Sustainability of Housing Conditions in Rural Kerala

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ABSTRACT

Housing being an important component of the 2030 agenda for sustainable development is an essential driver in achieving sustainable development goals directly or indirectly. Adequate and affordable housing leads to benefits in health, education and economic opportunities. "Adequate housing means more than a roof over one's head. It also means adequate privacy; adequate space; physical accessibility; adequate security; security of tenure; structural stability and durability; adequate lighting, heating and ventilation; adequate basic infrastructure, such as water supply, sanitation and waste management facilities; suitable environmental quality and health related factors; and adequate and accessible location with regard to work and basic facilities: all of which should be available at an affordable cost" (UN-HABITAT, 2023). The state of Kerala occupies a unique position not only among the states in India but also among the developing countries as well in its high level of human and social development. Regarding housing, the average size, quality, and investment per house in the state were better than in other parts of the country. Today, housing condition in Kerala is much better when compared to the rest of the country. Kerala has achieved massive improvements in quality of human life. In this context, the present study attempts to examine the sustainability of housing conditions in rural Kerala by analysing the unit level data of NSSO 76th round for rural sector of Kerala based on the criteria for sustainability in housing adapted from the relevant literature in this regard.

Keywords: sustainable development, housing adequacy, structural quality, basic infrastructure, sanitation, waste management.

1. Introduction:

Housing being an important component of the 2030 agenda for sustainable development is an essential driver in achieving sustainable development goals directly or indirectly. Adequate and affordable housing leads to benefits in health, education and economic opportunities. "Adequate housing means more than a roof over one's head. It also means adequate privacy; adequate space; physical accessibility; adequate security; security of tenure; structural stability and durability; adequate lighting, heating and ventilation; adequate basic infrastructure, such as water supply, sanitation and waste management facilities; suitable environmental quality and health related factors; and adequate and accessible location with regard to work and basic facilities: all of which should be available at an affordable cost" (UN-HABITAT, 2023).Housing is a shelter that provides primary living conditions such as safe housing, drinking water, and healthy food for humans (AmjadAlmusaed and Assad Almssad 2022).Adequate housing conditions and access to basic amenities are fundamental human rights and indicators of wellbeing (Bacter C. et.al. 2021). UN: Indicators of sustainable development 2007 states that living conditions are indicators of sustainable development and are measured on access to improved water, access to improved sanitation facilities, sufficient living area, structural quality of dwelling, and security of tenure .The state of Kerala occupies a unique position not only among the states in India but also among the developing countries as well in its high level of human and social development. Regarding housing, the average size, quality, and investment per house in the state were better than in other parts of the country. Today, housing condition in Kerala is much better when compared to the rest of the country. Kerala has achieved massive improvements in quality of human life. In this context, the present study attempts to examine the sustainability of housing conditions in rural Kerala by analysing the unit level data of NSSO 76th round for rural sector of Kerala based on the criteria for sustainability in housing adapted from the relevant literature in this regard.

2. Objective of the study:

The present study focuses on examining sustainability of housing conditions in rural Kerala by analyzing housing conditions such as quality of structure, ventilation, availability of drinking

water, bathroom and latrine facilities, security of tenure, waste management facilities, kitchen facilities, availability of electricity, and drainage facilities as they directly or indirectly contribute to sustainable development goals.

3. Methods and materials:

The present study is solely based on secondary data. The unit level data of NSSO 76[th]round have been extracted for the study. The data set for rural Kerala contains 1691 households as sample. To examine sustainability in housing conditions, 10 variables were identified from the relevant literature and the guidelines provided by UN HABITAT. The variables include quality of housing structure, ventilation of the dwelling unit, waste management, drainage facilities, sanitation facilities, availability of drinking water, electricity for domestic use etc. the data on these variables are in the form of YES/NO responses. For YES, the score is 1 and for NO, the score will be 0. And the total score for sustainability will be out of 10. The study used descriptive statistical tools such as percentages, mean, standard deviation etc. were used. To examine whether there exist significant differences in sustainability scores among various social groups, religious groups, districts and categories of economic activity such as primary, secondary and tertiary sectors, the Kruskal Wallis test is employed. The data being analysed using SPSS software.

4. Results and Discussion:

This section presents the interpretations and inferences of the data analysis. The descriptive statistics of the variables used for analyzing sustainability in housing conditions being presented in the table given below.

4.1. Description of the housing condition variables:

The following table gives information regarding the availability or possession of the sustainable housing conditions of rural households in Kerala. It can be observed from the table that 93.5% of the rural households in Kerala have their own houses while the remaining 6.5% do not. The table reveals that 70.6% of the rural households live in houses with good condition of structure and

82.8% have good ventilation also. The figures given in the table also reveals that 97.4% have separate kitchen facilities, 84.8% have sufficient drinking water throughout the year; 94.7% have bathroom and latrine facilities within the dwelling premises; and 99.5% have electricity for domestic use. It can be observed that 69.4% of the rural households have drainage facilities. Only 3.5% of the households dispose solid waste through biogas plant/manure pit. Also only 0.7% safely reuse waste water after treatment.

SL	Variables of sustainability of housing condition	Yes (%)	No (%)
1	Security of tenure (Ownership of house)	93.5	6.5
2	Good Condition of housing structure	70.6	29.4
3	Good Ventilation for the dwelling	82.8	17.2
4	Separate Kitchen facilities in the dwelling	97.4	2.6
5	Sufficiency of drinking water	84.8	15.2
6	Bathroom and latrine facilities in the dwelling premises	94.7	5.3
7	Availability of electricity for domestic use	99.5	0.5
8	Drainage facilities	69.4	30.6
9	Solid waste management through bio gas plant/manure pit	3.5	96.5
10	Waste water –safe reuse after treatment	0.7	99.3

Source: computed from NSSO 76th round unit level data

4.2. Construction of sustainability scores for housing conditions:

To examine the extent of sustainability of housing conditions, the sustainability score was created by simply adding the points of above mentioned variables. The sustainability score lies between 0 and 10. This score is analysed from social, religious, occupational and district-wise perspectives being presented in the following sections.

4.3. Sustainability of Housing conditions across social groups:

The table below presents mean and standard deviation of sustainability scores social group-wise. It can be noticed that average sustainability score is the lowest for scheduled castes and the highest for General category.

Social group	Mean	Std. Deviation
Scheduled Tribes	6.4	1.37
Scheduled Castes	6.0	1.55
Other Backward Classes	7.1	1.16
Others (General)	7.2	1.17

Source: computed from NSSO 76th round unit level data

Inorder to examine whether there exist statistically significant differences in the distribution across social categories, a Kruskal Wallis test being performed. The test results are presented in the table given below which indicates that the null hypothesis is rejected at 5% level of significance and it is proved that the distribution of sustainability score is not uniform across social groups.

Table 4.2. Hypothesis Test Summary					
Null Hypothesis	Test	Test Statistic	df	Sig.	Decision
The distribution of Sustainability Score is the same across categories of Social group.	Independent-Samples Kruskal-Wallis Test	162.983	3	.000	Reject the null hypothesis.
Asymptotic significances are displayed. The significance level is .050.					

Source: computed from NSSO 76th round unit level data

The pairwise comparisons reveal that there exist no significant difference between ST and SC households and between OBC and others regarding the distribution of sustainability score as the adjusted level of significance is greater than 0.05. There exists significant difference in the distribution of average sustainability score between ST and OBC, between ST and Others, between SC and OBC and between SC and Others.

Pairwise Comparisons of Social group

Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
ST-SC	-125.513	60.972	-2.059	.040	.237
ST-OBC	-461.533	54.272	-8.504	.000	.000
ST-Others	-477.250	56.082	-8.510	.000	.000
SC-OBC	-336.020	35.371	-9.500	.000	.000
SC-Others	-351.737	38.088	-9.235	.000	.000
OBC-Others	-15.717	26.050	-.603	.546	1.000
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is .05.					
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.					

Source: computed from NSSO 76th round unit level data

4.4. Sustainability of Housing conditions across Religious groups:

The table below explains the means and standard deviations of sustainability scores on the basis of religious categories in rural Kerala.

Religion	Mean	Std. Deviation
Hinduism	6.8	1.37
Islam	7.3	.93
Christianity	7.1	1.24
Others	7.4	1.08

Source: computed from NSSO 76th round unit level data

The table reveals that the mean sustainability score of housing conditions for Hindus being 6.8 which is the lowest; 7.3 for Islam community; and 7.1 for Christian community.

A Kruskal Wallis test was performed inorder to find out whether there exist statistically significant differences in the distribution of sustainability score across religious groups the results of which being presented in the table that follows. The Kruskal Wallis H statistic (65.161) is significant at 5% level indicating that the distribution of sustainability is core is not uniform across the categories of religion.

Table 4.2. Hypothesis Test Summary					
Null Hypothesis	Test	Test Statistic	df	Sig.	Decision
The distribution of Sustainability Score is the same across categories of Religion.	Independent-Samples Kruskal-Wallis Test	65.161	3	.000	Reject the null hypothesis.
Asymptotic significances are displayed. The significance level is .050.					

Source: computed from NSSO 76th round unit level data

The pairwise comparisons reveal that there exist significant differences in the sustainability scores between Hindus and Muslims; between Hindus and Christians, and between Christians and Muslims.

Pairwise Comparisons of Religion					
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.ᵃ
Hinduism-Christianity	-108.153	30.283	-3.571	.000	.002
Hinduism-Others	-203.218	100.283	-2.026	.043	.256
Hinduism-Islam	-222.444	28.598	-7.778	.000	.000
Christianity-Others	-95.065	102.668	-.926	.354	1.000
Christianity-Islam	114.291	36.082	3.167	.002	.009
Others-Islam	19.226	102.183	.188	.851	1.000
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.					
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.					
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.					

Source: computed from NSSO 76th round unit level data

4.5. Sustainability of Housing conditions across Occupational groups:

The mean and standard deviation of sustainability scores of occupational groups based on the economic activity they are engaged in. The mean score of sustainability is the highest for Tertiary sector.

Economic activity	Mean	Std. Deviation

Primary	6.7	1.40
Secondary	6.7	1.39
Tertiary	7.2	1.16

Source: computed from NSSO 76th round unit level data

A Kruskal Wallis test was conducted to examine whether the distribution of sustainability score is the same across categories of economic activity; the test results indicate that the null hypothesis is rejected at 5% level of significance and hence it is proved that there exist significant differences in the sustainability scores of primary, secondary and tertiary sectors.

Table 4.2. Hypothesis Test Summary					
Null Hypothesis	Test	Test Statistic	df	Sig.	Decision
The distribution of Sustainability Score is the same across categories of Economic Activity.	Independent-Samples Kruskal-Wallis Test	52.529	2	.000	Reject the null hypothesis.
Asymptotic significances are displayed. The significance level is .050.					

Source: computed from NSSO 76th round unit level data

As a post-hoc, the pairwise comparisons reveals that there is no significant differences in the sustainability score between primary and secondary sectors while there exist significant difference in the sustainability scores between primary and tertiary sectors; between secondary and tertiary sectors.

Pairwise Comparisons of Economic activity					
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
Primary-Secondary	-52.040	23.847	-2.182	.029	.087
Primary-Tertiary	-148.031	20.603	-7.185	.000	.000
Secondary-Tertiary	-95.991	24.019	-3.996	.000	.000
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is .05.					
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.					

Source: computed from NSSO 76th round unit level data

4.6. Sustainability of Housing conditions across Districts:

The following table presents the means and standard deviations of sustainability scores of each district in Kerala. The average sustainability score for the state is 7.0. It can be noticed from the table that the districts such as Kannur, Wayanad, Kozhikode, Malappuram, Ernakulam, Alappuzha and Kollam have average sustainability score above the state average while districts such as Kasaragod, Palakkad, Thrissur, Idukki, Kottayam, Pathanamthitta and Thiruvananthapuram have mean sustainability score below the state level. The sustainability score being the lowest for Idukki followed by Thrissur and Palakkad.

District	Mean	Std. Deviation
Kasaragod	6.9	1.41
Kannur	7.4	1.25
Wayanad	7.4	.80
Kozhikode	7.2	1.09
Malappuram	7.4	1.06
Palakkad	6.7	1.21
Thrissur	6.6	1.34
Ernakulam	7.2	1.18
Idukki	6.2	1.50
Kottayam	6.8	1.22
Alappuzha	7.4	1.13
Pathanamthitta	6.5	1.43
Kollam	7.3	.83
Thiruvananthapuram	6.7	1.53
State level	7.0	1.28

Source: computed from NSSO 76th round unit level data

The Kruskal Wallis test results indicate that there exist significant differences in the distribution of sustainability scores across districts of Kerala as the test statistic is significant at 5% level which rejects the null hypothesis.

Table 4.2. Hypothesis Test Summary					
Null Hypothesis	Test	Test Statistic	df	Sig.	Decision

The distribution of Sustainability Score is the same across Districts.	Independent-Samples Kruskal-Wallis Test	175.035	13	.000	Reject the null hypothesis.
Asymptotic significances are displayed. The significance level is .050.					

Source: computed from NSSO 76th round unit level data

5. Conclusion:

Adequate housing helps in achieving sustainable development goals. From the discussion above, it is clear that even though Kerala has achieved good sustainability scores,housing conditions of rural households differ in various dimensions. When we compare social groups SC/ST households have lower sustainability scores when comparing to that of OBC/Others category households. Tertiary sector stood in the first position in average sustainability score in comparison with primary and secondary sectors. Hindu community stood behind Muslim and Christian communities regarding average sustainability scores. Moreover, there exist significant differences in the distribution of sustainability scores across districts. In short, there exist inequalities as well as inadequacies in housing conditions that may hinter attainment of sustainable development goals.So the problem should be solved from social, religious, occupational and regional dimensions using a comprehensive policy framework. The waste water disposal and solid waste management system need to be improved as the proportion of rural families using efficient and effective modes of the same being negligible.So it is recommended to implement and propagate sustainable practices for disposing household waste water and solid waste in an effective manner.

References:

Almusaed, A; Almssad A. Introductory Chapter: Sustainable Housing-Introduction to the thematic area. Sustainable Housing 2022.

Bacter C; Saveanu, S; Buhas, R; Marc, C. Housing for sustainable societies. Children's Perception and satisfaction with their houses in Countries around the world. Sustainability 2021, 13, 8779.

Drinking Water, sanitation, Hygiene, and housing condition in India (July2018-Dec 2018), NSSO 76th Round

Ifyalem, K. J., Jakada, Z. A. (2023). The Influence of Housing and waste management facilities on Public health, J. Mater. Environ Sci., 14 (1), 62-81.

Nainggolan, S. M; Dewi, O C; Panjaitan, T. H. 10 criteria of Sustainable Housing: A Literature Review. International conference on Dwelling form (IDWELL 2020). Advances in Social science, education and Humanities Research, Vol. 475.

Safronova, N; Nezhnikova, E; Kolhidov, A. Sustainable Housing Development in Conditions of Changing living environment. MATEC Web of Conferences 106, 08024 (2017)

United Nations: Indicators of sustainable Development: Guidelines and Methodologies; Economic and social affairs: New York, NY, USA 2007.

United Nations: Housing and the Sustainable Development Goals; the transformational impact of housing. Habitat for Humanity 2023.