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ORIGINAL RESEARCH ARTICLE

Determining Factors Influencing Residents' Satisfaction Regarding Urban Livability in Pakistan

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Abstract

Livability is an important and crucial aspect of urbanity which depicts quality of life. The emerging cities have a variety of urban challenges, including poor quality of life that has focused urban planners towards livability measures. Pakistani cities are facing similar challenges, like provision of adequate infrastructural facilities and amenities, due to which cities are losing their livability standards. Hyderabad, the second biggest city of Sindh Province, is an emerging metropolitan facing the same dilemma. The objective of this paper is to measure the livability as perceived by the residents. Six urban settlements were selected through stratified sampling to represent three income groups present in the study area, i.e. upper, middle and lower. Through systematic sampling, a sample size of 290 was procured for the household-based questionnaire survey, and descriptive statistics and multiple regression techniques were used. Results showed a significant relationship between perceived livability and livability attributes. The environmental attribute was found most significant in affecting livability perception of residents. The study also highlights eight livability variables which need to be considered for improving the quality of life in future urban development projects, not just in Pakistan, but also other developing countries.

Keywords Community perceptions · Community well-being · Neighborhood facilities · Quality of life · Residential satisfaction

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Introduction

Livability means good quality of life (Bandarabad and Shahcheraghi 2012), and the standard of well-being of inhabitants in a region or a city (Okulicz-Kozaryn 2013). Livability is a vital part of urban planning as a discipline, and is now discussed widely in the interrelated fields like sustainable development, quality of life and quality of place (National Research Council 2002). The aim of planning and designing of neighborhoods is to offer livable settings to its residents (Pandey et al. 2014a). Therefore, livability has become an important element of focus by urban planners, and governments at all levels (Pandey et al. 2013). With rapid urban growth, good quality of life (QoL) for the public has become a challenging task. Livability assessments and QoL are often interrelated, and improvement in livability assessment can result in better QoL (Grieve and Weinspach 2010). The imperative need for assessing livability has also increased, which will help in ensuring long-term development plans for the city's planning and management in a sustainable manner (Yin and Yin 2009). The concept of livability entails wider aspects of quality of life, accessibility to facilities, neighborhood design, safety and security and satisfaction. This paper tries to propose a methodology for quantification of perceived livability through five main attributes, i.e., social, economic, cultural, environmental, and infrastructure. This study tries to better understand the multifaceted and multidimensional phenomena of livability through these selected attributes.

The trends of livability in Pakistan vary from urban to urban, urban to rural, and province to province (Parmar and Jalbani 2005). Uncontrolled urban growth has brought forth issues of unequal socioeconomic and infrastructural development (Rana and Bhatti 2018; Rana et al. 2017a, b). Small towns of yesteryears have risen as megacities, and this situation has instigated pressures on provision of amenities, and as a result has aggravated current living situations. Hyderabad, with its urban growth rate of about 2.4%, has an estimated population of 1.7 million residents (Pakistan Bureau of Statistics 2017). Poor urban management in the city has led to loss of public revenue, and severe harms to the well-being of its residents (Qasim and Zaidi 2013). As the cities grow, population increases and more housing schemes are needed to accommodate the inhabitants (Mohit and Iyanda 2016). Resultantly, development of new housing schemes in Hyderabad is increasing tenfold, without proper attention to the needs and satisfaction of residents (Haq 2014). According to Mercer ranking, only one city of Pakistan lies among the top 200 cities with respect to the quality of life. Mercer ranked Islamabad, the capital city of Pakistan at 195, Lahore ranked as 202 and Karachi ranked as 205 (Mercer 2018). Meanwhile, new emerging cities, i.e. Hyderabad, Gujranwala and Faisalabad were not included. The livability measuring scale usually includes metropolitan cities of Pakistan, while the newly emerging cities are neglected by urban planners. This paper makes an attempt to measure the perceived livability satisfaction level for a newly emerging city so that the same or modified methodology can be adopted in the future for other emerging cities. This research aims (i) to analyze the quality of life perceived by the occupants of different neighborhoods in terms of livability, (ii) and investigate the significant factors of livability for improving the livability.

Livability Revisited

Livability is considered as 'quality of life' of the inhabitants within an area, i.e. city or region (Okulicz-Kozaryn 2013). Livability is a crucial element of urban environment characteristics that affect the attractiveness of a place, but still, there is no definite definition in literature to describe the whole concept (Zhan et al. 2018). Livable means many things to different people and experts. It is a concept that people seem to recognize, but is difficult to define in a manner that everyone understands (Balsas 2010). Sometimes, the livability concept is also referred to as quality of life and includes the objective living environment with subjective experience of livability (Wei and Chiu 2018). Okulicz-Kozaryn and Valente (2019) claimed that livability is a complex issue and cannot be measured because of innumerable factors, but only a subjective well-being can be measured. Consequently, the concept of livability has become a complex and multifaceted phenomenon. It includes good governance, economic revitalization, environmental quality, the standard of living, cultural vitality, justice and adequacy of infrastructural facilities. In terms of quality of life, it can also include access to food, shelter, and security, and sense of belonging (Okulicz-Kozaryn 2013). 'Mercer Worldwide Quality of Living Survey' and 'The World's Most Liveable Cities' has used different criteria, such as access to education, healthcare, housing, public services, recreation, safety and environmental quality (Mercer 2018; The Economist Intelligence Unit (EIU) 2018; Barrette 2015). Zhan et al. (2018) claimed that urban livability and its determinants are beneficial to incorporate in the development of cities. Planners and policymakers consider livability as a guiding principle for the investment and decision-making that shape the urban environment (Ruth and Franklin 2014). Nowadays, various factors like civil society, local businesses, and local and state governments are working towards maintaining and improving the city's degree of livability (Kaal 2011). Livability can strengthen urban sustainability and help in executing development plans effectively (Godschalk 2017). Hence, urban livability assessment is a useful tool in order to answer the question of "who gets what, where and how" (Saitluanga 2014).

Numerous research studies have tried to measure perceived livability in the Global North. Li analyzed the factors which were responsible for perceived livability of foreign-born and native-born U.S. Residents (Li 2012). Using data from the American Housing Survey, the study summarized the amenities and satisfaction into categories such as infrastructure and physical attributes, safety, business accessibility, public services, and neighborhood housing. Analysis revealed that satisfaction with public transportation was negatively related to perceived neighborhood livability. In contrast, favorable amenities, such as proximity to open space and bodies of water proved to be positively related to perceived neighborhood livability. Okulicz-Kozaryn (2013) investigated relationship between the Mercer city ranking scale and primary data on livability. The study compared quality of life with resident's satisfaction. In another study, Okulicz-Kozaryn and Valente (2019) measured the subjective well-being and livability across European cities. This study found that Mercer city livability rankings and subjective well-being rankings were very different. For example, Zagreb ranked lower than Athens in city livability, but it had higher subjective well-being ranking. This implies that there is no direct link between actual livability statistics and perceived livability.

In the Global South, Pandey et al. (2014b) explored the perception of livability across various socioeconomic and demographic parameters. It was found that the perceived livability varied from person to person and place to place. Yin and Yin (2009) carried out an in-depth study to understand the city's livability. They used fourteen indices for eighteen cities to measure livability. Indicators included neighborhood satisfaction, infrastructure and physical attributes, safety amenities, business accessibility, public services, neighborhood housing and household characteristics. In a recent study on assessment of urban livability, Zhan et al. (2018) assessed urban livability satisfaction for Chinese cities through a questionnaire-based survey. The results indicated that moderate level of urban livability satisfaction existed for the urban populace. However, more research is required to see how livability issues are experienced and assessed in urban neighborhoods in developing countries. The assessment of the resident's livability satisfaction level may bridge this research gap, and guide the policy makers to look upon the housing livability. This study intends to assess the livability perceived by the residents in order to provide guidelines to improve the overall living conditions and quality of life.

Livability has become an emerging issue that needs to be addressed critically, especially in the context of developing countries, where the standard of life is meager in low and middle income neighborhoods (Pandey et al. 2014a). Research studies have been done on the assessment of the residents' livability satisfaction level in developed countries, however, limited studies were found in the Asian context. As livability is highly qualitative in nature, therefore, its acceptance may differ with the geographical area. The standard of living and lifestyle may vary with culture and norms of an area, which can lead to differences in expectations and demands for services standards and infrastructure. The in-depth review of both academic and grey literature depicts similarities with minor differences in measuring the livability. Previously studies have used subjective or objective indicators within the various dimensions and different methodologies to measure livability. In most of the cases, the selection of indicators varied with the area, and nature of the study. This study measures satisfaction regarding livability in a Pakistani city through the lens of cultural, environmental, social, infrastructural, and economic attributes.

Methodology

Study Area

Hyderabad, the second largest city in Sindh, Pakistan was selected as the study area (Talpur et al. 2016), which is located between 25° 22′ 45″ North & 68° 22′ 6″ East on the globe (Talpur et al. 2017). It is among the top ten major cities of Pakistan on the basis of population, with 1,732,693 residents as per Census 2017 (Pakistan Bureau of Statistics. Goverment of Pakistan 2017). Hyderabad master plan 2007–2027 pointed out a severe housing backlog and miserable living conditions (Osmani and Company (Pvt.) Ltd., 2008). The geographical location of Hyderabad city is shown in Fig. 1.

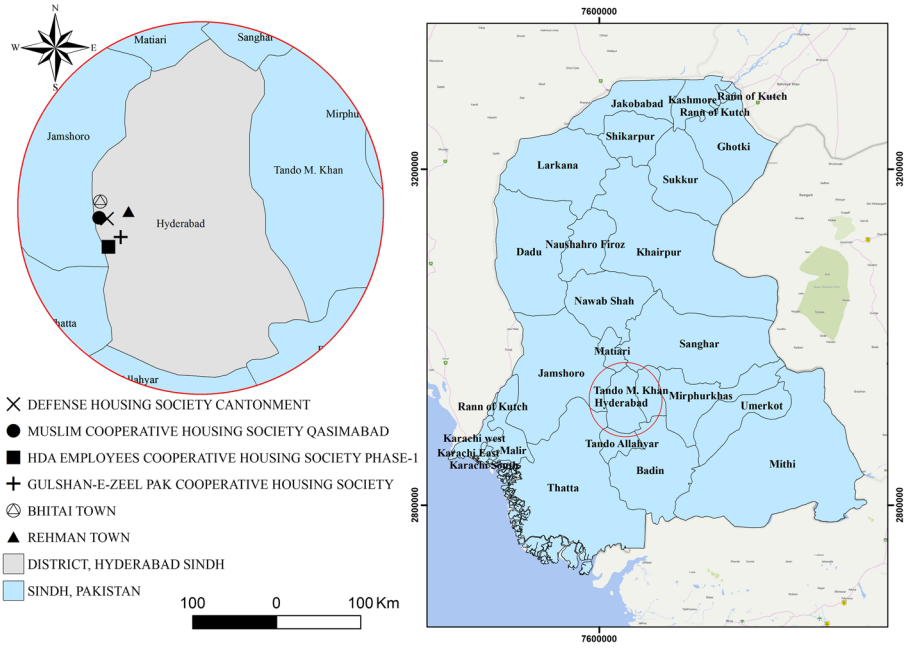

Fig. 1 Study area

The urban domain in Pakistan can be stratified into low, middle and high-income groups (Pakistan Bureau of Statistics 2016). Thus, stratified sampling was adopted to select urban settlements on the basis of income groups (Jain and Hausman 2006;Yakubu et al. 2014). The study area was divided into three residential categories, i.e. low, middle, and high income. Two neighborhoods were selected randomly from each income group, as advised by the Planning and Development Department of Hyderabad, Pakistan and the Department of City, and Regional Planning, Mehran University of Engineering and Technology Jamshoro Sindh. By using stratified sampling, six different housing settlements were selected for the present study (Table 1). Figure 1 shows location of each housing scheme.

Table 1 Selected housing schemes

Name	Abbreviation	Income Group
Defense Housing Society, Cantonment	DHS	Upper class
Muslim Cooperative Housing Society Qasimabad	MCHS	Upper class
HDA Employees Cooperative Housing Society Phase 1 (Kohsar Extension Housing Scheme)	HDA-ECHS	Middle class
Gulshan-e-Zeel Pak Cooperative Housing Society	GPCHS	Middle class
Bhitai Town	BT	Lower class
Rehman Town	RT	Lower class

Selection of Components and Variables for Livability Satisfaction Level

Cities across the world have been emphasizing on their livability scores to attract people, which requires selection of factors influencing city well-being (Lee and Kim 2018). Sung and Phillips (2018) used concepts of community well-being and quality of life, and explains that the indicators of measuring well-being can be used to develop a tool to gauge community well-being. Hence, a wide range of indicators has been chosen through rigorous literature with the aim of measuring livability (Table 2).

By reviewing the literature on variables that affect the neighborhood livability satisfaction, this research study considers the five components of residential livability satisfaction, each having three variables – (1) cultural attributes; (2) environmental attributes; (3) social attributes; (4) infrastructural attributes; (5) economic attributes.

Sampling and Data Collection

Systematic sampling technique was adopted in order to collect data regarding livability (Hamdan et al. 2014). A sample of 290 households ($n = 290$) was selected from a total of 2878 households based on systematic sampling with an interval of (10) households (Alnsour and Meaton 2014). Household survey was conducted via face-to-face interviews. Questionnaire was developed using expert inputs from academia and field experts. The questionnaire included the basic demographic profile of respondents, and perception-based questions were asked on the Likert scale. A pre-testing of 10 questionnaires was also done to streamline it. The 5-point Likert scale based questions were arranged for finding the residents perceptions about livability attributes from 1 = not at all satisfied, to 5 = extremely satisfied (Pandey et al. 2014a); Mahmoudi et al. 2015; Pampanga et al. 2015). These attributes were categorized under cultural, environmental, social, infrastructure and economic dimensions. Descriptive statistics (mean score) method was adopted to calculate each attribute, and the results were arranged graphically. Moreover, a scale of 10 points on Likert scale was also structured and responses were recorded about their "perceived livability". This was correlated with previously identified livability satisfaction variables, Thereafter, regression modeling was done to understand factors influencing perceived livability of residents (Anderson et al. 2012; Mohit and Iyanda 2015; Tao 2015).

Results and Discussion

Respondents of this research were predominantly males (81%) as compared to females (19%). The majority of the respondents (35.2%) belonged to mature age group (31–40 years), while 30.4% respondents were from 18 to 30 years age group, 27.2% belonged to the 41–50 years age group and only 7.2% respondents were of age range 51–60 years. Majority of residents were college graduates or more (70%), while the rest had attained higher secondary (25.9) or secondary education (4.1%) only. Most of the respondent's income level was in range of 21,000–50,000 PKR, which constituted about 41% of the total population. Most of the inhabitants of selected housing schemes had their own houses (66.6%), against rented ones (33.4%) which means that most of the respondents were permanent residents of that area (Table 3).

Table 2 Presence of Livability related variables in the literature

Indicators	Empirical Evidences
1. Cultural attributes	
Availability of restaurants	Okulicz-Kozaryn 2013; Litman 2015; Pandey et al. 2013; Khan and Javaid 2015 Saaty 1986; National Research Council 2002
Availability of public amenities (cinemas and clubs)	Okulicz-Kozaryn 2013; Pandey et al. 2014a, b, 2013; Mohit and Iyanda 2015; Saitluanga 2014; Khan and Javaid 2015; Li 2012; National Research Council 2002
Availability of worship places	Saitluanga 2014; Khan and Javaid 2015; National Research Council 2002
2. Environmental attributes	
Availability of garbage collection services	Pandey et al. 2014a, 2013; Mahmoudi et al. 2015; Mohit and Iyanda 2015; Pandey et al. 2010; Teck-Hong 2012
Regular maintenance of public parks	Okulicz-Kozaryn 2013; Leby and Hashim 2010; Pandey et al. 2014a, b, 2013; Khan and Javaid 2015
Availability of parks and playgrounds	Okulicz-Kozaryn 2013; Leby and Hashim 2010; Pandey et al. 2014a; Mohit and Iyanda 2015; Saitluanga 2014; Khan and Javaid 2015; Li 2012; Shamsuddin et al. 2012; Saaty 1986; Teck-Hong 2012; National Research Council 2002
3. Social attributes	
Security	Okulicz-Kozaryn 2013; The Economist Intelligence Unit (EIU) 2014; Litman 2015; United States Department of Transportation 2012; Leby and Hashim 2010; Pandey et al. 2014a, b, 2013; Ilesanmi 2012; Mohit and Iyanda 2015; Saitluanga 2014; Khan and Javaid 2015; Li 2012; Shamsuddin et al. 2012; Pandey et al. 2010; National Research Council 2002
Access to health facilities	Diener and Suh 1997; Saaty 1986; Okulicz-Kozaryn 2013; The Economist Intelligence Unit (EIU) 2014; Litman 2015; United States Department of Transportation 2012; Leby and Hashim 2010; Pandey et al. 2014a, b, 2013; Ilesanmi 2012; Mohit and Iyanda 2015; Saitluanga 2014; Khan and Javaid 2015; Shamsuddin et al. 2012; Pandey et al. 2010; National Research Council 2002
Provision and proximity to schools	Diener and Suh 1997; Okulicz-Kozaryn 2013; The Economist Intelligence Unit (EIU) 2014; Litman 2015; United States Department of Transportation 2012; Leby and Hashim 2010; Pandey et al. 2014a, b, 2013; Mohit and Iyanda 2015; Saitluanga 2014; Khan and Javaid 2015; Li 2012; Shamsuddin et al. 2012; National Research Council 2002
4. Infrastructural attributes	
Regular maintenance of streets and neighborhood's lighting	Okulicz-Kozaryn 2013; Litman 2015; United States Department of Transportation 2012; Leby and Hashim 2010; Pandey et al. 2013; Ilesanmi 2012; Mahmoudi et al. 2015; Mohit and Iyanda 2015; Saitluanga 2014; Khan and Javaid 2015; Li 2012; Shamsuddin et al. 2012; Pandey et al. 2010; National Research Council 2002
Reliability of utilities (electricity, water, gas)	Okulicz-Kozaryn 2013; Pandey et al. 2014a, 2013; Ilesanmi 2012; Mohit and Iyanda 2015; Saitluanga 2014; Khan and Javaid 2015; Li 2012; Pandey et al. 2010; National Research Council 2002
Availability of public transport	Okulicz-Kozaryn 2013; The Economist Intelligence Unit (EIU) 2014; Litman 2015; United States Department of Transportation 2012; Leby and Hashim 2010; Pandey et al. 2014a, 2013; Mahmoudi et al. 2015; Mohit and Iyanda 2015; Saitluanga 2014; Khan and Javaid 2015; Li 2012; Shamsuddin et al. 2012; Pandey et al. 2010; National Research Council 2002
5. Economic attributes	
Availability of affordable housing	The Economist Intelligence Unit (EIU) 2014; United States Department of Transportation 2012; Pandey et al. 2014a, 2013; Mohit and Iyanda 2015; Khan and Javaid 2015; Li 2012; Shamsuddin et al. 2012; National Research Council 2002
Access to shops	Litman 2015; Leby and Hashim 2010; Ilesanmi 2012; United States Department of Transportation 2012; Pandey et al. 2014a; Mohit and Iyanda 2015; Khan and Javaid 2015; Li 2012; Shamsuddin et al. 2012; National Research Council 2002
Employment opportunities	Okulicz-Kozaryn 2013; Litman 2015; United States Department of Transportation 2012; Leby and Hashim 2010; Pandey et al. 2014a; Mahmoudi et al. 2015; Mohit and Iyanda 2015; Saitluanga 2014; Khan and Javaid 2015; Li 2012; National Research Council 2002; Diener and Suh 1997

Table 3 Respondent's socio-demographic details

Socio-demographic characteristics		Frequency	Percentage
Gender	Male	235	81%
	Female	55	19%
Age	18–30	88	30.4%
	31–40	102	35.2%
	41–50	79	27.2%
	51–60	21	7.2%
Education level	Secondary	12	4.1%
	Higher secondary	75	25.9%
	Graduate or more	203	70%
Monthly Household Income (In PKR*)	<20,000	87	30%
	21,000–50,000	119	41%
	>50,000	84	29%
House ownership	Owned	193	66.6%
	Rented	97	33.4%

Field Survey, 2016

*1 USD = 123.24 PKR (Sept, 2018)

Cultural Attributes

Availability of restaurants, public amenities and place of worship were considered as components for cultural attributes of livability (Fig. 2). The result showed that satisfaction regarding the availability of worship places had highest mean scores in all six neighborhoods (Upper class; DHS and MCHS, middle

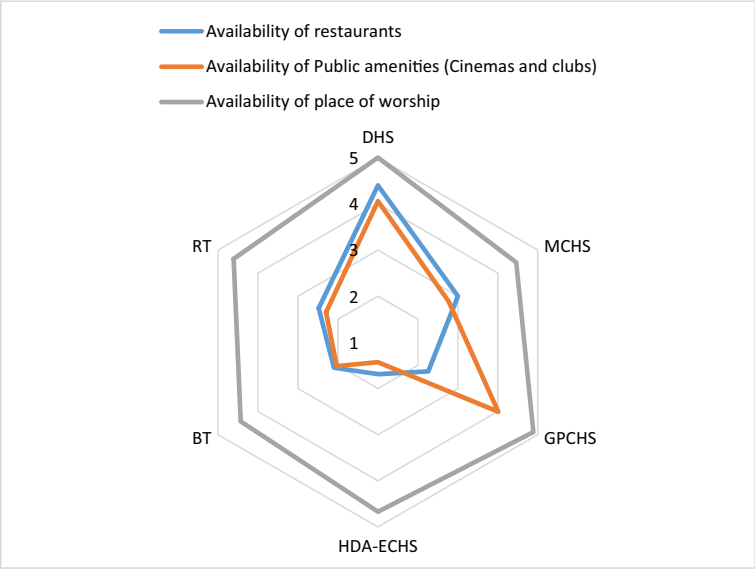

Fig. 2 Cultural attributes

class; HDA-ECHS and GPCHS, lower class; BT and RT). In contrast, satisfaction regarding the availability of restaurants was deemed poor by residents of both middle income and the lower income neighborhood. Such score implies lack of availability of restaurants in these neighborhoods. In addition, both upper-class neighborhoods depicted above-average satisfaction related to availability of restaurants (Fig. 2). Regarding availability of public amenities, the lowest satisfaction for this indicator was recorded in upper class neighborhoods, and was slightly higher in lower class neighborhoods. As compared to other four neighborhoods, middle class neighborhoods gave higher score related to the availability of public amenities (Table 4).

Environmental Attributes

The difference amid resident's level of satisfaction towards the neighborhood environment resulted in a mixed score regarding environmental indicators (Fig. 3). Residents of upper-class neighborhoods (DHS and MCHS) were most satisfied for all three indicators, including availability of garbage collection service, regular maintenance of public parks and availability of parks and playgrounds. Only one middle class neighborhood (HDA-ECHS) gave high scores for all three indicators, but on the other hand, a middle class neighborhood (GPCHS) gave low satisfaction for the availability of garbage collection, and below-average scores for remaining two indicators. Both of the lower income group neighborhoods (BT and RT) showed poor condition of environmental attributes in their areas (Fig. 3). Generally, it was observed that residents living in high income neighborhoods were most satisfied with their environment, and this satisfaction fell in the middle and low income neighborhoods. This can be due to the fact that residents of high income neighborhoods reside in large dwelling units, and they have ample open spaces (low densities). In lower income neighborhoods, smaller plots result in higher densities, and hence perceived low satisfaction regarding their immediate surroundings.

Social Attributes

Livability assessment regarding social attributes included security, access to health facilities, and provision and proximity to schools (Fig. 4). Both upper-class neighborhoods considerably gave high scores for all three selected social attributes of livability. While, middle-class urban settlements depicted slightly above-average scores for security attribute (Table 4). In contrast, lower class neighborhoods scored the least in the security. Similarly, the upper-class housing units had the easiest access to health facilities (Fig. 4). The middle-income group had mean values of >2.5, implying above average satisfaction regarding access to health facilities. However, residents from lower income settlements gave poor satisfaction regarding the same indicator. Proximity to school attribute represented the comfort level of citizens' access to school. DHS citizens (upper class) had the easiest access to school, which can also be verified from the results, i.e. "fully satisfied" with a value of 5.00. While low-income residents gave lowest scores in schools accessibility, as compared to middle-income and upper-income groups.

Table 4 Descriptive statistics of indicators

Indicators	Upper class income group				Middle class income group					Lower class income group		
	DHS		MCHS		GPCHS		HDA-ECHS		RT		BT	
	M	S.D	M	S.D	M	S.D	M	S.D	M	S.D	M	S.D
1. Cultural Attributes												
Availability of restaurants	4.40	.604	3.00	.816	2.26	.979	1.69	.959	2.10	.900	2.48	1.06
Availability of cinemas	4.06	.684	2.77	.832	4.01	.847	1.43	.901	2.03	1.00	2.30	1.07
Availability of place of worship	5.00	.000	4.46	.519	4.89	.312	4.67	.543	4.43	.747	4.61	.556
2. Environmental Attributes												
Availability of garbage collection service	4.14	.355	4.08	.277	3.07	1.051	3.16	1.33	1.80	1.11	2.30	1.31
Maintenance of public parks	4.46	.505	4.15	.376	2.09	.733	3.24	1.47	1.93	.888	2.21	1.02
Availability of parks and play grounds	4.49	.507	4.15	.376	2.16	1.092	3.28	1.19	1.98	1.07	2.06	1.08
3. Social Attributes												
Security of the neighborhood	4.66	.482	4.23	.599	3.44	.839	3.72	1.03	2.65	1.51	2.36	1.29
Access to health facilities	4.31	.471	4.00	.000	2.89	.835	3.79	1.12	2.40	.871	2.67	.990
Proximity to schools	5.00	.000	4.15	.376	3.20	1.189	3.88	.957	2.40	1.21	2.76	1.14
4. Infrastructural Attributes												
Maintenance of streets and neighborhood's lighting	4.11	.323	3.92	.277	2.98	1.120	3.28	1.32	2.48	1.13	2.18	1.28
Reliability of utilities	4.46	.505	4.15	.555	2.98	.934	3.72	1.07	2.60	.98	2.79	1.05
Availability of utilities	3.14	.430	3.38	.506	2.71	1.131	2.07	1.10	2.93	.971	2.15	1.00
5. Economic Attributes												
Affordability of housing	3.31	.471	3.31	.480	2.24	1.259	3.10	1.10	2.07	1.16	2.30	1.13
Access to shops	3.97	.453	3.62	.506	2.59	.780	3.52	1.23	3.03	1.07	3.00	1.27
Employment opportunities	3.77	.877	3.15	.376	2.44	1.165	2.67	1.28	2.48	1.08	2.52	1.22
Perceived liveability	8.23	.690	7.54	.519	5.86	1.116	7.09	1.67	5.33	1.22	5.45	1.46

M Mean value

S.D. Standard deviation

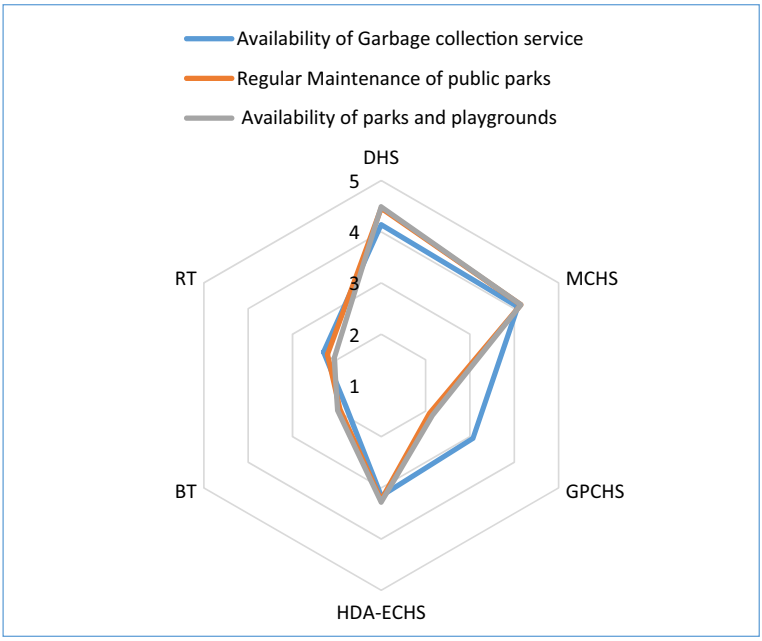

Fig. 3 Environmental attributes

3.4 Infrastructural Attributes

Infrastructural attributes included regular maintenance of streets and neighborhood's lighting, reliability of utilities (electricity, water and gas) and availability of public transport (Fig. 5). Lower income settlements secured least scores in regular maintenance of streets. On the other hand, considerably better situation was observed in all other selected housing schemes. Regarding reliability of utilities (electricity, water and gas), lower income neighborhoods depicted poor scores; while, the high income households gave highest score to the parameter, i.e. reliability of infrastructural amenities. Within middle-income groups, one neighborhood (HDA-ECHS) gave good score, while the other did not. Availability of public transports varied with poor scores in all neighborhoods, except the BT (lower class), which had relatively higher scores for this indicator. In all other neighborhoods, mean score indicated lack of availability of public transport (Table 4).

Economic Attributes

Economic attributes included availability of affordable housing, access to shops and employment opportunities (Fig. 6). These indicators varied according to stratified neighborhoods in the city. The satisfaction regarding availability of affordable housing in low-income settlements was very low. Only one middle income class neighborhood (HDA-ECHS) showed a better score. This implies that even people lived in upper class neighborhoods, were dissatisfied from the parameter of "housing affordability". For the indicator of access to shops, all six neighborhoods showed better scores (Fig. 6). Regardless of economic status, GPCHS (middle class) showed the least access to shops

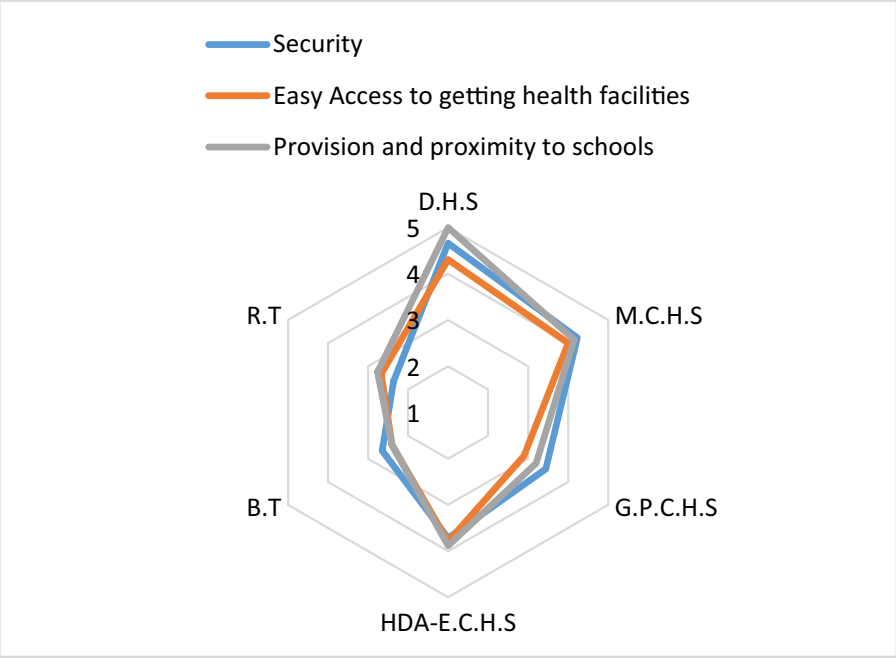

Fig. 4 Social attributes

as compared to lower class neighborhood, which showed relatively high mean values for access to shops. In terms of access to employment opportunities, upper class neighborhoods scored best. Whereas, the mean scores for employment opportunities in other neighborhoods varied, which implied fluctuated level of satisfaction for employment opportunities (Table 4).

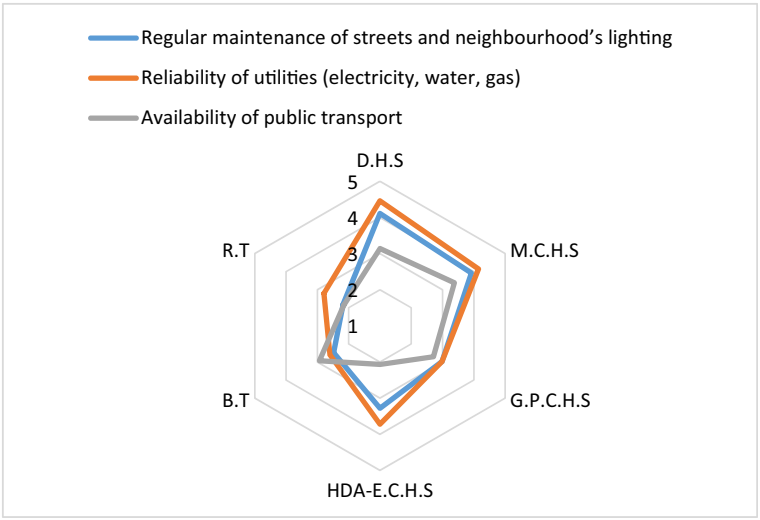

Fig. 5 Infrastructural attributes

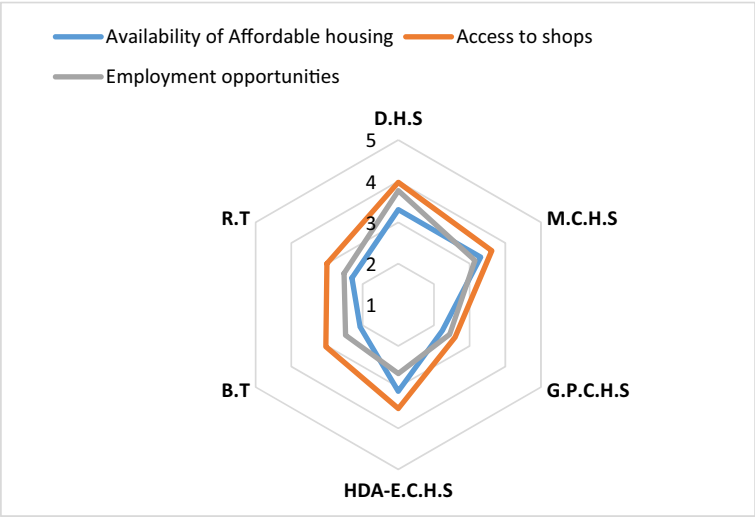

Fig. 6 Economic attributes

Relationship of Attributes with Perceived Livability

Overall Perceived Livability

The overall perceived livability varied among selected neighborhoods. The highest rating was found for the parameter "perceived livability" in DHS (upper class). In addition, it was noted that both lower-income neighborhoods (BT and RT) were least satisfied with respect to livability criterion (Fig. 7). This implied that people in lower class neighborhood perceived poor living conditions or miserable quality of life in their settlements. Likewise, middle-class neighborhoods showed slightly higher satisfaction level as compared to lower class neighborhoods.

Overall Perceived Livability and Livability Satisfaction Variables

Pearson correlation technique was utilized to find out the relationship between the overall perceived livability and livability satisfaction variables (Mohit et al. 2010). Table 5 indicates that perceived livability was significantly correlated ($p < 0.05$) with availability of restaurants, garbage collection service, parks and grounds, utilities, employment, and proximity to schools. Whereas, it was highly significantly correlated ($p < 0.01$) with certain indicators, like maintenance of parks and lighting, security, health facilities, reliability on amenities, housing affordability and commercial accessibility.

Factors Influencing Overall Perceived Livability

Multiple regression model was estimated to determine the best linear combination of 15 resident livability satisfaction variables for predicting (overall) perceived livability. The multi-linear regression model suggested the selection of eight variables which were influencing perceived livability. Two variables i.e. availability of garbage collection service and maintenance of public parks were greatly influencing perceived livability

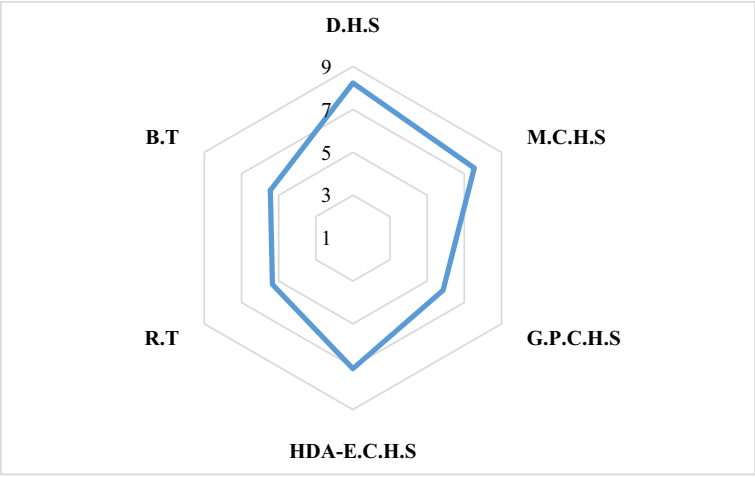

Fig. 7 Overall perceived livability on 10 points likert scale

($p < 0.01$), while other six variables were also found significant at $p < 0.05$, i.e. availability of worship place, availability of parks and playgrounds, access to health facilities, proximity to schools, availability of utilities and employment opportunities (Table 6).

The independent variables significantly predicted the dependent variable with $F(15,\ 274) = 19.448$, $p < 0.05$ (i.e. the regression model is a good fit of the data) with all eight variables. The R^2 value (0.516) imply that 51.6% of the variance in residential livability satisfaction was explained by the model. The tolerance values of the coefficients of predictor variables were recorded well over 0.484 ($1\text{-}R^2$). This shows a low level of multicollinearity among the predictors of the model. The beta weights presented in Table 6 suggested that the resident's perception of livability in selected housing schemes was greatly influenced by selected indicators. The results showed that all three environmental factors of livability (maintenance of public parks, availability of garbage collection service, availability of parks and playgrounds) are significant in building the overall perception of livability. Moreover, two social factors (proximity to schools, access to health facilities), one economic factor (employment opportunities), one cultural (availability of place of worship) are also significant.

In general, the variables X_1, ……..,$X_{p\text{-}i}$ in a regression model have to represent different independent variables, therefore the definition of general multiple linear regression model, with normal error terms, simply in terms of X variable is (Qureshi et al. 2016; Schneider et al. 2010)

$$Y = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \cdots\cdots\cdots\cdots + \beta_{p-1} X_{i,p-i} + \varepsilon_i \qquad (1)$$

Where:

β_0 is Y- intercept; β_1, β_2, β_3, β_p are the parameters of the regression equation; ε_i is a random error in Y for observations i.

Table 5 Pearson correlation coefficients between overall perceived livability and livability satisfaction indicators

Livability Indicators		Pearson Correlation with overall perceived livability
X_1	Availability of restaurants	0.259*
X_2	Availability of cinemas	0.105
X_3	Availability of place of worship	0.104
X_4	Availability of garbage collection service	0.492*
X_5	Maintenance of public parks	0.534**
X_6	Availability of parks and playgrounds	0.523*
X_7	Security of the neighborhood	0.343**
X_8	Access to health facilities	0.524**
X_9	Proximity to schools	0.517*
X_{10}	Maintenance of streets and neighborhood's lighting	0.372**
X_{11}	Reliability of utilities	0.409**
X_{12}	Availability of utilities	0.209*
X_{13}	Affordability of housing	0.427**
X_{14}	Access to shops	0.401**
X_{15}	Employment opportunities	0.392*

**correlation is significant at 1%

*correlation is significant at 5%

By adopting the values shown in Table 5 we get the regression model as;

$$Y = 1.184 + 0.005X_1 - 0.050X_2 + 0.277X_3 + 0.221X_4 + 0.250X_5 + 0.168X_6 - 0.103X_7 + 0.151X_8 + 0.162X_9 - 0.009X_{10} + 0.046X_{11} + 0.146X_{12} + 0.105X_{13} + 0.102X_{14} + 0.155X_{15} \quad (2)$$

Overall findings of the research indicated that perceived livability by the residents varied from place to place, and attributes of livability are correlated with perceived livability. Regression model predicts that livability perceived by residents is highly affected by availability of garbage collection service and maintenance of public parks. The selected indicators can play vital role in assessment of living conditions in either planned neighborhoods or slums.

In general, the findings of the present study show similarities with those found in literature, although they do not corroborate all of them. Findings support results of previous studies which validated that the residential satisfaction is related with suitable living conditions in neighborhoods (Mohit et al. 2010; Mohit and Iyanda 2015, 2016). The significant relationship of cultural attribute (availability of place of worship) with quality of life supports the claim of Hamdan et al. (2014) that socio-cultural dimension must be considered in augmenting the quality of life in Malaysian neighborhoods. Other variables, like provision and proximity of schools and access to health facilities observed in this study also corroborate previous studies (Leby and Hashim 2010).

Table 6 Regression analysis of livability satisfaction variables and overall perceived livability

R = 0.718, R Square = 0.516, Adjusted R Square = 0.489, Std. Error of the Estimate = 1.122,

Multiple Regression Model		Unstandardized Coefficients		t	Sig.
		β	Std. Error		
		1.184	.695	1.705	.089
X_1	Availability of restaurants	.005	.068	.079	.937
X_2	Availability of cinemas	−.050	.060	−.835	.405
X_3	Availability of place of worship	.277	.141	1.969	.050**
X_4	Availability of garbage collection service	.221	.073	3.010	.003***
X_5	Maintenance of public parks	.250	.071	3.519	.001***
X_6	Availability of parks and playgrounds	.168	.067	2.499	.013**
X_7	Security of the neighborhood	−.103	.076	−1.361	.175
X_8	Access to health facilities	.151	.086	1.745	.082*
X_9	Proximity to schools	.162	.075	2.144	.033**
X_{10}	Maintenance of streets and neighborhood's lighting	−.009	.074	−.120	.904
X_{11}	Reliability of utilities	.046	.079	.587	.558
X_{12}	Availability of utilities	.146	.066	2.201	.029**
X_{13}	Affordability of housing	.105	.069	1.527	.128
X_{14}	Access to shops	.102	.078	1.311	.191
X_{15}	Employment opportunities	.155	.067	2.326	.021**

a = Dependent Variable: Overall perceived livability

β = Predictors: (Constant); Significance level *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

Findings of this research also back the South Korean study by Lee and Kim (2018), which revealed that the social and administrative factors (same as environmental attributes for present study) are important for enhancing the overall quality of life. A study by Zhan et al. (2018) revealed the urban livability determinants in Chinese context, which also shows resemblance with results of this study. Overall, lower mean scores for livability satisfaction by lower income neighborhoods were seen, confirming similar situation of housing and neighborhoods in Nigeria and Ghana (Yakubu et al. 2014; Ilesanmi 2012). Variances and disparities in livability satisfaction level among neighborhoods in this study also supports arguments of Saitluanga (2014). However, Leby and Hashim (2010) found security as important predictor of perceived livability in Malaysian neighborhoods, which was in contrast with this study. Tao (2015) found economic attributes are important for better housing and living conditions, which contradicts with the present survey.

Overall, results indicated that environmental attribute is the most important component affecting livability assessment. The standardized coefficients reveal the weighting of the dimensions for overall livability, which can provide a new perspective to look at the key issues of the urban neighborhood planning and design. Among the five different variables of livability, environmental attributes were found the most significant factors influencing perceived livability. Thus,

this research suggested the high weightage of environmental dimension of livability for future studies. Besides environmental factor of livability, cultural, social and economic variables also showed promising values in the eyes of residents for a more livable neighborhood. In the light of this study, it is indicated that future neighborhood designs should promote a sense of cultural identity and social cohesion. On the other hand, economic attributes exhibited relative importance about the livability criterion of housing settlements, especially when these are planned near to employment opportunities.

Conclusion

The main goal of this research was to measure the perceived livability by the residents of Hyderabad, Pakistan. The study has tried to enhance our understanding of livability by highlighting indicators which influence perceived livability in urban neighborhoods. In Pakistan, there is no national or provincial urban planning regulatory authority. This makes things difficult for urban planners to follow neighborhood design regulations, which can vary from city to city, and province to province (Ahmad and Anjum 2012; Rana and Bhatti 2018). Empirical evidences suggest that the environmental component must be acknowledged in neighborhood design, so as to improve livability perception of urbanites. Taken together, the study results suggest that the resident's satisfaction varied moderately with availability of worship places, parks and playgrounds, health facilities, schools, utilities and employment opportunities. In general, the highest satisfaction level was observed among upper-class neighborhoods as compared to the middle-class neighborhoods and lower income neighborhoods. Public and private agencies should pay more attention to the management of services and planning design aspects of housing schemes in order to enhance the livability satisfaction level in every tier of society.

This study must acknowledge its limitations. Livability is a complex phenomenon and mere five attributes (or 15 indicators) on a neighborhood level cannot envelop whole livability or quality of life concept. This can be further enhanced by incorporating more dimensions and indicators for a better reflection of livability concept. This research was also limited as the respondents were predominantly males. However, it has tried its best to highlight the perceived livability in various housing schemes. The attributes and indicators can help urban planners in designing livable neighborhoods. The methodology adopted in this study can be useful for measuring satisfaction of residents across spatial and temporal dimensions. Regression model used in this study on resident's perceived livability is based on the selected attributes. In the future, more indicators, such as urban noise, air/water quality, climatic conditions, social relationships and frequency of public transportation, can also be added to enhance the livability concept for new emerging Asian cities.

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Compliance with Ethical Standards

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