

Insight of the Quality of Housing of Pakistani Households: Using New Methodology and the Countrywide Unit Record Data

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Abstract

This paper explores a new methodology for defining housing quality through constructing the comprehensive index by using the four dimensions. These dimensions include not only the internal as well as external conditions of the houses, but also incorporate the public provisions of the housing facilities available to the community as well as users' perceptions about these facilities. Thus, the dependent variable of quality of housing index (QHI) comprises of four dimensions. The study uses country-wide unit record data (PSLM-VI: 2010-11) collected at household level. This study concluded that age, income, education of the head as well as family's education have significant impact on the quality of housing. Specifically, family's education contributes to the quality of housing at household level. Moreover, the households enjoy higher quality of housing living in pucca houses, in own-houses or in urban areas. Conversely, the poor are badly-stricken for the housing quality.

Keywords: Quality of Housing, Regression Analysis, Well-Being, Quality of Life, Housing Quality

JEL Classification: I31, R21, P36

1. Introduction

Living conditions are very important in the sense that they provide peaceful environment to inhabitants. Living conditions are primarily based on the income level of the household. Higher income usually leads to higher quality of housing. But there are still other external factors which are responsible for making the housing conditions good. It is a fact that housing provides shelter to the inhabitants, access to health and educational services as well as employment opportunities which may lead to higher productivity and income for families.

Since the quality of housing not only depends upon the internal features of the housing units, but also upon the surrounding environment of the community, therefore it necessitates the consideration of both aspects. Broadly speaking, both

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the internal as well external factors determine the quality of housing. Internal factors consist of various physical housing facilities available within the house, whereas external factors are the facilities available to the households in their surrounding provided by the government. Hence this study will incorporate all these facilities in order to construct the quality of housing index (QHI). As far as the determinants of QHI are concerned, there are both demographic and economic variables which may affect the quality of housing. Therefore this paper considers broader set of explanatory variables which may affect the QHI.² So the theme of this paper is to construct the comprehensive housing quality index along with its determinants by using the country-wide micro-level data collected by Pakistan Bureau of Statistics (PBS), Islamabad under Pakistan Social and Living Standard Measurement Survey (PSLM VI): 2010-11.

Before the advent of micro level data, the researchers were quite unable to explore the in-depth analysis of any economic problem based on the specific circumstances of the households, therefore in the earlier studies, the behaviour of each household/economic unit was assumed to be the same which was very unrealistic assumption. Resultantly, the conclusion was affected by the aggregate level data which ultimately transmitted wrong signals to policy makers. Hence there was a dire need to have the micro level data so that the research findings should incorporate the impact of individual data units. Therefore, there has been shift, in the recent past, in the research activities from aggregate level data to the micro level data. Now many successful studies have used the unit record data which clearly indicated the impact of individuals' variation in the micro level data on the main research findings. In this way, the policy makers may have different options to be adopted which is more consistent to the specific situation.

The current research effort is also made in this context. That is, there is wider different in the socio-economic housing conditions faced by the households. These housing conditions are internal as well as external. Internal conditions include the housing physical conditions as well as facilities available within the households. While the external facilities are the governmental level facilities provided to the community level in the area. Again, this is the due to the availability of micro/individual level data which give such detailed information about each household. So, this detailed micro level information available at the micro level for each household is used in our analysis which could only be possible with the availability of detailed micro level data.

² For details of variables, see section 3.

The arrangement of the paper is as follows: Review of earlier studies appears after this section. Then proposed model and suitable estimation technique applied on the model is described. Section four deals with the results and discussion and last section conclude the study.

2. Review of Literature

There are various studies measuring the quality of housing in terms of various housing indicators: they include number of persons per housing unit, number of rooms per housing units, room density, age of the House, quality of the housing; access to water, electricity, piped gas, bath room, toilet and telephone facilities etc. number of housing units in the building, number of storeys of the building, Building age. [see Boelhouwer (2002), Bratt (2002), Das (2007), Ferriss (2000), Gabriel et al. (2003), Giannias (1998), Hemmasi and Prorok (2002), Westaway (2006), Mendes and Motizuki (2001), Royuela et al. (2003), Richards et al. (2007)].

Babalola et al (2013) applied Hedonic pricing model, which captures multi-dimensional characteristics of the houses in university premises. They concluded that housing rental value is inversely related with the age of the house and the number of houses built in the university locality.

Goodman (1978) estimated the housing quality of the low-income households living in the rental houses in Pennsylvania, USA. He proposed a quality of the housing model in which the explanatory variables are households' income, family size, education level, race, financial burden, crowding. He used Multiple Indicators and Multiple causes model (MIMIC) proposed by Joreskog and Goldberger (1975). The researchers concluded that quality of housing is based positively on income, education and the race.

Kain and Quigley (1970) explored the determinants of the quality of the housing by selecting residential quality, average structure quality, age of the housing unit, number of rooms and bathrooms, education of the head, surroundings of the house (location), and distance of the house from the central business area. The value of the housing units is taken as a dependent variable, while all the above-mentioned variables are explanatory variables. The study concluded that housing value is positively related with number of rooms and bathrooms, average structure quality, education of the head and location of the housing unit. On the other hand, age of the housing unit and the distance of the house from the central business centres are inversely related with the value of the housing unit.

Littlewood and Munro (1997) examined the relationship between income and poor housing conditions by using the dataset of Scottish House Condition Survey: 1991. They considered the role of housing outcome measures in relation to the different concepts of poverty, deprivation and social exclusion. They examined the relationship between income, socio-economic household characteristics and housing deprivation and concluded that income alone does not provide an adequate proxy for the quality of housing outcomes and that multiple housing measures are more satisfactory than the use of any single indicator. They concluded that overall, the low income has resulted into poor housing conditions of the households. Whereas, a very few non-poor households have also housing deprivation.

Park (2009) assessed the quality of life of South Korea as households by using the Asia Barometer Survey (ABS); 2006. The researcher divided the respondents into 3 categories: low, medium and high based on their income level. Education has more effective impact on the modern lifestyle of the Korean households. The study concluded that socio economic progress has failed to make every Korean experience a good quality of life because only a few Korean are enjoying the highest quality of life. The majority of the respondents believe that marriage as a most satisfying factor in their quality of life.

Rietz (1977) estimated the five versions of the demand for housing by using the census data of 1970 for Stockholm, Sweden. Explanatory variables are income of the household age, average age of the family, female ratio and marriage ratio of the household, marital status. The study found the consistent results in all the five equations. That are, demand for housing increases with the income and decreases with the age of the head as well as average age of the household. Results show that the elasticity of housing expenditure per household with respect to permanent income of less than one. The estimated income elasticity of demand for rooms per household is 0.4. Demand for rooms per capita also appears to be responsive to changes in the average age of the population. Demand for rooms per household is found to be more sensitive to household size.

Rodgers and converse (1975) investigated the American adults for the perception about quality of life through structured questionnaire based on responses of their satisfaction level ranging from complete dissatisfaction to complete satisfaction. Using the factor analysis research concluded that marriage; family life, health and education are the major factors of their perceived highest satisfaction for their quality of life. It means that the majority of the respondents assigned highest value to above factors/variable for their quality of life.

Rosen (1974) brought out a theoretical application of the hedonic price model to the residential housing market. Several authors have adopted this technique to construct house price indices and to determine the factors responsible for property prices (see for example, Butter, 1982; Margo, 1996; Meese and Wallace, 1997).

Ruivo (2010) and Marco (2006) studied the determinants of rental value of the house were studied by They investigated the rental value of the houses and found that cities with higher incomes, higher employment opportunities and small number of rental housing units are associated with higher rental rates.

Saddozai et al. (2013) examined the descriptive analysis of Determinants of Quality of Housing by dividing the quality of housing into three outcomes (, Pucca, Semi-Pucca and Ketcha) in Pakistan. This analysis is also performed for each Province and for each region (Rural and Urban). The study concluded that maximum households are living in the pucca houses in urban areas of Sindh and Punjab provinces, whereas majority of the household have Ketcha houses in Baluchistan and Khyber Pakhtoonkhwa provinces. The main findings are that the age and grand income of household has positive impact on the quality of houses. The dependency ratio is inversely related with the quality of the housing.

Sumka (1977) measured the quality of the housing unit from the self-weighting sample of rental housing units selected from non-metropolitan cities in North Carolina characteristics as well as neighbourhood characteristics were considered for the quality of the housing units. The study found the inverse relationship between the value of the quality of housing index and deficiencies in the various housing facilities like plumbing, heating and other infrastructure. The researcher further concluded that the quality of housing index increases proportionately with the availability of the physical housing facilities in the house.

Zietz et al. (2007) investigated the relationship of particular housing characteristics with the selling price. The study found that characteristics do not have the same price across a given distribution of house prices. The study, therefore, utilized quartile regression analysis to examine the issue and found that purchasers of high-priced homes value certain housing characteristics such as the number of bedrooms differently from buyers of low-priced homes. That other variables such as age also played significant role in evaluating house prices.

Most of the studies showed that poverty leads to the poor housing quality. As the poor have less economic resources to finance their family, so they may have lesser housing facilities. As a result, the poor not only have the inadequate housing facilities but the quality of the housing facilities are also very low. Hence

the relationship between poverty and the low quality of the housing is linked by most of the researchers. [See, for example, Rowntree, 1901; Townsend, 1979; Mack and Lansley, 1985; Black et al. 1988; Hopton and Hunt, 1996; Bradshaw, 1993].

Earlier studies showed that quality of life and housing is much explored under the domain of sociology, anthropology, psychology and other disciplines of social sciences but it is less explained in the context of economics. Therefore we are interested to explore the economic aspect of the quality of the housing. It will be done by indicating certain variables/factors affecting the quality of the housing of the households. That is why; the main focus of this paper is to explore the determinants of the quality of the housing.

3. Model

Our dependent variable is quality of housing index (QHI) which is detailed and comprehensive in the sense that it covers the four important diversified aspects of housing. These four aspects are explained as follow:

One, it includes the detailed housing characteristics possessed by the households at their premises. Since the different housing facilities have different quality available to the households, all these housing facilities are given different weights according to their quality. Of course, the highest quality is assigned highest numerical value and vice versa. By adding all these weights at each household level, we got certain numerical values for housing facilities as a variable "WEIGHT1". Two, distance of the facilities from the house is included in constructing the quality of the housing index (QHI). Obviously, some facilities are very near to the house, whereas some are distant from the house. So these distances are given weights accordingly. That is, nearest and farther values are assigned largest and lowest values, respectively. By adding these weighted values at the household level, we again get certain aggregated numerical value under a variable "WEIGHT2". Three, the frequencies of use of these facilities are also included in the Index, which shows the number of time as specific facility is utilized by the household. Most frequently used facilities are assigned highest numerical weights and least used facilities are assigned minimum numerical weights. Likewise, all these weights are added together to get a variable "WEIGHT3". Four, perception of the households about the quality of available facilities and services are also the part of this Index. These perceptions are given weights accordingly and then are also added up to form the variable "WEIGHT4".

Now all the above constructed variables (WEIGHT1 through WEIGHT4) are added up to have the quality of housing index (QHI).³ Since QHI covers all the individual as well as community characteristics, it is right to say that QHI is detailed and comprehensive in explaining the various dimensions of quality of housing.

Our explanatory variables are age, of the household head, education, and income of the household head. We have also the qualitative variables such as employment status of the head, industry of the head where he/she is employed, location, wellbeing, status of the house, occupancy status of the household. It is important to note that each qualitative variable is shown through dummy variable. Each dummy variable has a base category having the value of zero. The Table 1 shows the base category of each qualitative variable, whose value is taken as zero.

Table 1: Dummy Variables Showing their Base Categories

Variable	Base category
Industrial classification	Agriculture
Employment status	Paid employee
Poverty	Poor
Status of the house	Ketcha house
Occupancy status	Owner occupied
Location	Rural

For each qualitative variable, value of coefficient of their categories shows the comparison with its base category. After incorporating the categories of the all dummy variables in the model, we have the following form of the model for estimation. The error term possesses the conventional assumptions. Since our dependent variable is quantitative, the most appropriate available estimation technique is ordinary least squares (OLS) to estimate the coefficients of the explanatory variables.

³ WEIGHT1 through WEIGHT4 are not the separate explanatory variables, but these show the relative weights of different dimension based on their importance and significance in housing at household level. Then quality of housing index (QHI) is constructed by adding all these weights.

$$\begin{aligned}
QHI = & \alpha + \beta_1 (\text{age}) + \beta_2 (\text{income}) + \beta_3 (\text{education of head}) + \\
& \beta_4 (\text{no. of persons having the education of matric and above}) + \\
& \beta_5 (\text{POVERTY}) + \beta_6 (\text{location}) + \beta_7 (\text{EMPL}) + \beta_8 (\text{SE}) + \beta_9 (\text{OT}) + \\
& \beta_{10} (\text{WS_RT}) + \beta_{11} (\text{MAN}) + \beta_{12} (\text{TRP}) + \beta_{13} (\text{CON}) + \beta_{14} (\text{CSPS}) + \\
& \beta_{15} (\text{OTH}) + \beta_{16} (\text{UNDE}) + \beta_{17} (\text{pucca}) + \beta_{18} (\text{SEMI_PUCCA}) + \beta_{19} (\text{rent}) + \\
& \beta_{20} (\text{sub_rent}) + \beta_{21} (\text{rent} - \text{free}) + \text{error}
\end{aligned}$$

Each estimated coefficient will show the effect of relevant explanatory variable on the dependent variable. As the data are cross sectional, the hetroskedasticity problem is most likely to prevail. Robust least square estimation technique is used to take care of the hetroskedasticity⁴.

4. Results and Discussions

Using the robust least square estimation, we have found the regression results given in Table 2. Referring the Table 2, we found that the coefficient of age implies that with a one-year increase in the age, quality of housing increases by 0.03 units. The effect of the education of the head is also positive and significant. The result shows that quality of housing increase by 19%, if there is 100% increase in the education level of the head. We also show the effect of family education on the quality of housing.⁵ The results show the effect of family education is higher (0.6149) than the head's education (0.1942). That is, with the addition of one member having matric or higher education in family, the quality of housing increases by 0.61 units. The income of the family is positively affecting the quality of housing of the households. When we compare the effect of various categories of the employment status with "paid employee", we found that quality of housing between 'employer', 'other' and 'paid employee' is almost the same. The quality of housing increases by 1.46 times, when the employment status of the head changes from 'paid employee' to 'self-employment'. Now we look in the performance of industrial classification. The results imply that whenever the industry switches from 'agriculture' to any other specific category, the quality of housing increases. It clearly shows that the households whose heads are engaged in agriculture have the minimum quality of housing than the rest of households. The quality of housing is highest in those households whose heads are involved in 'community, social and personal services'. When head of the

⁴ Fortunately EViews 8 (ver.8.0) provides built-in above said technique, thus we used the EViews (ver.8.0) for applying the Robust least square estimation technique.

⁵ Family education is shown by the number of persons in the family with matric or higher education.

household's industry changes from 'agriculture' to 'community social and personal services', the quality of housing improves by 3.4 times. Similarly, 'manufacturing', 'wholesale and retail trade', 'construction', 'other' industries and 'transport' sector also contribute positively towards the households' quality of housing. The quality of housing declines by 0.313 units, on average, in poor households as compare with the non-poor. It implies that quality of housing in poor households are smaller (by 0.313 units) from the non-poor households. The urban households have the better quality of housing (by 4 times) than the rural household. Now we discuss the impact the status of housing on its quality.

Table 2: Regression Results of Quality of Housing of Pakistani Households

Variable	Coefficient	Probability
Constant	58.83918	0
AGE	0.030902	0
Construction	1.922906	0
Community, social and personal services	3.446488	0
Manufacturing	3.245335	0
Others Industries	2.846156	0
Transport	3.261558	0
Undefined economic activities	4.247674	0.4268
Wholesale and retail trade	2.529641	0
Self-employed	1.468773	0
Other-E-status	-0.70868	0.8945
Employer	-0.26035	0.673
Members with at least matric education	0.61491	0
Poverty	-0.31358	0.04
Rental	-0.96113	0
Rent free	-4.58395	0
Subsidized rent	-1.47425	0.0009
Yearly Income of household	0.00714	0
Year of education of head	0.194174	0
Urban	3.937343	0
Pucca house	7.356316	0
Semi-pucca house	6.290037	0

Source: calculated through using PSLM-VI data, by the researcher

The results given in Table 2 shows those households, living in semi-pucca houses, have 6 times better quality of housing than those households living in ketcha houses. Similarly, the pucca houses residents are better-off even more (7times), when compared with ketcha house residents. The results further show

that when the occupancy status changes from 'owner-occupied' to 'rental' housing, the quality of housing declines by 0.96 units. The households living in rent-free houses are worse off; that is, their quality of the housing is 4.5 times lesser than the 'owner-occupiers'. 'Subsidized rental' households are worse off than 'owner occupiers'.

5. Conclusions

The results of the study conclude that age, income, education of the head as well as family's education have positive and significant impact on the quality of housing. Out of these variables, family education contributes at the most on quality of the housing, since its coefficient value is highest (0.6149). The households living in pucca houses or own-houses or in urban area are much better-off. The households whose heads are engaged in the services sector are enjoying higher quality of housing than the others. The quality of housing between those households whose head are linked with undefined economic activities or agriculture sector is almost the same.

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