Research Article

Indian Journal of Extension Education
Vol. 59, No. 3 (July–September), 2023, (38-42)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Socio-economic Categorization- A New Classification for the Farm Households

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ARTICLE INFO

Keywords: Classification, NbClust, Socio-economic, Rural

http://doi.org/10.48165/IJEE.2023.59307

Conflict of Interest: None

ABSTRACT

In most of the social science research, farmers are classified into various categories based on their socio-economic status (SES), adoption levels, knowledge, and utilization patterns, where SES is the most commonly measured phenomenon. The study aimed to create a standard method of socioeconomic classification of the population for the developed scale with a scientific foundation that can be easily and simply applied to each sector or population stratum and is also useful for other variables of interest such as adoption, knowledge of farmers, etc. The socioeconomic status (SES) of the population in a nation is crucial since it is one of the key factors affecting a person's health, education, mortality, morbidity, and nutritional status. The study was conducted in the year 2022-23 with 300 farmers from the state of Telangana. The number of classes was obtained by applying NbClust package in R software. The score range for the respective classes was calculated using Cumulative Square Root of Frequency (CSRF). The Nblust analysis suggested a 5-class cluster. The new five socio-economic classes include upper, upper middle, middle, upper lower, and lower class with scores of 25 and above, 21-24, 17-20, 13-16, and below 13 respectively.

INTRODUCTION

Several studies in agriculture, sociology, economics, education and psychology etc. require information on the SES of people. Classifying people into categories would be convenient and provide better comprehension. Present study discusses on the classifications proposed by the past studies and provides a new method of classification for rural families. The new method of classification is based on a scale developed by the researcher to measure SES of farmers. The scale comprises of eight items with sub-items relating to education, family, land, house, income, social participation, farm power status and material possessions.

Confusion exists in grouping farmers/families into different SES classes. The notions, lower, middle, upper, etc., were understood differently in various studies. In majority of the studies measuring the socio-economy of rural people, a three-level classification namely low, medium and high are used (Devarani & Bandhyopadhyay, 2012; Khwaja et al., 2015; Kumar et al., 2018; Virender et al., 2019). Whereas two-level SES categorization viz., low/medium and medium/high is employed by Shivani et al., (2013) & Kumari et al., (2021). The findings of most of these studies have revealed that farmers are mostly belonging to medium class followed by low class and there is no clear demarcation between the classes (Deeptangshu & Jahanara, 2021; Singh et al., 2021).

Though there are some standard socio-economic classes for farmers, past studies have not utilized these standardized categories and followed the three level classification. Coming to the standardized classes, the five-level categorization of socio-economic groups is highly prevalent (Tiwari et al., 2005; Gaur, 2013; Kadian, 2014; Pandey et al., 2018). Whereas, the method of scoring is done by mean and standard deviation (SD). The problem with scoring using mean and SD is, as it is based on the average value in the data, when employed allowing the data to cluster in middle level with wider difference between the categories at extreme ends

Received 15-03-2023; Accepted 31-05-2023

(Swetha et al., 2019; Singh et al., 2021; Mishra et al., 2022). Comparing and drawing conclusions of findings from similar studies becomes challenging. Due to this, the studies focusing on analyzing the transformation on socio-economic conditions as result of Govt. schemes, trainings, technology adoptions are not uniform in classifying farmers into SES classes (Kobba et al., 2020; Kumar et al., 2022; Vijayan et al., 2022).

When coming to the classification of rural population by other sectors, various research organizations and centers, a 12 class classification developed by the market research society of India is in utilization. Each family will be assigned to one of the 12 SEC groups ranging from A1-E3. According to the reports using the new SEC class, the rural population was at a high disadvantage as there exists a larger gap in the income levels, occupation and education with urban areas (Rachit, 2011). The real scenario of agrarian and rural conditions was not depicted. Scientific investigation requires standardized methods and concept, so that all could understand and comprehend in the same way. In this context, using the newly developed SES scale with modified and updated items, a redefined socio-economic classification with appropriate classes and scoring methods is put forth.

METHODOLOGY

In the present study, the socio-economic phenomena were observed without any external influence at a single point of time. Hence, cross sectional survey design was followed. The three agro climatic zones in the state of Telangana were used to choose the sample. Using the random sample approach, one district from each agro climatic zone, two mandals under each district and two villages under each mandal were chosen. Respondents were selected using stratified proportionate sampling bringing the sample's size to 300. Data was collected using the interview schedule based on the newly developed SES scale for farmers by the researcher.

Two key concerns had to be addressed in order to develop a classification scheme appropriate for the current study: the number of SES groups to be formulated, and to determine the scores of the category in which a respondent fall. The number of classes was fixed employing NbClust package in R software version 4.3.1 (Charrad et al., 2015; Vasu et al., 2019). The NbClust package provides 30 indices for identifying the clusters from the data set. It suggests to the user the best clustering based on several outcomes by trial and error with several combinations of cluster size, clustering techniques and distance measurements. The clusters range from 2 to 15 respectively. The k-means technique is used by the function to determine the optimal number of clusters for the dataset. Based on the past classification levels and experts suggestions, the maximum cluster range for the present study was fixed at 7. As classifying into more than 7 classes would be too vague and ambiguous in understanding and demarcating the farmer socio-economic conditions.

The next step, determining the score range for the obtained classes is calculated using the method Cumulative Square Root of Frequency (CSRF). This method proves to be highly efficient in determining strata boundaries of each class based on the total scores in the data set (Raghavarao, 1987). The foremost step in this method is to obtain number of classes using the following formula.

Number of classes = 2.5 x (Number of samples) ¼

Next, class interval is calculated. Based on the class interval value, the upper and lower limit of the classes is formulated. The frequency of respondents falling in each class is calculated and cumulative square root frequency of all the classes will be determined based on the frequency values in the respective classes. Then the calculation of the boundary values of the each class was performed by using the following formula.

$$L = K + \left[\frac{\mathrm{L_i} - C}{\sqrt{f}}\right] \times n$$

Where, K - Class lower limit in which L_i lies
L_i - Cumulative square root value i.e. L_1, L_2, ….L_i
C - Cumulative square root frequency of the preceding class where L_i lies
N - Interval of the class
F - Square root of frequency of i^{th} class where L_i falls

RESULTS AND DISCUSSION

The optimal and best numbers of clusters from the NBClust analysis were depicted in the Figure 1. The Hubert and Dindex index use a graphical visualization to provide the best clusters possible. Both the index seek a significant peak that relates to a considerable shift in the measure's value as shown in Figure 1. The summary of NBclust analysis was as follows: Among all indices: 1 proposed 3, 3 proposed 5, 1 proposed 4 and 1 proposed 6 as the best number of clusters. Based on the majority rule the best and optimum number of clusters for data set as given by analysis was 5. The result of the NBClust analysis for the number of socio-economic classification of the data set was in conformity with past literature where majorly a 5-level classification was used (Tiwari et al., 2005; Gaur, 2013; Kadian, 2014).

These obtained five number of classes were named as 'upper' the top most class, followed by the middle three 'upper middle', 'middle', 'lower middle', with the bottom class named 'lower'. The presence of odd number of classes, the number of classes was equal on either side of the "middle class". The scores calculated using CSRF were presented in the table. These scores satisfy the basic characteristics suggested by Rogers (1962) for a category set viz., exhaustive, mutually exclusive and were derived from the same classificatory principle (SES total score criterion).

Description of the five class socio-economic groups

The brief characteristics of each socio-economic group is given below. They were based upon information gathered during the research survey. These are, however, generalizations, and it's possible that they don't accurately characterize individuals when applied in another research area. A slight modification among the categories can be made for future use.

Upper category

The farmers belonging to this category scored more than 24 with highest score of 33 on the socio-economic status scale. They

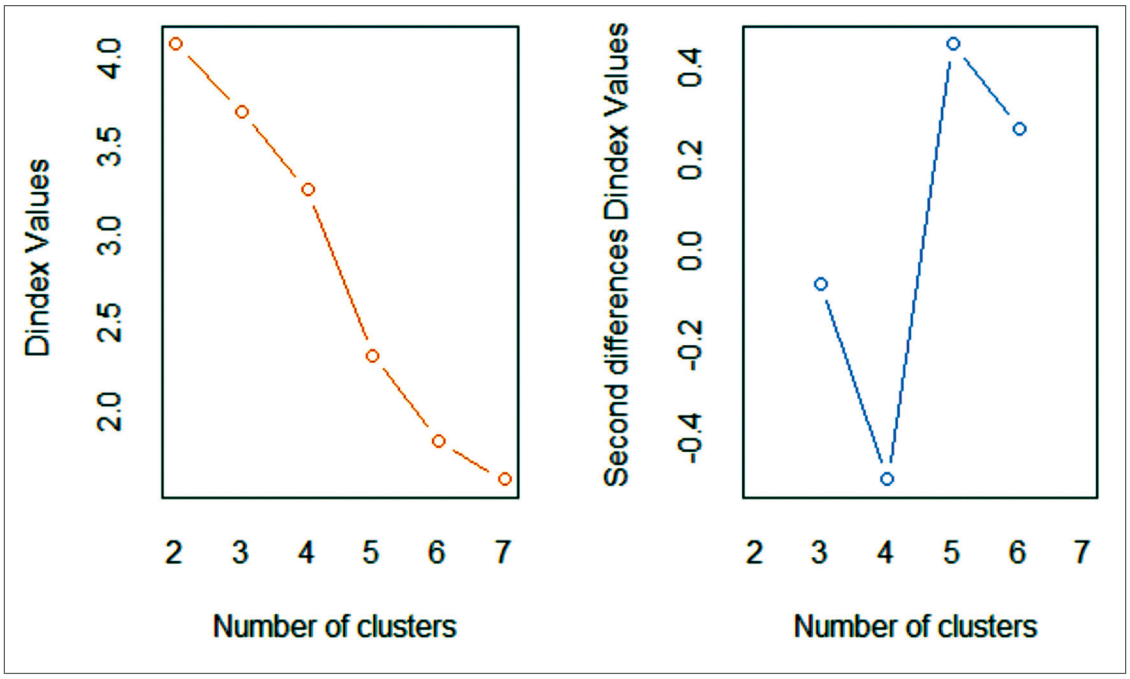

Figure 1. Results of NBClust analysis showing optimum number of clusters

Table 1. Five level socio-economic categorization using CSRF method

Category	Scores	Percentage of respondents
Lower	Below 13	15.33
Lower middle	13-16	22.00
Middle	17-20	30.33
Upper middle	21-24	18.33
Upper	25 & above	14.33

might be prominent figures or the community's elite. People outside the village were also familiar with them. As a result of their increased participation and connections, this group offered leaders to the society. They possessed more than 20 acres of land and had a permanent housing condition in which the roof and walls of house were made of permanent materials such as galvanized iron, cement, burnt bricks. Their main source of livelihood was agriculture, with employing both permanent and temporary farm labour. Their farm inventory includes a tractor, sprayer, cattle shed, cage wheels and leveler. All of them possessed household items such as refrigerator, cooler, mixer and grinder. The family living condition was a neutral family with 3-5 people. Their educational level varied between middle or higher secondary school grade. All were found to be active participants in more than one social organization and majority of them were office-bearers in any one of the social organizations. The monthly income of this group was above 20,000 rupees. Around 14 per cent of the farmers in the research area came in this category.

Upper middle

The range of socio-economic status score for this group was 21-24 points. They possessed 10-20 acres of land or more and had a permanent to semi-permanent housing condition which means either the roof or wall of the house made of temporary materials like asbestos sheets or un-burnt bricks. Their main source of livelihood was agriculture, with employing farm labour for agricultural operations during sowing and harvesting. Their farm inventory included a tractor, sprayer and leveler. All of them possessed household items such as refrigerator, cooler and mixer. The family living situation was a neutral family with 3-5 people. Their educational level varied between middle or higher secondary school grade. All were found to be active participants in more than one social organization. The monthly income of this group was above 15,000-20,000 rupees. 18 per cent of farmers belonged to this level.

Middle

The socio-economic status score for farmers in this group ranged from 17-20. They possessed 5-10 acres of land and had a semi-permanent to temporary housing condition where both the roof and walls made of temporary materials. Their main source of livelihood was agriculture, with employing farm labour during harvesting. Their farm inventory included a sprayer and leveler. All of them possessed household items such as refrigerator and mixer. The family living condition comprised of both joint and neutral condition with 3-7 people. Their educational level varied between primary to post graduate level. All were found to be active participants in at least one social organization. The monthly income of this group was above 10,000-15,000 rupees. The middle class category comprised of 30 per cent of the sample population.

Lower middle

The range of socio-economic status score for this group was 13 to 16. Majority of them had education ranging from primary to under graduate level. They possessed 1-5 acres of land and had

a temporary housing condition. Their main source of livelihood was agriculture and working as casual labour during offseason. Their farm inventory included sprayer and possesses household items such as refrigerator. The family living condition is a neutral family with 2-3 people. Their educational level varied between primary to post graduate level. Farmers belonging to this category were either participants in atleast one social organization or no membership in any of the social organization. The monthly income of this group was above 5,000-10,000 rupees. This class accounted to around 22 per cent of respondents from the total sample.

Lower

This category had scores less than 13 points on the socio-economic status scale. All were illiterates and possessing land up to one acre. All were found to be simultaneously cultivating and working as agricultural labourers. They had non-serviceable housing condition mud walled and thatched house. None of them had any participation and possessions with income below 5000 rupees. 15 per cent of farmers in the study were poor. The description of the socio-economic classes in the present study confirms to past studies where farmers possessing land less than 10 acres were in middle class. Income above 2 lakhs per annum were of high class and lower class people with no social membership, material possessions (Devarani & Bandhyopadhyay, 2012; Kumar et al., 2018; Singh et al., 2019).

The description given in this paper could be seen as suggesting that a person who was previously associated with the top class or lower class in a social system will continue to be that way in the future. This isn't always the case. In fact, a large number of studies demonstrate that people in a social system migrate significantly over time from one class to another, and this could be particularly true for vertical mobilization. However, for the majority, the change could be to a neighbouring class. Rarely does anyone move forward or backward more than two categories. These transitions could be occurred as a result of a tragedy, such as the loss of a significant family member, family disputes, and similar events in the case of upper class individuals and as for lower class due to higher studies, additional land possessions, etc.

CONCLUSION

There should be a clear-cut demarcation of classes in to which an individual belongs, as it would help the extensionists, researchers and government officials to help the target population. As the presence of standard classes for rural people was long overdue in present scenario, present study was undertaken with new methodology to standardize these classes. Using the NBClust analysis in R, the best possible number of classes arrived at 5 class classification. The scoring attempted using CSRF ranged from below 13 for lower class to above 25 for upper class. These standardized classes were part of a scale developed for measuring SES of farmers. The proposed new socio-economic classification would have a wide range of application with extension researchers, policy makers for identifying the target population and initiate better developmental programmes. The classification methodology could be applied in categorizing farmers for measuring their adoption behavior, extent of utilization and knowledge levels pertaining to technologies, improvement practices etc.,

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