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What Attributes Determine Housing Affordability?

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***Abstract*—**The concept of housing affordability is a contested issue, but a pressing and widespread problem for many countries. Simple ratio measures based on housing expenditure and income are habitually used to defined and assess housing affordability. However, conceptualising and measuring affordability in this manner focuses only on financial attributes and fails to deal with wider issues such as housing quality, location and access to services and facilities.

The research is based on the notion that the housing affordability problem encompasses more than the financial costs of housing and a households ability to meet such costs and must address larger issues such as social and environmental sustainability and the welfare of households. Therefore, the need arises for a broad and more encompassing set of attributes by which housing affordability can be assessed. This paper presents a system of criteria by which the affordability of different housing locations could be assessed in a comprehensive and sustainable manner. Moreover, the paper explores the way in which such criteria could be measured.

***Keywords*—**Affordable housing, attributes, housing affordability, sustainable communities

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I. Introduction

HOUSING affordability is a prevalent problem for many countries across the globe. Declining affordability has significant implications that go beyond the immediate effect experienced by households, such as economic performance and labour market efficiency, social cohesion and polarisation of cities, along with environmental considerations [1]. Tackling the concern is therefore imperative in order for international governments to address wider issues and goals, such as sustainability.

A significant amount of the research on housing affordability has been based on housing costs and household income. However, OECD countries are increasingly recognising the need for a broad and more encompassing understanding of housing affordability, rather than simple ratio measures based on housing expenditure and income which cannot deal with issues such as housing adequacy, location quality and access to services [2]. Bogdon and Can [3] previously criticised the pre existing affordability literature for focusing on house prices rather than the condition, location and neighbourhood characteristics of the housing. Nevertheless, affordability is still commonly assed by focusing primarily on financial burdens, with little or no regard for housing quality, location and neighbourhood characteristics.

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There are a number of recent studies on housing affordability that seek to go beyond the traditional notions of financial impacts on households. Research carried out in the U.S. posits that housing affordability should consider the welfare of residents, which is affected by a wide range of location-related attributes, such as transportation costs, proximity to employment opportunities and public safety [4]. Location is also highlighted as a significant factor related to housing affordability by other U.S. researchers. It is recommended that the interaction between housing and location provides a more meaningful measure of affordability; housing may be considered affordable by a ratio measure, but location costs are often underestimated or ignored [5]. The study seeks to assess affordability by considering, not only the cost of housing, but also its location efficiency by measuring the transportation costs associated with place [5]. Furthermore, recent Australian research in housing affordability endeavours to link the concept with environmental sustainability, arguing that true housing affordability must take into account, not simply housing expenditure, but also a wider range of costs that households face, e.g. energy and transport related costs [6].

The aforementioned literature highlights the complex nature of housing affordability and the wide range of attributes that may influence households. The presented research is based on the notion that the housing affordability problem encompasses more than the financial costs of housing and household ability to meet such costs and must address larger issues such as social and environmental sustainability and the welfare of households. Therefore, the need arises for a broad and more encompassing set of criteria by which housing affordability can be assessed. The research seeks to determine such attributes which influence housing affordability. This paper presents a system of criteria, which has been validated by UK professionals, by which the affordability of different housing locations could be assessed in a comprehensive and sustainable manner. Furthermore, the paper explores the way in which such housing affordability criteria could be assessed and measured.

II. Data Collection and Analysis

A two stage approach was adopted in order to develop the criteria system for housing affordability; stage one involved the initial identification of a criteria system and stage two concerned the validation of the criteria and the determination of their level of importance/significance. Initially, a system of criteria influencing housing affordability was identified via an extensive literature review and semi-structured interviews with seven local authorities in Merseyside and Cheshire, UK (see Table II in appendix).

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Subsequently, the second stage validated the criteria system via questionnaire surveys conducted with professionals. A pilot questionnaire was first conducted with 65 housing and planning experts from North West England [7]. The pilot questionnaire allowed criteria to be initially validated, or even excluded, from the proposed housing affordability criteria system. Furthermore, the process allowed respondents to suggest additional criteria that they believed ought to be included. Following stage one and the pilot questionnaire, a total of 20 criteria were identified for the housing affordability criteria system (see Table I). Questionnaire surveys were distributed to experts in order to elicit data on the importance/significance of the 20 housing affordability criteria. The primary questionnaire survey was conducted with 337 (response rate 56.2%) housing and planning experts from across the UK. These experts, basing their answers on their knowledge, experience and perception, ranked the housing affordability criteria on a scale of importance ranging from 1 to 10, where a ranking of 1 meant "not important at all" and a ranking of 10 meant "most important". This data allowed a weighting to be computed for each criterion, in order to reflect the significance of the criteria to housing affordability. Weights were determined by dividing the mean score by the sum of mean scores and multiplying by 100 (as such, this ensures the total of all weights is 100%). The mean scores of importance obtained and the subsequent weights of the criteria are displayed in Table I. Figure 1 illustrates the mean scores of importance/significance and standard deviation for each housing affordability criterion.

TABLE I
HOUSING AFFORDABILITY CRITERIA SYSTEM

Housing affordability criteria		Mean	Variance	SD	Weight
1	House prices in relation to income	8.7	2.4	1.5	6.31
2	Rental costs in relation to income	8.7	2.1	1.4	6.31
3	Interest rates and mortgage availability	8.0	2.6	1.6	5.81
4	Availability of rented accommodation (private and social)	8.0	2.5	1.6	5.81
5	Availability of low cost home ownership products	7.1	3.6	1.9	5.15
6	Availability of market value home ownership products	6.5	3.7	1.9	4.72
7	Safety (low crime rate)	6.1	4.5	2.1	4.43
8	Access to employment	7.4	3.2	1.8	5.37
9	Access to public transport services	6.8	3.6	1.9	4.93
1	Access to good quality education/schools	6.9	3.6	1.9	5.01
11	Access to shopping facilities	6.3	3.6	1.9	4.57
12	Access to health services	6.6	3.7	1.9	4.79
13	Access to early years child care	6.4	3.5	1.9	4.64
14	Access to leisure facilities	5.5	4.1	2.0	3.99
15	Access to open green public space	6.0	4.1	2.0	4.35
16	Presence of environmental problems (e.g. litter, traffic)	6.1	4.1	2.0	4.43
17	Quality of housing	7.6	3.4	1.9	5.52
18	Energy efficiency of housing	7.2	4.0	2.0	5.23
19	Waste management	5.8	5.2	2.3	4.21
20	Deprivation in area	6.1	4.5	2.1	4.43

**SD (Standard deviation)*

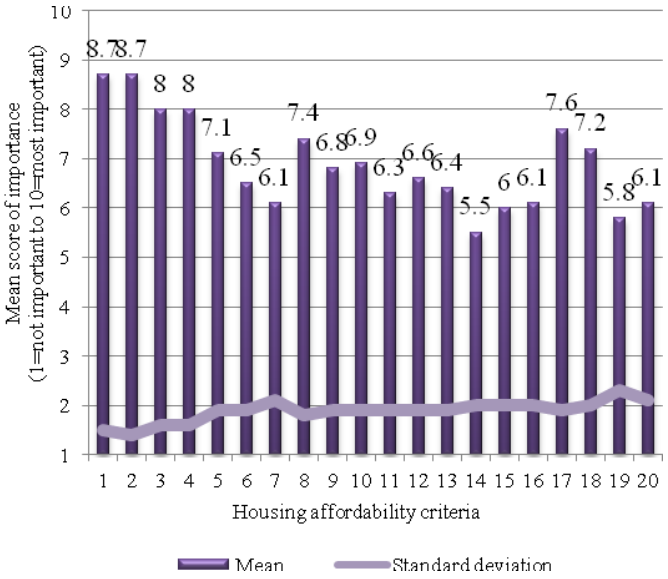


Fig. 1 Importance of housing affordability criteria (see Table I for criteria descriptions)

III. CRITERIA MEASUREMENT OPTIONS

The next stage in the research is to determine the way in which the presented criteria (Table I) could be measured in order to assess the affordability of different housing locations. This section of the paper explores measurement options for each criterion. The measurement of the criteria is discussed from the perspective of assessing the affordability of different areas, at electoral ward level.

Criterion 1 (house prices in relation to income) - This criterion will be assessed by equating average house price to income ratios. A ratio is calculated by dividing house price by household income. For this criterion a higher score is worse for housing affordability.

Criterion 2 (rental costs in relation to income) - Assessed by calculating the average percentage (%) of income spent on rent. This would be equated for 1, 2, 3 and 4 bedroom properties and then an average value concluded. For this criterion a higher score is worse for housing affordability.

Criterion 3 (interest rates and mortgage availability) - Interest rates would be assessed using the UK (Bank of England) Bank Rate (%) and mortgage availability could be assessed by the average TLV (loan to value) rate (%) on mortgages.

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Criterion 4 (availability of private and social rented accommodation) - This factor will be assessed in two parts: Part A) 'Availability of private rented housing' will be assessed by determining the quantity of properties available on the market (within the area to be assessed) using Rightmove.co.uk; and Part B) 'Availability of social rented housing' will also be assessed by determining the quantity of properties available on the market (e.g. using Propertypool.org.uk).

Criterion 5 (availability of low cost home ownership products) - Availability of low cost home ownership products will be assessed by determining the quantity of properties available on the market (within the area to be assessed) using the Homeshub.co.uk.

Criterion 6 (availability of market value home ownership properties) - Availability of market value home ownership properties will be assessed by determining the quantity of properties available on the market (within the area to be assessed) using Rightmove.co.uk.

Criterion 7 (safety/crime) - This attribute will be assessed using police crime statistics which scale crime from low to high for England and Wales. The level of crime in an area is compared with the rest of England and Wales to determine a crime rate. The 'crime rate' for a given area is the number of crimes per 1000 people in that area. For each area these are calculated by dividing the actual number of crimes by the population and then multiplying by 1000. Each crime level/banding will then be given an associated score (where a higher score is worse for the assessment):

Crime level		Associated score (negative)
Top 2% of areas with the highest crime rate	High	5
Next 14% of areas	Above average	4
Middle 68% of areas	Average	3
Next 14% of areas	Below average	2
Bottom 2% of areas with the lowest crime rate	Low	1

Source: www.police.uk

Criterion 8 (access to employment) - This will be assessed in two parts: Part A) Distance to employment opportunities and Part B) Employment deprivation. Distance to employment opportunities will be calculated using maps which show key employment sites and access boundaries (i.e. access within 15 minutes, access within 30 minutes) and an associated value will be given (see Part A below). Employment deprivation can be calculated using Job Seekers Allowance (JSA) data which shows the percentage claimants within a neighbourhood area. JSA is a benefit paid to people who are unemployed, but who are available for, and actively seeking work. The national average JSA claim rate will be used as a benchmark and then data for each neighbourhood area can be assessed against it and given an associated score (see Part B below). The scores for part A and part B can then be combined in order to obtain a final value for criterion 8.

Part A) Distance	Associated score
High – Key employment site within 15 minutes by public transport	3
Moderate – Key employment site within 30 minutes by public transport	2
Low – Key employment site over 30 minutes away by public transport	1

Part B) Employment Deprivation	Associated score
Well below average JSA claims	5
Below average JSA claims	4
Average JSA claims	3
Above average JSA claims	2
Well above average JSA claims	1

**JSA (Job Seekers Allowance)*

Criterion 9 (access to public transport facilities) - Access to public transport will be assessed in two parts, scoring access to both bus stops (Part A) and railway stations (Part B). In line with the Department for Transport (DFT) guidance and accessibility standards in 'Shaping Neighbourhoods' [8], a distance of 400m to a bus stop and 800m to a rail station is an indicator of good accessibility to public transport. Access to each service will be assessed separately then the values can be combined to obtain a final score:

Part A) Access to bus stops	Associated score
High – Bus stop within 400m (5 minutes)	3
Moderate – Bus stop within 800m	2
Low – Bus stop over 800m away	1

Part B) Access to railway stations	Associated score
High – Railway within 800m (10 minutes)	3
Moderate – Railway within 1200m	2
Low – Railway over 1200m away	1

Criterion 10 (access to good quality schools/education) - This criterion will be assessed in two parts, for both primary and secondary education: Part A) Proximity to good quality schools and Part B) Education attainment. Part A will be assessed using an access scale for both primary (see Part A.1) and secondary (see Part A.2) schools and Ofstead evaluation data will be used to determine the quality of the schools. Ofsted inspects all state schools in England and provides an overall assessment of a school's performance (judgements are made on a four point scale: 1=outstanding, 2=good, 3=satisfactory, 4=inadequate). Part B will be assessed by using Key Stage 1 and 2 (primary schools) and GCSE (secondary schools) results. All scores will be combined to obtain a final value for the area under assessment:

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Part A.1) Access to primary schools	Associated score
Very High – Outstanding/good quality schools within 400m	4
High – Outstanding/good quality schools within 800m	3
Moderate – Outstanding/good quality schools within 1200m	2
Low – Outstanding/good quality schools over 1200m away	1

Part A.2) Access to secondary schools	Associated score
Very High – Outstanding/good quality schools within 800m	4
High – Outstanding/good quality schools within 1200m	3
Moderate – Outstanding/good quality schools within 2000m	2
Low – Outstanding/good quality schools over 2000m away	1

Part B.2) Education attainment (secondary)	Associated score
Well above average results	5
Above average results	4
Average results	3
Below average results	2
Well below average results	1

Part B.1) Education attainment (primary)	Associated score
Above average results	3
Average results	2
Below average results	1

Criterion 11 (access to shopping facilities) - This factor will be assessed by considering access to local/district centres. Local centres are defined as having a supermarket and/or a range of small food shops, a newsagent, chemist and post office. District Centres contain at least one supermarket or superstore, a range of non-retail services, such as banks and restaurants, as well as local public facilities such as a library. Good accessibility is considered as 800m (10 minutes walk) of a local centre or supermarket [8]. Using this as a basis for good accessibility, the following access scale could be applied:

Access to shops	Associated score
Very High - District centre within 800m	4
High – Local centre within 800m	3
Moderate – Local/district centre within 1200m	2
Low – Local/district centre over 1200m away	1

Criterion 12 (access to health care) - This criterion will be assessed by determining the distance to GPs, pharmacies and hospitals. Each of these services will be assessed separately and then the three scores combined. Thus, for each service the following access scales could be used:

Access to GPs and pharmacies	Associated score
High – Amenity within 800m	3
Moderate – Amenity within 1200m	2
Low – Amenity over 1200m away	1

Access to hospitals	Associated score
High – Hospital within 30minutes by public transport*	3
Moderate – Hospital within 60minutes by public transport	2
Low – Hospital over 60minutes away by public transport	1

**The core national accessibility indicators, developed by central government, examine access to hospitals by the percentage of households within 30 minutes and 60 minutes from a hospital by public transport [9].*

Criterion C13 (access to child care) - This criterion will be assessed in two parts: Part A) Child care sufficiency and Part B) Distance to child care. Local authorities are required to carry out Childcare Sufficiency Assessments under the Childcare Act 2006. This data on sufficiency could be given an associated score for each area to be assessed, for example:

Part A) Sufficiency	Associated score
Sufficient	3
Potential for undersupply	2
Limited	1

Part B) Distance to child care	Associated score
High – amenities within 600m*	3
Moderate – amenities within 1000m	2
Low – amenities over 1000m away	1

**Source [8]*

Criterion 14 (access to leisure facilities) - Access to leisure facilities will be evaluated by determining the distance to both playgrounds/play areas (Part A) and fitness/leisure centres (Part B). Each will be scored separately and then the values combined to achieve a final score:

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Part A) Access to play areas	Associated score
High – play area within 400m*	3
Moderate – play area within 800m	2
Low – play area over 800m away	1

**Government guidance suggests that children's play facilities should be within 400m from home [10].*

Part B) Access to fitness/leisure	Associated score
High – facilities within 1500m	3
Moderate – facilities within 2000m	2
Low – facilities over 2000m away	1

Criterion 15 (access to open green public space) - This factor will be evaluated by determining the distance to publically accessibly open green spaces/parks. Guidance used by local authorities suggests that all residents should have access to an area of publically accessible open space within 400m from home [8], [11]. Therefore, the following access scale and scoring system could be adopted:

Access to open space	Associated score
High – Public park/green space within 400m	3
Moderate – Public park/green space within 800m	2
Low – Public park/green space over 800m away	1

Criterion 16 (presence of environmental problems) - This will be assessed by the rate (%) of dwellings with 'Environmental Problems Present' (where a higher score is worse for the assessment). This data is published within local authorities' house condition surveys, a requirement by the Government. Environmental Problems relate to area upkeep and utilisation, such as litter and rubbish, dog fouling, street parking, heavy traffic and vacant buildings.

Criterion 17 (quality of housing) - This factor will be analysed in two parts: Part A) the rate (%) of private sector properties meeting Decent Homes Standard (within the area to be assessed); and Part B) the rate (%) of social housing that is decent (within the area to be assessed).

Criterion 18 (energy efficiency of housing) - This criterion will be determined by using Standard Assessment Procedure (SAP) ratings. SAP ratings are used in England to measure the energy efficiency of a home by taking into account factors such as property type, construction materials, insulation and the efficiency of heating systems. The rating is expressed on a scale of 1 to 100, with the higher the rating the more energy efficient the home. An average SAP rating could be used as a benchmark and then each area (to be assessed) can be compared against it to determine a corresponding score:

Energy Efficiency	Associated score
Below average SAP rating	1
Average SAP rating	2
Above average SAP rating	3

Criterion 19 (availability of waste management facilities) - This criterion will be assessed using the National Performance Indicator NI 192: 'percentage (%) of household waste sent for recycling, composting or reuse', a sustainable communities indicator used in the Egan Review: Skills for Sustainable Communities [12]. The National Indicators were set up to measure local authorities' performance and report to central UK government. The percentage itself could be used in an assessment or the figure could be compared against an average rate to establish an associated score, for example:

Waste Management Level	Associated score
Well above average	5
Above average	4
Average	3
Below average	2
Well below average	1

Criterion 20 (deprivation in area) - Deprivation will be measured by the '% of area in most deprived 10% nationally' using the Index of Multiple Deprivation (IMD). The indices of deprivation identify the most disadvantaged areas in England. Deprivation is assessed by examining factors such as income deprivation, health deprivation and disability and barriers to housing and services. The actual rate (%) of deprivation could be used in an assessment. Alternatively, an average rate of deprivation (%) could be used as a benchmark and each area (to be assessed) could be compared against it to establish an associated score (where a higher score is worse):

Deprivation	Associated score (negative)
Well below average IMD	1
Below average IMD	2
Average IMD	3
Above average IMD	4
Well above average IMD	5

**IMD (Index of Multiple Deprivation)*

IV. Conclusion

There is an increasing need to reconsider the way housing affordability is conceptualised and measured. Housing affordability is typically assed by considering economic criteria, whilst other important factors, such as housing location, quality of life and sustainability are often ignored. The authors posit that housing affordability assessments must take a broader and more sustainable view of the wide ranging criteria that affect households.

The presented research is based on the notion that the housing affordability problem encompasses more than the financial costs of housing and a households ability to meet such costs and must address larger issues such as social and environmental sustainability. Therefore, this paper has presented a criteria system, validated by UK professionals, by which the affordability of housing could be assessed comprehensively and sustainably, rather than focusing solely on financial burdens. The paper has also explored the way such criteria could be assessed. Although examined in a UK context, the criteria system could be used internationally.

APPENDIX

TABLE II
DERIVATION OF HOUSING AFFORDABILITY CRITERIA

	Affordability criteria	Derivation
1	House prices in relation to income	Local authority interviews, [13], [14].
2	Rental costs in relation to income	Local authority interviews, [13], [14].
3	Interest rates and mortgage availability	Local authority interviews, [1], [15], [16].
4	Availability of rented accommodation (private and social)	[17], [18], [19].
5	Availability of low cost home ownership products	[17], [18], [19].
6	Availability of market value home ownership products	[17], [18], [19].
7	Safety/crime	[17], [18], [19].
8	Access to employment	[4] [18], [19], [20].
9	Access to public transport services	[5], [13], [18], [19], [20].
10	Access to good quality education/schools	[4], [13], [18], [20], [21], [22].
11	Access to shopping facilities	[18], [20], [21], [22].
12	Access to health services	[13], [18], [20], [22].
13	Access to early years child care	[18], [20].
14	Access to leisure facilities	[18], [20].
15	Access to open green public space	[13], [17], [18], [19], [20], [22].
16	Presence of environmental problems	[17], [19], [20], [23].
17	Quality of housing	Local authority interviews, [17], [19], [24].
18	Energy efficiency of housing	Local authority interviews, [6], [17], [19].
19	Waste management	[17], [18], [19].
20	Deprivation in area	[20], [25], [26].

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