.

Many works and empirical studies on this subject have been conducted in Western countries. However, those related to the Maghreb region, specifically Algeria, are scarce and suffer from limitations related to transparency and data availability. Statistics in this field are not yet well developed in our country, and scientific and empirical research on housing has not received sufficient attention.

In this context, this research is framed as follows, the study of the issue of housing demand and access, based on data from a survey conducted with a sample of 700 households in the Bejaia province, distributed across 16 municipalities. The analysis focuses specifically on identifying the factors that may influence housing demand and access to property.

2. Theoretical Framework

The study of housing issues has primarily developed along two main axes. The first involves establishing models for forecasting housing investment using a macroeconomic approach. The second focuses on analyzing household behavior regarding housing consumption. Research on housing demand often aims to estimate its determinants, such as household income, housing prices, and demographics. Other quantitative assessments of this demand have been conducted in relation to household mobility,

duration, and occupancy status. Some authors have analyzed housing demand using a linear probability model, probit (Lee and Robert, 1978), or logit models (Rodriguez Hernandez and Barrios Garcia, 2008; Oktay et al., 2014; Arnold and Boussard, 2017), while others have used regression models, with a particular focus on estimating income and price elasticities (Malpezzi, Mayo, and Gross, 1985; Henderson and Loannides, 1986; Thuillier, 1994).

The neoclassical economic theory of consumer behavior applied to housing was introduced by Muth (1960) and later developed by Olsen (1969) (Megbolugbe, Marks, & Schwartz, 1991, p 382) formulated the housing demand function, which depends on household income, relative housing prices, and consumer preferences or tastes.

Macroeconomic models of housing demand have primarily relied on the stock-flow structure of behavioral equations, which enable the identification of the main variables that determine this demand, estimation, and the construction of a forecasting model.

For any analysis, the selection and definition of explanatory variables are crucial. The main factors that have been identified as determinants of housing demand are: Income, demographics, and prices.

2.1 The price variable and the estimation of the hedonic function

In the literature, housing prices are typically assessed through a production function that converts the cost of inputs (such as land prices and other production factors) into housing prices. Alternatively, the hedonic pricing technique is used to assess indices related to each characteristic of the housing unit (Thuillier, 1994, P75).

The theory of hedonic prices was formulated by Sherwin Rosen in 1974. Hedonic prices are defined by the prices of observed products and the specific quantities of characteristics associated with each product (Rosen, 1974, p34). Therefore, goods are evaluated based on their attributes. Housing is considered a heterogeneous good, consisting of characteristics that are considered as homogeneous inputs to consumers' utility function. Since housing is a heterogeneous good, the hedonic approach provides an appropriate framework for estimating the contributions of its different

characteristics to the formation of its price. Sherwin Rosen (1974) defined a hedonic price function that relates product prices in a market to the characteristics, with the derivative representing the marginal price of the attribute. He estimated the price function and then the demand function for each of the attributes. The variables used in the assessment of hedonic prices in housing include (Halleux, 2009, p42):

- Structural variables (intrinsic characteristics) related to the properties themselves (comfort features, number of rooms, etc.).
- Location-related variables: represented by accessibility attributes (positioning within the urban space) and attributes related to neighborhood quality (factors contributing to quality of life)

2.2 The Income Variable and its Measurement

A vast theoretical and empirical literature has highlighted the fundamental role of the income variable in explaining of the demand. Many studies have used permanent income as a measure, a concept introduced and developed by Milton Friedman starting in 1957 (Lee & Trost, 1978).

Lung Fei Lee and Robert P. Trost (1978) estimated the permanent income variable by calculating a five-year average of household income (including rental income) divided by the price index. Household income also included that of the spouse, commercial income, rental income, interest income, and dividends. By calculating permanent income over four years, Tong Hun Lee and Chang Min Kong demonstrated that housing demand is more sensitive to changes in permanent income than to changes in annual income and that it is inelastic with respect to changes in permanent income and housing prices (Lee & Hang, 1977, p305). Denis Thuillier proposed two income indicators for estimating the demand: household consumption expenditures and permanent income, represented by an auxiliary variable obtained through a multiple regression of selected and deemed determinative variables (Thuillier, 1994, p72) .

Measures of permanent income were proposed by James Follain, Gill-chin Lim, and Bertrand Renaud (Follain, Lim, & Renaud, 1980). One is represented by total household consumption expenditures, which can be substituted for their disposable income (since theoretically consumption is

proportional to permanent income). The other uses aggregated household data (assuming that non-permanent components of income cancel out when aggregation is based on factors unrelated to transitory or non-permanent income).

2.3 The Demographic Factor

The influence of demographic factors on housing demand has also attracted authors. Many studies have analyzed the impact of demographic variables on housing demand by incorporating various socio-demographic variables related to the household or the household head (age, gender, race, or marital status of the household head). Unlike some analyses that suggest the introduction of demographic variables into demand equations has little effect, many others have found a significant impact on calculated elasticities (Mayo, 198, p109).

In addition to the income and price variables, James Follain, Gill-chin Lim, and Bertrand Renaud (Follain, Lim, & Renaud, 1980) included the household size variable in the housing demand estimation equation. It was selected among other socio-demographic variables such as the age of household members, the number and age of children in the household, the number of sub-families in the household, the gender, and the occupation of the household head.

In their estimation model applied to housing expenditures, Lung Fei Lee and Robert P. Trost (Lee & Trost, 1978). included variables that characterize the household head, namely age, gender, and race. They also considered variables related to household size, permanent income, and mobility. Additionally, they incorporated regional variables represented by city size and distance to its center, as well as a relative housing price index.

Few studies have been carried on countries in process of development where information systems in this field are less developed, making it difficult to accurately capture certain variables. Variables such as income, price, and demographics remain the primary elements of housing demand. Demographic characteristics, including those of the household head, the household itself, or the housing unit, have also demonstrated their influence on this demand.

3. Survey Methodology

In this research, we conducted a field survey on a sample of 700 households. Urban households are well represented, accounting for 57.4% of the total sample. The structure of the housing stock covered by the survey in terms of construction type corresponds to that of the province, consisting of 75% single-family homes, 17% flats, and 8% traditional houses. The surveyed household sample is predominantly composed of homeowners, including co-owners and property buyers (60.3%), with a quarter being tenants (25.9%), and those living rent-free accounting for 13.9%.

For the distribution of the sample by dispersion, gender, and type of construction, the rates are identical to those observed at the provincial level. The household sample is characterized by a significant number of those with financial resources less than six times the minimum wage, household heads in the age group of 30 to 39 years, and those with a marital status.

Table 1. Characteristics of the parent population and the survey sample

Characteristics	Size of the mother population	Structure of the mother population	Size of the maintained sample	Structure of the maintained sample
Number of municipalities				
Urban	13	25%	4	25%
rurals	39	75%	12	75%
Number of households				
Urban	85 740	55%	402	57,4%
Rurals	70 518	45%	298	42,6%
Gender of the household head:				
Man	113 936	88%	616	88%
Woman	14 980	12%	84	12%
Type de construction:				
Individual house	105 129	75 %	525	75 %
flat in a building	23 567	17%	119	17%
Traditionnal house	11 260	8 %	56	8 %

Source: carried out by us.

4. Presentation and interpretation of the survey results

To examine the effect of some explanatory variables on the likelihood of being a housing applicant (or an owner) and to determine which

characteristics differentiate the applicants (or owners) from the non-applicants (or non-owners), a binary logistic regression model was used. The choice of this model is justified by the qualitative nature of the data and the binary nature of the dependent variable, which takes the value 1 if the household is an applicant (or owner) and 0 otherwise.

Variables related to household and household head characteristics were used to explain housing demand [(Lee and Trost, 1978) (Follain et al., 1980) (Rodriguez Hernandez and Barrios Garcia, 2008) (Oktay et al., 2014)] and household access to ownership [(Kain and Quigley, 1972) (Carliner, 1974) (Struyk, 1974) (Li M., 1977) (Arnold and Boussard, 2017)].

4.1 Determinants of housing demand

Before beginning our analysis, it is essential to identify among the surveyed households those who have applied for housing. In addition to the demand from those who wish to access homeownership, the demand in the market also includes households who are already housed (homeowners) and wish to improve their living conditions (CDC, 2003, p11) by seeking another place to live. The steps taken to search for housing reflect this desire for change (Antille, Lula, & Schönenberger, 2005, p22). We will refer to those who are not homeowners and have declared themselves as tenants or living rent-free and are looking to become homeowners as "non-owner status applicants." We will call those who have declared themselves as homeowners, co-owners, or property buyers looking for another place to live as "owner applicants."

The binary logistic regression model for housing demand includes:

- Variables related to household characteristics: Number of people in the dwelling, number of cohabiting households in the same place, and the number of dependent children.
- Variables related to the head of the household: their age, level of education, and socio-occupational category.
- Economic variable: Household income.
- Location-related variable: Residential area.

The factors selected by the model that best explain housing demand are: the number of cohabiting households in the same dwelling, the age of the head

of the household, their level of education, and dispersion. The results of the estimated regression model are presented in the table below.

Table 2. Estimation of the binary logistic regression model for housing demand

Variables	B	E.S	Wald	ddl	Sig	Exp(B)	I C for Exp (B) 95%	
							inferior	superior
Cohabiting households			12,016	2	0,002			
One household (ref)	0,724	0,259	7,788	1	0,005	2,062	1,240	3,428
2 à 3 households	2,645	1,200	4,858	1	0,028	14,085	1,340	148,015
4à 5 households								
Age			34,283	5	0,000			
Inferior to 30 years old,(ref)	0,374	0,469	0,636	1	0,425	1,454	0,580	3,647
30 à 39 years old	0,225	0,466	0,300	1	0,584	1,290	0,518	3,215
40 à 49 years old	- 0,467	0,485	0,928	1	0,335	0,627	0,242	1,621
50 à 59 years old	-1,260	0,551	5,239	1	0,022	0,284	0,096	0,834
60 à 69 years old	-1,943	0,712	7,454	1	0,006	0,143	0,036	0,578
70 years old and over								
Education			13,009	6	0,043			
Without education (ref)	0,526	0,531	0,981	1	0,322	1,693	0,597	4,796
Literate	-0,626	0,461	1,850	1	0,174	0,535	0,217	1,318
Primary education	-0,033	0,435	0,006	1	0,940	0,968	0,413	2,268
intermediate education	-0,334	0,449	0,554	1	0,457	0,716	0,297	1,725
secondary education	-0,683	0,455	2,256	1	0,133	0,505	0,207	1,232
Vocational training	-0,567	0,442	1,649	1	0,199	0,567	0 ,239	1,348
Higher Education								
Dispersion								
Urban (ref)								
Rural	-0,706	0,178	15,828	1	0,000	0,493	0,348	0,699
Constant	0,166	0,588	0,080	1	0,777	1,181		

Source: Results obtained using SPSS software version 21.0.

There is a positive correlation between the number of cohabiting households in the dwelling and the housing demand. Those living in homes occupied by 2 to 3 households are twice as likely to be applicants. The chances are even higher when there are 4 to 5 households cohabiting, with a 14-fold increase in chances.

The probability of being a housing applicant varies according to age category. Household heads between 30 and 49 years old are one time more likely to be applicants, given that most tenants and those living rent-free belong to this category.

Beyond this age range, household heads have progressively fewer chances of being applicants. Those aged 50 and over are less likely to apply for housing, with half the chance for those in their fifties, one-third for those between 60 and 69 years old, and one-seventh for those aged 70 and above. Older household heads are much less likely to be applicants because they are often homeowners. The probability of having a house and realizing their housing plans increases as they age.

Literate household heads have twice the likelihood of being housing applicants. Household heads with a university degree, whose chances of being housing applicants did not differ significantly from those with vocational training or with secondary, intermediate, or primary education, all have lower chances of being applicants compared to those with no education. Housing demand is stronger for households living in urban areas than for those residing in rural areas (with half the chance). Therefore, housing demand is clearly primarily associated with factors such as cohabitation, the age of the applicant household head, and the residential area. A second estimation allows us to identify the determinants of demand specific to households that are already homeowners. In addition to the explanatory variables used previously, another variable related to the origin of homeownership is included. The link between housing demand and cohabitation is confirmed. Homeowners whose dwelling is occupied by two or three households are twice as likely to seek another housing solution than those living alone. Co-owning households are the most affected by cohabitation and the desire to preserve their privacy. The category related to

cohabitation with four or five households is not statistically significant and is not interpretable. Homeowners who acquired their property through purchase or construction are half as likely to request housing as those whose housing was inherited or gifted.

4.2 Factors Influencing Access to Housing In this section, we focused on the sample of homeowners who purchased or constructed their housing and declared themselves as having become homeowners during the period 2007-2017. The aim is to determine the influence of certain household and household head characteristics on access to housing by applying binary logistic regression analysis. We selected the following variables: the age of the household head, their level of education, their socio-occupational category, household income, and dispersion. We first examine the overall sample of this category of homeowners and then focus specifically on the sub-sample of young household heads.

Table 3 Determinants of access for recent homeowners

Variables	B	E.S	Wald	ddl	sig	Exp(B)	I C for Exp (B) 95%	
							inferior	superior
Socioeconomic characteristics			19,697	9	0,02			
Employor, Boss (ref)								
Farmer-Breeder	-0,667	1,067	0,391	1	0,532	0,513	0,063	4,155
Senior executive	0,213	0,745	0,081	1	0,775	1,237	0,287	5,328
Self-employment profession	-0,663	0,707	0,878	1	0,349	0,515	0,129	2,062
Middle manager		0,656	0,287	1	0,592	1,421	0,393	5,135
Laborer	0,351	0,655	2,713	1	0,100	0,340	0,094	1,227
Employee	-1,078	0,616	0,472	1	0,492	0,655	0,196	2,190
Retiree and pensioner	-0,423	0,678	0,473	1	0,492	1,595	0,422	6,028
No professional activity	0,467	1,23	1,453	1	0,228	0,226	0,020	2,540
Others	-1,489							
	-21,564	28420,722	0,000	1	0,999	0,000	0,000	
Dispersion								
Urban (ref)								
Rural	1,414	0,245	33,209	1	0,000	4,113	2,542	
Constant	-1,053	0,612	2,961	1	0,085	0,349		

Source: Results obtained using SPSS software version 21.0.

Senior executives, middle managers, retirees, and pensioners are all one time more likely to become homeowners through purchase or construction than those who are employers.

Household heads who are farmers, laborers, employees, or have no professional activity all have lower chances of accessing homeownership. The probability of not purchasing or constructing a home is higher for the latter category (four times less likely). Executives, who typically have relatively high and stable financial resources often required to obtain a bank loan, thus increase their probabilities of accessing homeownership.

Households residing in rural municipalities are four times more likely to buy or build a house than those in urban municipalities, primarily due to easier access to land (often through inheritance) and lower land prices. Additionally, there is typically more available space for housing construction in rural areas. The "other" category is not statistically significant.

In order to determine the factors that promote homeownership among young household heads, we also applied binary regression analysis to the subset of those aged under 40 from our survey. The explanatory variables introduced are still the same, including the level of education, the household head's profession, household income, and residential area.

Table 4 Determinants of access for recent homeowners aged under 40 years

Variables	B	E.S	Wald	ddl	sig	Exp(B)	I C for Exp (B) 95 %	
							inferior	superior
Dispersion								
Urban (ref)								
Rural	1,033	0,367	7,916	1	0,005	2,811	1,368	5,774
Constant	-1,386	0,246	27,647	1	0,000	0,250		

Source: Results obtained using SPSS software version 21.0.

Dispersion appears to be the only factor determining housing access for household heads under the age of 40. Young household heads living in rural areas have a higher probability (three times more likely) of buying or

building a house than those from urban areas. This result may reflect the challenges faced by young household heads living in urban municipalities where real estate prices are relatively high. Each of the two models has a significant constant, which indicates a lack of adequate supply to meet the expressed demand, thereby impeding access to housing.

5. CONCLUSION

The results of the estimation through a binary regression model of housing demand in Algeria show that the age of the household head, their level of education, the residential area, and cohabitation play a significant role in determining housing demand. Relatively young household heads (aged 30-39), those with lower levels of education, households residing in urban municipalities, as well as those cohabiting, are more likely to be housing applicants. The origin of homeownership can explain the demand of households that are already homeowners. Homeowners who acquired their property through purchase or construction are less likely to request another housing solution than those whose housing was inherited or gifted.

Access to homeownership significantly differs depending on the residential area. Indeed, household heads living in urban or rural areas do not have the same opportunities to become homeowners. The probability of buying or building a house is higher for households residing in rural municipalities. Similarly, for young households, dispersion is the most discriminating variable when it comes to housing access, where rural household heads in this age category have fewer difficulties finding housing. This situation likely results from geographic disparities in real estate prices, primarily reflecting the cost of land. Furthermore, being in a managerial position (middle or senior) or being retired or a pensioner increases the probability of accessing homeownership.

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