

Short Communication

Introducing sesIndia: an R package for updating and calculating socioeconomic scales in India - a computing tool

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ABSTRACT

Background: Socioeconomic status (SES) measures health status and living standards. The B.G. Prasad and Kuppuswamy scales are used to classify individuals based on SES in Indian setting. These measures required adjustments in line with financial inflationary trends that affect income. To help in updating and calculating these SES scales sesIndia package is developed, where the package uses consumer price index for industrial workers (CPI-IW). An R package was developed and tested to update SES scale and calculate SES classifications in India. The sesIndia uses valid inputs CPI-IW (website which updates CPI-IW) provides updated B.G. Prasad and Kuppuswamy scale income thresholds. It also computes SES classes for B.G Prasad and Kuppuswamy scales. The sesIndia package enables researchers to reliably calculate SES with updated CPI-IW. The R package sesIndia guarantees precise and reproducible SES classification. SES being a part of most public health and policy research, such a package which accounts for inflation trends will be robust tool for researchers. The source code for sesIndia can be accessed from <https://github.com/pk041199/sesIndia>.

Keywords: BG Prasad scale, Kuppuswamy scale, R package, Socioeconomic status scale

INTRODUCTION

Socioeconomic status (SES) assesses health and wellbeing. SES help to plan services and conduct research in healthcare, nutrition, education.¹ India has a vast economic and social diversity where SES assessment addresses health disparities and guide public health strategies. B.G. Prasad scale and the modified Kuppuswamy scale are currently used by most researchers. B.G Prasad scale, based on per capita monthly income and Kuppuswamy scale established in the late 1970 targets urban population with education, occupation, and family income components.²

Economic inflation affects the accuracy of the SES classification and thus regular recalibration of the income thresholds is required. The Labour Bureau of India's

consumer price index for industrial workers (CPI-IW) provides standards to adjust income thresholds in order to address economic trends.³

CPI-IW can be used for income category adjustment of B.G. Prasad scale and Kuppuswamy scale, while occupation and education scores are constant in Kuppuswamy scale.⁴

We introduce an R package (sesIndia) to simplify updating and calculation of SES classifications based on the B.G. Prasad and Kuppuswamy scales using CPI-IW data. sesIndia automates income threshold adjustments and supports numeric coded inputs for education and occupation to calculate SES scale. With built in data validation for reliable results researchers and policymakers.

Package description

sesIndia adjust income thresholds for B.G. Prasad and Kuppuswamy scales and calculates SES classifications. Features include CPI-IW based income range updates, support for CSV/excel file inputs, and data validation of inputs and SES calculation. The package can be installed from GitHub: `devtools::install_github("pk041199/sesIndia")`.

Implementation

R and R studio were used to develop R functions such as `update_bg_prasad()`, and `update_kuppuswamy()` which adjust income thresholds for respective scales using the formulae, `validate_ses_data()` which ensure input format to calculate, `calculate_ses_bg()` and `calculate_ses_kuppuswamy()` which compute SES classifications.⁵

METHODS

The following formula was used to adjust income range.

$$\text{Updated income} = \text{Base Income} \times (\text{CPI} - \text{IW}_{\text{base}} / \text{CPI} - \text{IW}_{\text{current}})$$

Where, CPI-IW_{base} (2016) = 100, as the reported values from labour bureau of India are with reference to 2016 as base value.

Data input will be data frame or CSV/excel with income (INR, numeric), education (1-7), occupation (1-10). Data

output will be updated income ranges or calculated SES classifications.

Example

Update and validate Kuppuswamy scale for January 2025 (CPI-IW=143.2): `kup_updated <- update_kuppuswamy(cpi_iw = 143.2) print(kup_updated)`.⁶

Table 1: Class.

S. no.	Class	Lower	Upper	Score
1	Upper	60125	Inf	12
2	Upper middle	30063	60095	10
3	Middle	22548	30030	6
4	Lower middle	15032	22526	4
5	Lower	9019	15006	3
6	Lower lower	3038	8998	2
7	Lowest	0	3006	1

Calculate SES for a study dataset: `ses_kup <- calculate_ses_kuppuswamy(sample_ses_data, income_column = "income", education_column = "education", occupation_column = "occupation", cpi_iw = 143.2) print(ses_kup)`.

File-based SES calculation: `ses_kup_file <- calculate_ses_kuppuswamy("data.csv", income_column = "income", education_column = "education", occupation_column = "occupation", cpi_iw = 143.2)`.

Table 2: Income.

S. no.	Income	Education	Occupation	Income score	Education score	Occupation score	Total score	SES
1	5000	4	6	2	4	6	12	Lower middle
2	35000	6	9	10	6	9	25	Upper middle
3	3000	2	2	1	2	2	5	Upper lower
4	65000	7	10	12	7	10	29	Upper
5	1000	1	1	1	1	1	3	Lower

RESULTS

An R package was developed and tested to update SES scale and calculate SES classifications in India. The sesIndia uses valid inputs CPI-IW from <https://labourbureau.gov.in> (website which updates CPI-IW) provides updated B.G. Prasad and Kuppuswamy scale income thresholds. It also computes SES class for B.G Prasad and Kuppuswamy scale. The package was validated against Labour bureau CPI-IW data and yearly published scales.⁷ The package provides a robust computation to calculate SES classification.

DISCUSSION

The sesIndia package enhances the reliability of research where ever socioeconomic status is one of the components

in the research. By using sesIndia package we need not wait for yearly publication of updated scale thresholds. As long as the labour bureau of India releases CPI-IW with the base year as 2016 the package doesn't require major updates. The author will maintain package updates in case of a change in base year. The sesIndia package is similar to SesIndexCreator, which automates SES index creation, but still our package focuses in Indian context.⁸

There are limitations as the calculation is dependent on manual input of CPI-IW from the source, to do that researcher require expertise, as the package assumes that the provided CPI-IW is valid. There is scope for improving the package where we can integrate regional CPI indices, add new SES scales, and enhance error handling for missing data.

CONCLUSION

The sesIndia package equips researchers to reliably calculate SES with updated CPI-IW. The R package sesIndia ensures precise and reproducible SES classifications. SES being a part of most public health and policy research, such a package which accounts for inflation trends will be robust tool for researchers. The researchers can contribute to the GitHub repository, and feedback can be provided for improvements. The source code for sesIndia can be accessed from <https://github.com/pk041199/sesIndia>.

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