RESEARCH ARTICLE

Inequities in curative health-care utilization among the adult population (20–59 years) in India: A comparative analysis of NSS 71st (2014) and 75th (2017–18) rounds

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Abstract

Objective

The study attempts (a) to compute the degree of socio-economic inequity in health care utilization and (b) to decompose and analyze the drivers of socio-economic inequity in health care utilization among adults (20–59 years) in India during the periods 2014 and 2017–18.

Data source

The analysis has been done by using the unit level data of Social Consumption: Health (Schedule number 25.0), of National sample Survey (NSS), corresponding to the 71st and 75th rounds.

Methods

Odds ratios were computed through logistic regression analysis to examine the effect of the socio-economic status on the health seeking behaviour of the ailing adult population in India. Concentration Indices (CIs) were calculated to quantify the magnitude of socio-economic inequity in health care utilization. Further, the CIs were decomposed to find out the share of the major contributory factors in the overall inequity.

Results

The regression results revealed that socio-economic status continues to show a strong association with treatment seeking behavior among the adults in India. The positive estimates of CIs across both the rounds of NSS suggested that health care utilization among the adults continues to be concentrated within the higher socio-economic status, although the magnitude of inequity in health care utilization has shrunk from 0.0336 in 2014 to 0.0230 in 2017–18. However, the relative contribution of poor economic status to the overall explained inequities in health care utilisation observed a rise in its share from 31% in 2014 to 45% in 2017–18.
Conclusion
To reduce inequities in health care utilization, policies should address issues related to both supply and demand sides. Revamping the public health infrastructure is the foremost necessary condition from the supply side to ensure equitable health care access to the poor. Therefore, it is warranted that India ramps up investments and raises the budgetary allocation in the health care infrastructure and human resources, much beyond the current spending of 1.28% of its GDP as public expenditure on health. Further, to reduce the existing socio-economic inequities from the demand side, there is an urgent need to strengthen the redistributive mechanisms by tightening the various social security networks through efficient targeting and broadening the outreach capacity to the vulnerable and marginalized sections of the population.

Introduction
Health is a “critically significant constituent of human capabilities”, i.e. an integral enabling factor for a person to thrive as a human being and health equity is central to social justice [1]. That is why the inequalities in health and health care have been flagged as more critical than inequalities in most other domains [1, 2]. Since the decade of 1990s, policy oriented research in health inequities has emerged as an increasingly popular domain of investigation worldwide with national governments, policy-makers and international organizations like the World Bank and the World Health Organization starting to put equity among the top priorities in their agendas [3–5]. This is reflected in the Millennium Development Goals (Goals- 4, 5 and 6) that laid primary thrust on the improvement in the health outcomes of the world’s poor and subsequently in the Goal-3 of Sustainable Development Goals that also focused on ensuring equity in health [6, 7]. Studies have testified that the inequalities in health outcomes and access to health care are due to the differences in economic constraints between the poor and the rich rather than the differences in their preferences [8–12]. Such inequalities should not be considered simply as inequalities but as inequities as they are socially unjust [13]. The report of the Commission on Social Determinants of Health (CSDH), set up by the World Health Organization (WHO) in 2005, also observed that rather than differences in individual behaviors, it is a “cluster of random events” that systematically keeps the health of some population groups worse than others. Inadequate and inefficient health care delivery system were flagged as important determinants of health outcomes [14]. India’s National Health Policy in 2002 has recognized ‘ensuring a more equitable access to health services across the social and geographical expanse of the country’, as an important objective [15]. Moreover, the development in health inequity literature [16–19] has motivated researchers in India to estimate the inequities in health status and distribution of health care services across the various socio-economic groups [20–25].

Ideally, access to health care is a human right that all citizens of a country irrespective of their socio-economic position should rightfully enjoy. However, in a developing country like India, with 29.5 per cent of its population living under the poverty line (fixed at 32 INR per day for rural areas and 47 INR for urban areas) during 2011–12 [26], health is a privilege for a large section of its population. The latest round of National Sample Survey on Social Consumption: Health [27], shows that the proportion of persons reported as ailing (PPRA) is unevenly distributed across the economic groups with the poorest reporting the lowest PPRA of 3.79
compared to that of the richest (8.17). The rate of treatment seeking is also higher among the rich (93.5%) compared to the poor (86.3%). This is indicative of higher tolerance and lack of awareness among the poor people for the mortality and morbidity risks. This higher tolerance is also reflective of the fact that treatment seeking of the poor is often associated with high opportunity costs of wage loss, which the poor find difficult to afford. The poor often thus indulge in self-treatment to save time and money [27]. The skewed time preference of the poor, in terms of discounting heavily the future health risks, induce them to postpone treatment for minor illnesses and seek treatment when in the verge of collapse and thereby ending up incurring exorbitantly high out of pocket expenditures, which often become catastrophic [28–32].

In terms of efficiency in health care deliveries, two aspects are critically important—accessibility and utilization. While the former covers the supply side, the latter broadly covers the demand side. According to the National Health Systems Resource Centre (NHSRC) Report 2017 [33], 70 percent of the aggregate health care expenditure are incurred through out of pocket (OOP) expenditure and 75 percent of the morbidities are treated through private sectors at exorbitant costs. Under this backdrop, the NSS Social Consumption: Health (2019) [27] data reveals that the bottom two income-quartiles accounted for almost 63% of the total unmet need for health care. The inequality in unmet need for health care was far worse in rural sector with 78% of the share borne by the two lowest income-quartiles. Moreover, only 39.09% of ailing persons belonging to the poorest quartile availed treatment in a government hospital, while 25% of the richest quartile availed services of a government facility. Majority of the ailing poor have to resort to the services of the private hospital or clinics (56%), which are quicker in service-delivery. In India, the lowest wealth quintile of population is reported to utilize only one-tenth of public health subsidy as opposed to nearly one-third by the richest wealth quintile [34]. This inequality is inequitable as it arises out of a person’s marginalization in the society.

While research in the domain of inequity in health care utilization has gained momentum in India since mid-2000, the studies dedicated to this issue have been largely limited to the maternal health care utilization [35–40] or child immunization, i.e. preventive health care utilization [41–45]. The studies that have investigated the inequities in health care utilization in India have methodological limitations as they are mostly restricted to only bivariate analysis [46–49]. As opposed to the developed countries, there is, by and large, very thin literature in India that examine the issues of socio-economic inequity in health care utilization by employing the newer econometric tools of measurement of health inequality [20, 22–25, 50] and most of these existing studies have either done an aggregated analysis for all ages or have focused only on the elderly population. The issue of inequity in health care utilization among adults remains under-researched in India. The aim of the present study, is, therefore, to plug this research gap.

Given that the age dependency ratio in India is 49.25% (i.e., 39.73% and 9.52 for young and old population respectively) [51], India has a considerably large proportion of the adult population (47.2%) between the ages of 20 and 59 years [52]. Healthy adulthood is the bedrock of a country’s human resource base. This age-group forms the workforce and acts as engines of economic growth. It is therefore, imperative that the working age-group stays healthy and has equitable access to health care services in case of illnesses. Since, an overwhelming majority of the workforce in India (82%) is employed in the unorganized sector [53] characterized by unregulated and unsafe working conditions, they are highly vulnerable to various disease burdens as well as workplace-related health hazards. Unintentional injuries constitute the largest share of deaths (roughly 26%) among the younger adult age-groups. Among the middle-aged adults, however, the leading causes of death are cardiovascular diseases, accounting for roughly 32% deaths [54]. However, due to inequitable access to health care, the disadvantaged groups
even succumb to easily curable diseases, in the absence of medical attention. Given the huge disparity in health indicators among the wealth quintiles [24, 55], a study of inequity in health care utilization is extremely warranted for a targeted policy intervention.

Given this backdrop, the central concern of the study is, therefore, to delve into the complex interplay of a person’s health seeking behavior and their position in the socio-economic gradient. The primary objectives of the study are: (a) computing the degree of socio-economic inequity in utilization of health care and (b) observing its prominent contributory factors among the adults in India (20–44 years or younger adults and 45–59 years middle-aged). We also aim to see if there have been any changes in inequity and its drivers between the two NSS rounds, i.e. 71st (2014) and 75th (2017–18).

Materials and methods

Data source

The analysis has been done by using the unit level randomized data collected through 71st and 75th rounds of the National sample Survey (NSS) [27, 56], corresponding to the Schedule number 25.0 (Social Consumption: Health), collected during the period of January—June 2014 and July 2017—June 2018 respectively. The NSS 71st and 75th rounds survey data provide a nationally representative detailed information on self-reported morbidity episodes and the corresponding treatment seeking for a specified recall period along with a comprehensive background information of that particular individual’s socio-economic and demographic characteristics. The socio-economic and demographic profile of our samples in the age-group 20–59 years, pertaining to both the 71st and 75th rounds is presented in Table 1. It must be noted here that adults are not a homogenous group and display a great degree of heterogeneity. For the present study, this broad age-group is bifurcated into younger adults aged between 20 and 44 years and middle-aged persons aged 45–59 years.

In this study, out of the total sample size, only those adults (20–59 years) who self-reported some illness in the past 15 days recall period were considered for analyses related to health care utilization. Health care facilities are supposed to be utilized only by those who need it, i.e. those who suffer from any ailment that require medical treatment. Thus, the number of observations for our analyses pertaining to utilization of health care (inclusive of both in-patient and out-patient treatments) was restricted to 18,445 (9244 and 9201 for younger adults and middle-aged respectively) for 71st round and 20,157 (8680 and 11,447 for younger adults and middle-aged respectively) for 75th round. It is to be noted that the figures do not pertain to number of ailing persons, rather number of spells of ailment reported. This means that there may be more than one spell of ailment reported by a single individual which has been reported as separate observations because treatment must be sought for each incidence of illness by an individual. The number of individuals who reported multiple spells of illnesses was 1346 (430 and 916 for younger adults and middle-aged respectively) for 71st round and 1132 (243 and 889 for younger adults and middle-aged respectively) for 75th round. Ailments reported among the younger adults (20–44 years) were majorly related to infection and respiratory in both the 71st and the 75th rounds. The share of infection related ailments increased from 24 to 31.5 percent between the two rounds. In case of the middle-aged population (45–59 years), diabetes and hypertension were the most commonly reported ailments across the time periods 2014 and 2017–18. The frequency distributions of number of spells of illnesses and the nature of illnesses have been presented in Tables 2 and 3.
Table 1. Socio-economic and demographic profile of the sample.

| Background Characteristics | Adult Population (20 to 59 years)* | 2014 (71st round) | 2017–18 (75th round) |
|----------------------------|------------------------------------|-------------------|----------------------|
|                            | Frequency (%)                      | Frequency (%)     | Frequency (%)        |
| Age                        | Younger Adults (20–44 years)       | 132,733           | 73.68                |
|                            | Middle Aged (45–59 years)         | 47,411            | 26.32                |
| Sex                        | Male                               | 89,454            | 49.66                |
|                            | Female                             | 90,690            | 50.34                |
|                             | Transgender                        | -                 | -                    |
| Place of Residence         | Rural                              | 99,148            | 55.04                |
|                            | Urban                              | 80,996            | 44.96                |
| Education                  | Illiterate                         | 40,249            | 22.45                |
|                            | Upper Primary or below             | 67,687            | 37.76                |
|                            | Secondary                          | 24,669            | 13.76                |
|                            | Higher secondary or above          | 46,646            | 26.02                |
| Marital Status             | Currently Married                  | 144,391           | 80.55                |
|                            | Others                             | 34,860            | 19.45                |
| Religion                   | Hindu                              | 137,885           | 76.54                |
|                            | Muslim                             | 25,169            | 13.97                |
|                            | Christian                          | 10,616            | 5.89                 |
|                            | Sikh                               | 3,280             | 1.82                 |
|                            | Others                             | 3,194             | 1.77                 |
| Social Group               | ST                                 | 23,135            | 12.84                |
|                            | SC                                 | 29,467            | 16.36                |
|                            | OBC                                | 70,915            | 39.37                |
|                            | Others                             | 56,627            | 31.43                |
| Economic Group             | Poor                               | 47,963            | 26.63                |
|                            | Lower Middle                       | 35,849            | 19.90                |
|                            | Upper Middle                       | 51,149            | 28.40                |
|                            | Rich                               | 45,158            | 25.07                |
| Health Coverage            | Not Covered                        | 149,694           | 83.51                |
|                            | Covered                            | 29,555            | 16.49                |
| Household Size             | 4 or less                          | 59,382            | 32.96                |
|                            | 5 to 6                             | 62,440            | 34.66                |
|                            | 7 or more                          | 58,322            | 34.66                |
| Region                     | North                              | 47,963            | 26.63                |
|                            | Central                            | 38,091            | 21.14                |
|                            | East                               | 31,946            | 17.73                |
|                            | Northeast                          | 22,875            | 12.70                |
|                            | West                               | 24,864            | 13.80                |
|                            | South                              | 35,340            | 19.62                |
| TOTAL                      |                                    | 179,251           | 100                  |
|                           |                                    | 314,203           | 100                  |

Note
* unweighted sample

Source: Authors’ calculation based on the NSS 71st and 75th Round data on Social Consumption: Health

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Variables for statistical analyses

**Dependent variable.** “Whether any treatment was taken on medical advice for a reported spell of ailment” (Yes = 1, No = 0) has been chosen as the dependent variable. In both the 71st and 75th rounds of NSS, information was collected on the nature of treatment sought for the spells of ailment during the last 15 days recall period. This includes treatment for ailments that started within the past 15 days as well as those that started more than 15 days ago but were ongoing during the recall period; the ailments may be acute or chronic.

### Table 2. Frequency distribution of individuals reporting one or multiple illnesses among adult population in India.

| Number of Spells | Younger Adults (20–44 years) | Middle-Aged (45–59 years) | All Adults (20–59 years) | Younger Adults (20–44 years) | Middle-Aged (45–59 years) | All Adults (20–59 years) |
|------------------|-------------------------------|---------------------------|--------------------------|-------------------------------|---------------------------|--------------------------|
|                  | Frequency %                   | Frequency %               | Frequency %              | Frequency %                   | Frequency %               | Frequency %              |
| 1                | 8338 95.10                    | 7124 88.6                 | 15462 91.99              | 8170 97.11                    | 9,501 94.44               | 17,671 93.98             |
| 2                | 390 4.45                      | 723 9.0                   | 1113 6.62                | 225 2.67                      | 727 7.00                  | 952 5.06                 |
| 3                | 36 0.41                       | 150 1.9                   | 186 1.11                 | 13 0.15                       | 131 1.26                  | 144 0.77                 |
| 4                | 3 0.03                        | 34 0.4                    | 37 0.22                  | 4 0.05                        | 26 0.25                   | 30 0.16                  |
| 5                | 0 0.00                        | 9 0.1                     | 9 0.05                   | 1 0.01                        | 5 0.05                    | 6 0.03                   |
| 6                | 1 0.01                        | 0 0.0                     | 1 0.01                   | 0 0                           | 0 0                       | 0 0                      |
| Total            | 8768 100                      | 8040 100                  | 16808 100                | 8413 100                      | 10390 100                 | 18803 100                |

Source: Authors’ calculation based on the NSS 71st and 75th rounds’ data on Social Consumption: Health

### Table 3. Nature of ailments reported by the adult population in India.

| Nature of Ailment                      | Younger Adults (20–44 years) | Middle-Aged (45–59 years) | All Adults (20–59 years) | Younger Adults (20–44 years) | Middle-Aged (45–59 years) | All Adults (20–59 years) |
|---------------------------------------|------------------------------|---------------------------|--------------------------|------------------------------|---------------------------|--------------------------|
|                                       | Frequency %                  | Frequency %               | Frequency %              | Frequency %                  | Frequency %               | Frequency %              |
| Infection                             | 2,250 24.34                  | 988 10.74                 | 3,238 17.55              | 2,739 31.56                  | 1,395 12.15               | 4,134 20.51              |
| Cancer                                | 88 0.95                      | 99 1.08                   | 187 1.01                 | 77 0.89                      | 178 1.55                  | 255 1.27                 |
| Blood diseases                        | 137 1.48                     | 87 0.95                   | 224 1.21                 | 108 1.24                     | 105 0.91                  | 213 1.06                 |
| Diabetes                              | 456 4.93                     | 1665 18.1                 | 2121 11.5                | 574 6.61                     | 2626 22.88                | 3200 15.88               |
| Endocrine, metabolic, nutritional     | 290 3.14                     | 224 2.43                  | 514 2.78                 | 373 4.3                      | 352 3.07                  | 725 3.6                  |
| Psychiatric and Neurological          | 814 8.81                     | 531 5.77                  | 1,345 7.29               | 633 7.29                     | 559 4.87                  | 1,192 5.91               |
| Eye                                   | 108 1.17                     | 125 1.36                  | 233 1.26                 | 81 0.93                      | 127 1.11                  | 208 1.03                 |
| Ear                                   | 56 0.61                      | 43 0.47                   | 99 0.54                  | 38 0.44                      | 38 0.33                   | 76 0.38                  |
| Hypertension                          | 467 5.05                     | 1497 16.27                | 1964 10.65               | 530 6.11                     | 2339 20.9                | 2929 14.53               |
| Cardio-Vascular                       | 234 2.53                     | 507 5.51                  | 741 4.02                 | 234 2.7                      | 649 5.65                  | 883 4.38                 |
| Respiratory                           | 1,171 12.67                  | 872 9.48                  | 2,043 11.08              | 888 10.23                    | 705 6.14                  | 1,593 7.9                |
| Gastro-intestinal                     | 914 9.89                     | 576 6.26                  | 1,490 8.08               | 691 7.96                     | 512 4.46                  | 1,203 5.97               |
| Skin                                  | 225 2.43                     | 142 1.54                  | 367 1.99                 | 241 2.78                     | 164 1.43                  | 405 2.01                 |
| Musculo-Skeletal                      | 821 8.88                     | 1,237 13.44               | 2,058 11.16              | 558 6.43                     | 1,197 10.43               | 1,755 8.71               |
| Genito-urinary                        | 380 4.11                     | 170 1.85                  | 550 2.98                 | 272 3.13                     | 163 1.42                  | 435 2.16                 |
| Obstetric                             | 239 2.59                     | 1 0.01                    | 240 1.3                  | 201 2.32                     | 1 0.01                    | 202 1                    |
| Injuries                              | 347 3.75                     | 196 2.13                  | 543 2.94                 | 274 3.16                     | 170 1.48                  | 444 2.2                  |
| Others                                | 247 2.67                     | 241 2.62                  | 488 2.65                 | 168 1.94                     | 137 1.19                  | 305 1.51                 |
| Total                                 | 9,244 100                    | 9,201 100                 | 18,445 100               | 8,680 100                    | 11,477 100                | 20,157 100               |

Source: Authors’ calculation based on the NSS 71st and 75th rounds’ data on Social Consumption: Health
In this study, all the categories of treatment except no treatment were clubbed together, thereby getting the binary category—medical treatment sought (1), no medical treatment sought (0). Further, the cases of reported self-treatment were re-categorized in the no medical treatment category.

**Predictor variables.** Four broad domains of covariates have been identified that may induce inequalities in health care utilization. These domains pertain to sets of demographic factors, socio-economic factors, institutional factors and geographical factors.

The demographic variables include: (a) age (categorized as younger adults (20–44 years) and middle aged (45–59 years), due to the varying disease burden and health seeking behavior of the two age cohorts); (b) sex (male and female); (c) social groups (Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Classes (OBC) and others); (d) religion (Hindu, Muslim, Christian, Sikh, and others and (e) marital status (currently married and others (inclusive of those who never married or are divorced/ separated/ widowed)).

The socio-economic variables comprise of (a) economic group: given that NSS provides data on households’ monthly consumption expenditure (MPCE) and not income, we have taken MPCE as a proxy for income. MPCE quartiles were created based on the relative ranking of the households as per standard of living (NSSO 2019); (b) educational status: the NSS collected information on the general educational level of individuals in 15 categories that were contracted into four broad classifications vis a vis illiterate; upper primary or below; secondary; higher secondary and above for the present study; (c) household size (categorized as 4 or less; 5 to 6; and 7 or more).

The institutional variable comprises of health insurance (categorized as covered and not covered). Lastly, the geographical variables include (a) place of residence (urban and rural); and (b) region (North, East, West, Central, Northeast and South) to account for the effect of the regional imbalance in India.

**Statistical analyses**

Bivariate percentage distribution (cross-tabulation) is calculated to estimate the differences in PAP (Proportion of Ailing Persons per 100) and percentage of ailing persons seeking treatment on medical advice by predictor variables. The results are tested for statistical significance by using Pearson’s Chi-squared test for homogeneity or independence.

The association between predictor variables and health seeking behavior is examined by considering binary logistic model. The equation is presented as follows:

\[
P_i = \Pr (y = 1|x) = F(x\beta) = \frac{\exp(x\beta)}{1 + \exp(x\beta)}
\]

(1)

\(F(x\beta)\) follows the cumulative distribution function of the logistic distribution. Eq (1) is not linear in parameter and requires certain manipulations to get a logistic function, \(L\) which is linear in parameter.

\[
L = \log\left(\frac{p}{1-p}\right) = x\beta + u
\]

(2)

\(L\) gives the log of odds in favor of \(y_i = 1/x_i\), where \(x_i\) is the vector of socio-economic covariates of \(i^{th}\) individual, the coefficients \(\beta\) are parameters to be estimated, and \(u\) is the idiosyncratic error term.

A number of studies have estimated the level of inequalities in health, using various techniques like Lorenz curve, Gini coefficient, Concentration Index and Concentration Curve [13, 17, 19, 45, 57–61]. In the present study, Concentration Index has been chosen to measure the
magnitude of socio-economic inequity in health care utilization as it is the best suited for our objective. This is because, by computing Gini coefficient one can only measure pure health inequality and not socio-economic inequality in health [62]. Gini coefficient (based on the Lorenz curve) is computed by ranking individuals to their health status whereas in the computation of the Concentration Index (based on the Concentration Curve), individuals are ranked according to their socio-economic status [63, 64].

Following Wagstaff (2005) [65], the magnitude of socio-economic inequity in utilization of health care was quantified through Concentration Index (CI), by using the equation:

\[
CI = \frac{1}{n} \sum_{i=1}^{n} \frac{(a - b)}{(a - \mu)(\mu - b)} \left(2r_i - 1\right)
\]

Where,
- \(n\) = sample size
- \(\mu\) = weighted mean of the health variable of the sample
- \(r_i\) = fractional rank of the \(i^{th}\) individual (for weighted data) in terms of their household’s economic status. Monthly Per-capita Consumption Expenditure- MPCE (obtained by dividing monthly usual consumption expenditure of a household by the size of the household), is the rank variable for this analysis.
- \(a = 1\), and \(b = 0\) are the maximum and minimum levels of health care utilization respectively.

The value of CI varies between \(-1\) and \(+1\). A negative value implies that the outcome of the variable is concentrated among socio-economically disadvantaged people while a positive value means the inequity is pro-rich.

Further, the concentration indices are decomposed to find out the share of the major contributory factors. The contribution of each of the predictors is computed as a percentage of the total inequality in health care utilization. For any additive linear regression model, association of a health variable, \(y\), to a set of \(k\) determinants- \(X_k\) can be expressed as follows [18]:

\[
y_i = \alpha + \sum \beta_k x_k + \epsilon
\]

Given the association between \(y_i\) and \(x_k\) in Eq (4), the concentration index for \(y_i\) health variable (C) can be expressed as follows [18]:

\[
C = \sum \left(\frac{\beta_k X_k}{\mu}\right) C_k + \frac{GC}{\mu}
\]

Where,
- \(X_k\) is the mean of the \(x_k\) determinant,
- \(C_k\) is the concentration index of the \(x_k\) determinant
- \(\mu\) is the mean of the health outcome
- \(GC/\mu\) is the generalized concentration index for the error term or the residual component (unexplained inequity in health outcome)

The absolute contribution of each determinant is the product of the sensitivity (elasticity) of health variable with respect to that determinant and the degree of MPCE-based inequality in that determinant (concentration index, \(C_k\)) which is expressed as \((\beta_k X_k/\mu) \times C_k\). The percentage contribution of each determinant is obtained by dividing its absolute contribution by C of the health variable, multiplied by 100, which is expressed as \([(\beta_k X_k/\mu) \times (C_k/C)] \times 100 \) [18].

All the statistical analyses were conducted using the software STATA version 14.
Results

Socio-economic differentials in PAP (Proportion of Ailing Persons) and utilization of health care

Socio-economic and demographic differentials of the PAP and health care utilisation of the adult population in India are presented in Table 4. This analysis is important as it compares the morbidity rate and rate of seeking treatment by those who self-report any episode of morbidity. The results show that the proportion of (living) persons (per 100) reporting ailments at any time during past 15-days recall period has declined from 9.39 in 71st round to 5.98 in 75th round. Also, rate of seeking treatment on medical advice has improved from 87.42% in 71st round to 90.80% in 75th round. This fall in PAP and improvement in treatment seeking rate has been observed across all the covariates.

Our analysis shows that a high rate of self-reported morbidity may not always induce a commensurate higher rate of treatment seeking by individuals belonging to various socio-economic and demographic categories. For example, with respect to the level of education, illiterates reported a higher PAP (11.7 in 71st round and 8.38 in 75th round) than those with some education. However, illiterates have a lower rate of seeking treatment compared to the educated population (83.62% and 89.39% in 71st and 75th rounds respectively).

With respect to gender, more adult females reported morbidity compared to adult men in both the rounds, but the proportion seeking treatment for an ailment was equal for both the sexes in 71st round and slightly higher for females in 75th round. Also, the proportion of ailing adults is higher in urban areas compared to rural areas in both the rounds. The rate of treatment seeking is also higher in urban adult population than their rural counterparts in both the rounds. Marital status also has considerable influence on the health-seeking behaviour. Those who reported being currently married had better health-seeking tendencies when compared to those who never married or are divorced/ widowed/ separated.

The rate of seeking treatment by economic status suggests that those adult individuals belonging to the richer MPCE quartiles have higher self-reported morbidity and a higher rate of treatment seeking compared to adults belonging to poorer MPCE quartile. Those who are covered by certain health insurance scheme have a marginally higher rate of treatment seeking. SCs and STs have lower rates of treatment seeking compared to OBCs and others. Household size was not a significant determinant of differences in the rate of seeking medical treatment of the adult population.

The socio-economic differentials of the ailing adult population with unmet need for health care has been presented in Table 5. Majority of the adult population, whose need for medical treatment remained unmet on experiencing a spell of ailment, belonged to the younger adults age-group (20–44 years), female sex, Hindu religion and Other Backward Castes across both the rounds- 71st and 75th. Furthermore, more than 70% of the ailing adults who did not seek treatment on medical advice belonged to the rural place of residence, during both the periods-2014 and 2017–18. It was also found that majority of the adults with untreated ailments were either illiterates or had very low level of educational attainment (i.e. upto upper primary or below) and belonged to the bottom two wealth quartiles across both the rounds of NSS. An overwhelming majority of the ailing adults with unmet need for health care had no health insurance (76% and 83% in 71st and 75th rounds, respectively).

Association between socio-economic factors and health seeking behavior

In this section, odds ratios are computed through logistic regression to examine the effect of the economic status (MPCE-based quartiles) on the health seeking behaviour of the ailing adult population in India, after controlling for other covariates (demographic, socio-economic,
Table 4. Socio-economic differentials in morbidity prevalence rate and utilization of health care in adult population in India.

| Covariates                | 2014 (71st round) | 2017–18 (75th round) | 2014 (71st round) | 2017–18 (75th round) |
|---------------------------|-------------------|-----------------------|-------------------|----------------------|
|                           | Proportion of Ailing Persons (%) | chi squared | Proportion of Ailing Persons (%) | chi squared |
|                           | Rate of seeking treatment (%) | chi squared | Rate of seeking treatment (%) | chi squared |
| Age                       | Younger Adults (20–44 years) | 6.64 | 4500 † | 3.71 | 7400 † | 84.84 | 111.48 † | 87.89 | 154.622 † |
|                           | Middle Aged (45–59 years) | 17.14 | 11.83 | 90.00 | 93.00 |
| Sex                       | Male | 7.84 | 494.166 † | 5.10 | 430.456 † | 87.42 | 0.0001 | 90.06 | 9.583 † |
|                           | Female | 10.91 | 6.86 | 87.42 | 91.34 |
| Place of Residence        | Rural | 8.61 | 158.099 † | 5.35 | 298.891 † | 85.51 | 59.134 † | 89.35 | 52.471 † |
|                           | Urban | 10.35 | 6.83 | 89.27 | 92.30 |
| Education                 | Illiterate | 11.70 | 684.207 † | 8.38 | 1200 † | 87.52 | 35.191 † | 89.39 | 17.755 † |
|                           | Upper Primary or below | 10.15 | 6.52 | 87.91 | 91.17 |
|                           | Secondary | 8.33 | 5.06 | 89.25 | 91.74 |
|                           | Higher secondary or above | 6.85 | 4.38 | 90.67 | 91.25 |
| Marital Status            | Currently Married | 9.72 | 96.455 † | 6.10 | 33.168 † | 87.52 | 0.9008 | 91.05 | 6.957 † |
|                           | Others | 8.01 | 5.48 | 86.90 | 89.63 |
| Religion                  | Hindu | 9.40 | 236.076 † | 5.88 | 336.819 † | 87.06 | 35.191 † | 90.65 | 23.020 † |
|                           | Muslim | 9.92 | 7.30 | 88.73 | 91.95 |
|                           | Christian | 6.81 | 4.15 | 85.15 | 87.55 |
|                           | Sikh | 15.14 | 7.92 | 94.64 | 93.45 |
|                           | Others | 7.20 | 4.37 | 85.95 | 90.75 |
| Social Group              | ST | 5.46 | 479.536 † | 3.06 | 837.346 † | 77.25 | 153.223 † | 81.74 | 158.729 † |
|                           | SC | 9.90 | 6.18 | 85.80 | 90.21 |
|                           | OBC | 9.95 | 6.06 | 88.76 | 91.03 |
|                           | Others | 10.03 | 7.07 | 88.70 | 92.52 |
| Economic Group            | Poor | 6.62 | 1300 † | 3.79 | 1500 † | 80.42 | 236.972 † | 86.30 | 173.903 † |
|                           | Lower Middle | 7.80 | 4.91 | 83.61 | 89.66 |
|                           | Upper Middle | 9.73 | 6.13 | 87.25 | 92.29 |
|                           | Rich | 13.20 | 8.17 | 90.98 | 93.50 |
| Health Coverage           | Not Covered | 8.47 | 901.716 † | 5.29 | 1200 † | 87.32 | 0.369 | 90.11 | 28.185 † |
|                           | Covered | 14.05 | 9.06 | 87.66 | 92.49 |
| Household Size            | 4 or less | 12.05 | 922.007 † | 7.76 | 1000 † | 87.08 | 4.318 | 91.04 | 1.243 |
|                           | 5 to 6 | 9.21 | 5.43 | 87.23 | 90.65 |
|                           | 7 or more | 6.88 | 4.51 | 88.34 | 90.52 |
| Region                    | North | 8.17 | 3600 † | 6.07 | 2400 † | 92.85 | 287.097 † | 91.43 | 224.003 † |
|                           | Central | 7.58 | 5.19 | 88.17 | 88.99 |
|                           | East | 9.97 | 7.00 | 80.99 | 88.06 |
|                           | Northeast | 2.64 | 1.65 | 75.98 | 79.33 |
|                           | West | 8.65 | 5.98 | 86.59 | 93.44 |
|                           | South | 16.64 | 8.66 | 89.41 | 93.24 |
| TOTAL                     | 9.39 | 5.98 | 87.42 | 90.80 |

Note: † p<0.001
Source: Authors’ calculation based on the NSS 71st and 75th rounds’ data on Social Consumption: Health
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The results of the logistic regression have been presented in Table 6. The results show that the economic status is a significant determinant of treatment seeking behavior of ailing persons. With reference to the poor, the lower middle, upper middle and
rich, all have higher odds of seeking treatment for an ailment in both the rounds. Also, in both the rounds, ailing persons with a certain level of education have higher likelihood (odds) of seeking medical treatment than the illiterates.

Younger adults have lesser probability (odds) of seeking medical treatment than middle-aged population. Male ailing adults have lower odds of seeking treatment than their female counterparts. Urban dwellers have a higher probability (odds) of seeking treatment for a spell of ailment than their rural counterparts. Accessibility of health care services especially is an issue of concern in rural India [22, 66]. However, the association of place of residence with treatment seeking behavior was not statistically significant in our study. Those who are currently married have higher odds of treatment seeking than others (never married, widowed/ separated/divorced). This is supported by studies that have found an adverse effect of widowhood on the health seeking behavior of women [67, 68]. In respect of religious groups, the odds of Hindu adult population seeking treatment for an illness are less likely than that of Muslim adults in both the rounds and the results are statistically significant at 01 percent level. This is not in line with the literature of socio-economic inequalities in health [46, 69]. In spite of the average socio-economic status of Indian Muslims being lower than their Hindu counterparts, Muslim advantage in certain health indicators (like child mortality) has been observed as a ‘paradox’ with very limited studies attempting to explain this phenomenon [70]. A study attempted to explain the Muslim advantage by suggesting that this may be an effect of the ‘omitted variables correlated with religion’ and ‘factors that operate through the community’ [71]. However, qualitative exploration of the unquantifiable cultural factors that overlap with religion in determining health seeking behavior is required to fully understand the Muslim advantage in this respect. SC, OBC and others have higher odds of seeking medical treatment than STs in both the rounds. This finding is in concurrence with studies that have found high prevalence of untreated morbidities among the Scheduled Tribes (STs) [72]. It has been argued that the lack of good quality and timely health care services at public facilities in tribal areas may be responsible for keeping STs away from availing medical treatment and causing them to resort to home-remedies, traditional healers, etc. [72, 73]. Adults covered by certain schemes for health expenditure support had lower odds of seeking treatment than those with no coverage in 71st round although indicating a weaker association with the coefficient being significant at 08 percent level. However, in 75th round, those with certain health insurance had higher odds of seeking treatment than those without any health coverage (significant at 1.2% level). This is supported by studies that have shown a strong association between health insurance coverage and treatment seeking behavior as financial cost acts as one of the major barriers to receiving health care [74, 75]. When medical costs have to be borne out-of-pocket in the absence of reimbursement provisions supported by health insurance coverage, ailments are likely to remain untreated. In case of household size, in the 71st round, those living in a household of 4 or less or those living in households of size 5–6 had lesser odds of utilizing health care services with reference to household size of 7 or more. This is in contrast to studies that found under-utilization of health care services by individuals with large family sizes [76, 77]. This may be because a greater household size indicates a greater number of earning members and therefore the affordability of health care is better. However, the composition of the household in terms of earning members, dependent members (child and elderly), etc. needs to be investigated to come to a concrete conclusion in this respect. Household size didn’t, however, show a significant association with treatment seeking behavior in the 75th round.

With respect to the regional dimension, adults living in central, east, west, northeast and south regions had lesser odds of utilizing health care compared to those living in northern India in 71st round. However, in 75th round, adults in western and southern regions showed higher odds of seeking medical treatment than those in North. Given that India witnesses
### Table 6. Association between socio-economic factors and health seeking behavior in adult population in India.

|                         | 71st round (2014) | 75th round (2017–18) |
|-------------------------|-------------------|---------------------|
| Number of obs           | 18,084            | 20,148              |
| Pseudo R2               | 0.0492            | 0.0424              |
| LR chi2(28)             | 678.67            | 524.69              |
| Prob > chi2             | 0.0000            | 0.0000              |
| Medical Treatment Sought|                   |                     |
| Dependent Variable      | 2014 (71st round) | 2017–18 (75th round) |
| Covariates              |                   |                     |
| Age                     |                   |                     |
| Middle Aged (45–59 years) | 1          |                     |
| Younger Adults (20–44 years) | 0.607 †     | 0.572 †             |
| Sex                     |                   |                     |
| Female                  | 1                 |                     |
| Male                    | 0.916*            | 0.823 †             |
| Place of Residence      |                   |                     |
| Rural                   | 1                 |                     |
| Urban                   | 1.041             | 1.056               |
| Education               |                   |                     |
| Illiterate              | 1                 |                     |
| Upper Primary or below  | 1.532 †           | 1.284 †             |
| Secondary               | 1.596 †           | 1.327***            |
| Higher secondary or above | 1.841 †       | 1.289***            |
| Marital Status          |                   |                     |
| Currently Married       | 1.051             | 1.120*              |
| Religion                |                   |                     |
| Muslim                  | 1                 |                     |
| Hindu                   | 0.798***          | 0.818***            |
| Christian               | 0.699***          | 0.645***            |
| Sikh                    | 1.167             | 1.101               |
| Others                  | 1.118             | 1.626**             |
| Social Group            |                   |                     |
| ST                      | 1                 |                     |
| SC                      | 1.412 †           | 1.710 †             |
| OBC                     | 1.528 †           | 1.595 †             |
| Others                  | 1.435 †           | 1.830 †             |
| Economic Group          |                   |                     |
| Poor                    | 1                 |                     |
| Lower Middle            | 1.181**           | 1.161**             |
| Upper Middle            | 1.437 †           | 1.429 †             |
| Rich                    | 1.850 †           | 1.588 †             |
| Health Coverage         |                   |                     |
| Not Covered             | 1                 |                     |
| Covered                 | 0.909*            | 1.169**             |
| Household Size          |                   |                     |
| 7 or more               | 1                 |                     |
| 4 or less               | 0.725 †           | 0.921               |
| 5 to 6                  | 0.830***          | 0.959               |
| Region                  |                   |                     |
| North                   | 1                 |                     |
| Central                 | 0.724***          | 0.999               |
| East                    | 0.410 †           | 0.821**             |
| Northeast               | 0.325 †           | 0.513 †             |
| West                    | 0.554 †           | 1.341***            |
| South                   | 0.667 †           | 1.290***            |

Note: Reference category
† p<0.001
*** p≤0.01
** p≤0.05
* p≤0.10

Source: Authors’ calculation from the NSS 71st and 75th rounds’ data on Social Consumption: Health

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varied levels of government spending on health care in its constituent states, the regional factor has strong associations with utilisation of health care by the poor [78].

**Socio-economic inequity in health care utilization: Concentration Index (CI)**

The results of the logistic regression established significant association between a person’s MPCE based economic status and their health seeking behavior, indicating the prevalence of socio-economic inequity in health care utilization for any spell of illness. In this section, we attempt to quantify the socio-economic inequalities in utilization of health care among the adult population by using Concentration Indices (CIs). Fig 1(A) shows the values of CIs of health care utilization for the entire adult population (20–59 years) and also separately for the younger adult population of 20–44 years and middle-aged population of 45–59 years, for both the NSS rounds (71st and 75th). The results clearly show that the values of concentration indices in both the rounds, for all three categories of the adult population are positive, indicating that the distribution of health care utilization is pro-rich, demonstrating the phenomenon of elite capture. This means that, those who belonged to the poorest socio-economic group are in a more disadvantageous position than those who belonged to the richest quartile in terms of health care utilization.

The value of CI in health care utilization for the entire adult population (20–59 years) was 0.0336309 in 71st round and 0.02303135 in 75th round, indicating the existence of socio-economic inequalities in the utilization of health care among the adult population in India. Although the distribution of health care utilization still remains inequitably skewed in favor of the rich, the magnitude of inequity has shrunk over the period of time between 2014 (71st round) and 2017–18 (75th round). Moreover, the comparison of CI values among the younger adult population of 20–44 years and middle-aged population of 45–59 years, showed that, the degree of socio-economic inequality is greater among the middle-aged population than younger adults in both the rounds. Also, the magnitude of socio-economic inequality is found to be greater among adult females when compared to adult males and those adults residing in rural areas when compared to those in urban areas in both the rounds (Fig 1B and 1C).

**Major contributory factors in socio-economic inequity in health care utilization: Decomposition analysis**

Although the values of CI reveal the existence and magnitude of socio-economic inequity, the CIs do not shed any light on the pathway through which the inequity occurs. Thus, the decomposition of concentration index is important to explore the major contributory factors that lead to socio-economic inequities in health care utilization. The results of decomposition analyses of health care utilization are presented in Table 7, for the entire adult population (aged between 20 and 59 years) in India and separately for the younger adults (20–44 years) and middle-aged adults (45–59 years). The analysis is focused on the relative contributions of each covariate to the overall inequality in health care service utilization of the adult population.

The estimates of the percentage contribution of various socio-economic covariates to overall inequality in health care utilization in case of the adult population of 20–59 years, show that the poor economic status of the adult population alone contributed 30.66% of total explained inequalities in the 71st round. The share has increased to 44.67% in 75th round. Illiteracy and rural sector together explained roughly over one-fourth of the inequalities in health care utilization of ailing adult population of 20–59 years in both 71st (27.58%) and 75th (26.18%) rounds. However, the contribution of illiteracy saw a decline by 5% from 71st round to 75th round, while the share of rural sector increased by 3% between 71st and 75th rounds. The
contribution of ‘no health coverage’ to the total explained inequities has observed a sharp rise from 1.06% to 8.47% between the two rounds, while the contribution of SC/ST social group has declined from 9.69% to 4.45%. Although the distribution of Muslim religion across the economic groups is concentrated among the poor (CI = -0.135), there is little sensitivity of health care utilization to variation in this factor (represented by elasticity = 0.003), which is why this particular covariate makes very little contribution to the inequity of health care utilization. The eleven selected variables together explained 71.66% and 87.06% of total estimated inequalities in the 71st and 75th rounds respectively. The contribution of some factors like female sex, marital status other than currently married, Muslim religion, household size of 7 and above show a negative share of contribution. This is because the contribution of each factor is a product of elasticity and CI of that factor. If either of these parameters observe a

Fig 1. MPCE based Concentration Index (CI) for health care utilization among adult population in India. (a) Age group, (b) Sex and (c) Sector wise. Source: Authors’ calculation from the NSS 71st and 75th rounds’ data on Social Consumption: Health.

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Table 7. Contribution of predictors to socio-economic inequity in health care utilization among adult population in India: Results of decomposition analysis.

| Covariates                      | Adult Population (20–59 years) |                     |                     |                     |                     |                     |                     |
|--------------------------------|--------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                                | 2014 (71st round)              | 2017–18 (75th round)|                     |                     |                     |                     |                     |
|                                | Elasticity | CI   | Absolute Contribution to CI | % Contribution | Elasticity | CI   | Absolute Contribution to CI | % Contribution |
| Age Group 45–59 years          | 0.038      | 0.088| 0.0034                           | 10.030        | 0.034      | 0.051| 0.0017                           | 7.47           |
| Female                         | 0.030      | -0.004| -0.0001                          | -0.390        | 0.020      | -0.017| -0.0004                          | -1.50          |
| Rural                          | -0.020     | -0.199| 0.0041                           | 12.140        | -0.015     | -0.231| 0.0036                           | 15.44          |
| Illiterate                     | -0.020     | -0.259| 0.0052                           | 15.440        | -0.010     | -0.260| 0.0025                           | 10.74          |
| Never married/ widowed/ divorced| -0.005    | 0.037| -0.0002                          | -0.520        | -0.004     | 0.017 | -0.0001                          | -0.27          |
| Muslim                         | 0.003      | -0.135| -0.0004                          | -1.310        | 0.007      | -0.101| -0.0007                          | -3.18          |
| SC/ ST                         | -0.019     | -0.171| 0.0032                           | 9.690         | -0.004     | -0.244| 0.0010                           | 4.45           |
| Poor                           | -0.012     | -0.862| 0.0103                           | 30.660        | -0.014     | -0.742| 0.0103                           | 44.67          |
| No health coverage             | -0.006     | -0.058| 0.0004                           | 1.060         | -0.036     | -0.054| 0.0020                           | 8.47           |
| Household size 7+              | 0.009      | -0.345| -0.0032                          | -9.400        | 0.001      | -0.286| -0.0002                          | -0.77          |
| Northern Region                | 0.012      | 0.119| 0.0014                           | 4.160         | 0.002      | 0.197 | 0.0004                           | 1.53           |
| Residual                       | 0.0095     |     | 28.44                            |               |           |      | 0.0030                           | 12.94          |
|                                | 100                          |                     |                     | 100                          |                     |                     |

| Covariates                      | Younger Adults (20–44 years) |                     |                     |                     |                     |                     |                     |
|                                | 2014 (71st round)              | 2017–18 (75th round)|                     |                     |                     |                     |                     |
|                                | Elasticity | CI   | Absolute Contribution to CI | % Contribution | Elasticity | CI   | Absolute Contribution to CI | % Contribution |
| Female                         | 0.029      | -0.003| -0.001                           | -0.310        | 0.015      | -0.031| -0.0005                          | -3.64          |
| Rural                          | -0.020     | -0.185| 0.004                           | 15.160        | -0.014     | -0.232| 0.0033                           | 26.27          |
| Illiterate                     | -0.024     | -0.288| 0.007                           | 29.010        | -0.008     | -0.280| 0.0023                           | 18.19          |
| Never married/ widowed/ divorced| -0.010   | 0.084| -0.001                           | -3.440        | -0.008     | 0.103 | -0.0008                          | -6.27          |
| Muslim                         | 0.005      | -0.117| -0.001                           | -2.210        | 0.015      | -0.044| -0.0007                          | -5.23          |
| SC/ ST                         | -0.011     | -0.143| 0.002                           | 6.270         | 0.004      | -0.190| -0.0007                          | -5.36          |
| Poor                           | -0.009     | -0.839| 0.007                           | 30.800        | -0.002     | -0.750| 0.0015                           | 12.22          |
| No health coverage             | -0.031     | -0.048| 0.001                           | 6.090         | -0.054     | -0.055| 0.0030                           | 23.80          |
| Household size 7+              | 0.011      | -0.334| -0.004                           | -15.110       | 0.000      | -0.252| 0.0001                           | 0.69           |
| Northern Region                | 0.016      | 0.101| 0.002                           | 6.530         | 0.006      | 0.218 | 0.0014                           | 11.26          |
| Residual                       | 0.007      |     | 27.21                            |               |           |      | 0.0035                           | 28.09          |
|                                | 100                          |                     |                     | 100                          |                     |                     |                     |

| Covariates                      | Middle Aged (45–59 years) |                     |                     |                     |                     |                     |                     |
|                                | 2014 (71st round)              | 2017–18 (75th round)|                     |                     |                     |                     |                     |
|                                | Elasticity | CI   | Absolute Contribution to CI | % Contribution | Elasticity | CI   | Absolute Contribution to CI | % Contribution |
| Female                         | 0.024      | -0.001| 0.0000                           | -0.090        | 0.019      | -0.002| -0.0004                          | -0.14          |
| Rural                          | -0.021     | -0.211| 0.0045                           | 11.750        | -0.020     | -0.230| 0.00452                          | 15.75          |
| Illiterate                     | -0.013     | -0.277| 0.0036                           | 9.500         | -0.009     | -0.278| 0.00238                          | 8.29           |
| Never married/ widowed/ divorced| -0.001    | -0.015| 0.0001                           | 0.050         | 0.000      | -0.067| -0.0003                          | -0.11          |
| Muslim                         | 0.003      | -0.133| -0.0004                           | -1.000        | 0.002      | -0.147| -0.0002                          | -0.98          |
| SC/ ST                         | -0.028     | -0.201| 0.0056                           | 14.740        | -0.011     | -0.290| 0.00316                          | 11.01          |
| Poor                           | -0.014     | -0.887| 0.0127                           | 33.600        | -0.018     | -0.749| 0.01324                          | 46.18          |
| No health coverage             | 0.017      | -0.062| -0.0011                          | -2.850        | -0.025     | -0.046| 0.00117                          | 4.07           |
| Household size 7+              | 0.007      | -0.366| -0.0027                          | -7.100        | 0.001      | -0.315| -0.00041                         | -1.42          |
| Northern Region                | 0.007      | 0.162| 0.0011                           | 2.930         | -0.001     | 0.194 | -0.00022                         | -0.78          |

(Continued)
negative value, the resultant product is a negative number and thus, the contribution is in negative terms.

The age-disaggregated decomposition analyses of health care utilization for the younger adults and middle-aged populations also bring some insightful results. In case of the younger adults, while the relative contribution of poor economic status alone contributed 30.80% of total explained inequalities in the 71st round, this share declined drastically to 12.22% in the 75th round. The contribution of ‘no health coverage’ has sharply increased from 6.09% to 23.80% across the two rounds for this age-group. The residual estimates remain roughly the same in both the rounds. In case of the middle-aged population, the relative contribution of poor economic status rose from 33.60% of total explained inequalities in 71st round to 46.18% in the 75th round. The contribution of rural place of residence has also increased from 11.75% to 15.75% across the two rounds. However, the contribution of SC/ST social group has seen a decline from 14.74% to 11.01% between the 71st and the 75th rounds for the middle-aged adults. The residual estimates (38.47% in 71st round and 18.12% in 75th round) show that the eleven selected variables together explained a greater part of the total estimated inequalities in 75th round in comparison to the 71st round. The contribution of poor economic status to the total explained inequalities is more in case of middle-aged population compared to the younger adults in both the rounds.

**Discussion and conclusion**

This paper made an attempt to contribute to the existing pool of literature in the domain of health inequity in India, by quantifying and decomposing the socio-economic related inequality in the health care utilisation, among adults (younger adults and middle-aged), by analyzing the two rounds of NSS- 71st and 75th, corresponding to the Schedule number 25.0 (Social Consumption: Health). A number of intriguing findings are highlighted in this study. The results of logistic regression revealed that economic status continues to show a strong association with the treatment seeking behavior among the adults in India (with a statistical significance of 1%). In addition, the other important covariates—education, social group, and household size, have statistically significant effect on the variation in treatment seeking. These are important parameters for socio-economic gradient, so the statistical significance of these variables further substantiates the core contention of our proposition. The positive estimates of CIs across the two rounds of NSS suggested considerable socio-economic inequality. Health care utilization of the adults continues to be concentrated within higher socio-economic status, although, the magnitude of inequity in health care utilization has shrunk from 0.0336 in 2014 to 0.0230 in 2017–18. However, the relative contribution of poor economic status to the overall explained inequalities in health care utilisation observed a rise in its share from 31% in 2014 to 45% in 2017–18. This resonates with the finding of a study [79], highlighting the fact that, even though economic status-related inequality in in-patient health care utilization has lowered, it hasn’t made the situation more equitable for the poor due to the factors like poor provisioning of public health facilities, increased out of pocket expenditure for treatment in private facilities, among others.
The findings of this study are in tune with previous studies on health inequities pertaining to both developed and developing countries, demonstrating the fact that the distribution of health care utilization is highly skewed, disfavoring the poor [11, 20, 22, 23, 25, 57, 80, 81]. Thus, the findings of this study affirm the significance of the socio-economic gradient theory. In India, a country with a very low human development index [82] and widespread impoverishment [26], the socio-economic gradient theory is a fitting explanation of inequities in health care utilization. The poor are highly constrained by multiple deprivations including impoverishment, malnutrition, lack of education, poor sanitation, unhygienic living conditions, etc. that increase their susceptibility to diseases. Poor income base coupled with lack of social security support and high opportunity costs of seeking treatment due to informal job contracts, substantially restrict the health seeking behavior of the poor [83, 84].

A study on health care inequities in Northern Indian states, found poor utilization of health care services by lower income groups [20]. The magnitude of inequity for both out-patient and in-patient health care utilization was pro-rich while the inequity was higher in rural areas compared to urban areas in majority of the Indian states [25]. A study on the need-standardized income-related horizontal inequity in health care utilization found that the elderly with poor economic status have greater unmet needs for health care service utilization due to the distribution of health care access being pro-rich [22]. Another study that investigated the horizontal inequity in health care utilization (out-patient care) found that the inequity in out-patient care was pro-rich for adult population groups [23]. Further, the distribution of hospital admission was found to be pro-rich [24]. Studies in support of the socio-economic gradient theory are not confined to India only but have been conducted across the globe. A study conducted in rural Bangladesh found that the socio-economic status overrides age and gender in determining the health seeking behavior of adults and elderly [85]. A study based in Switzerland found that equity in access to health care particularly with respect to specialist visits, showed a pro-rich distribution [80]. An investigation into the socio-economic inequities in the health care utilization in South-America found high levels of pro-rich inequity [81]. Even though the level of utilization of the poor is lower than the richer economic groups, it is more likely that the poor spend more on health care as a share of income than the better-off and the majority of the spending are made out of pocket due to lack of health insurance coverage [4, 32].

As per NHSRC (2017) [33], an average Indian bore 70 per cent of the total medical expenses from their own pocket. Such a high catastrophic out-of-pocket expenditure on health care creates a huge burden on households belonging to even middle-income wealth quintiles that may be forced to slip into poverty due to unforeseen health shocks [32, 86–88]. To meet the expenses borne out-of-pocket, poorer households often resort to distress health financing. Such a situation widens the inequality across income categories and breeds conditions of perpetual poverty for the disadvantaged groups. The other side of this disease burden is the adverse effect of the income-generating capacities of the poor [30].

India, with a staggering disease burden, is facing multiple challenges to counter it due to regional imbalance and steep socio-economic gradient in health care accessibility. The widespread presence of socio-economic inequity is socially unjust, unethical and detrimental to human wellbeing. It is, therefore, imperative to reduce the socio-economic inequities and address this problem both from the demand as well as supply sides. Public health care infrastructure in India is critically malnourished due to persistent under-investments for a long period, with a sharp rural-urban divide. Public health care services even when available are perceived to be of poor quality [27] and often ailing persons have to resort to utilizing private health care services putting a huge burden on their expenses [89]. In order to ensure equitable health care accessibility to the poor, revamping the public health infrastructure is the foremost necessary condition from the supply side. Therefore, it is warranted that India ramps up
investments and raises the budgetary allocation in the health care infrastructure and human resources, much beyond the current spending of 1.28% of its GDP as public expenditure on health [90]. Further, in order to reduce the existing socio-economic inequities from the demand side, there is an inherent need to strengthen the redistributive mechanisms by tightening the various social security networks, through efficient targeting and broadening the outreach capacity to the various vulnerable and marginalized socio-economic groups. Lack of awareness is another major constraint in treatment seeking behavior of the population and is grossly tied with the socio-economic gradient. Education is an important instrument which enables individuals to process information. Hence, demand for self-protection (in terms of both mitigating and averting behavior) from various morbidity risks can be effectively triggered by ensuring equitable access to education and health care facilities.

It is to be noted here that the present study suffers from the general limitations of subjectivity of perception and reporting bias, which are inherent to any self-reported data (in this case, the National Sample Survey data). Morbidities may have been under-reported by the poor due to their increased tolerance and lack of awareness of diseases. On the other hand, the self-reported data of whether or not any medical treatment was sought may have been over-reported due to the absence of a mechanism for cross-checking the reported information through medical prescriptions/ entry in public medical registers, diagnostic records, etc.

**Author Contributions**

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**References**

1. Sen A. Why health equity? Health Econ. 2002; 11(8):659–66. [https://doi.org/10.1002hec.762](https://doi.org/10.1002hec.762) PMID: 12457367
2. Tobin J. On Limiting the Domain of Inequality. J Law Econ [Internet]. 1970; 13(2):263–77. Available from: [http://www.jstor.org/stable/725025](http://www.jstor.org/stable/725025)
3. Gwatkin DR. Health inequalities and the health of the poor. Bull World Health Organ. 2000; 78(1):3–17. PMID: 10686729
4. O’Donnell O, Doorslaer E van, Wagstaff A, Lindelow M. Analyzing Health Equity Using Household Survey Data: A Guide to Techniques and their Implementation. World Bank Institute, Washington D. C. 2008.
5. Purohit BC. Various approaches to inequity: A review of literature. In: Inequity in Indian Health Care [Internet]. 2017. p. 5–25. Available from: [http://link.springer.com/10.1007/978-981-10-5044-2](http://link.springer.com/10.1007/978-981-10-5044-2)
6. UN DESA. The Millennium Development Goals Report 2015, UN, New York [Internet]. 2016. 73 p. Available from: [https://www.un-ilibrary.org/content/publication/6cd11401-en](https://www.un-ilibrary.org/content/publication/6cd11401-en)
7. UN. The Sustainable Development Goals Report 2019, UN, New York [Internet]. 2019. 61 p. Available from: [https://www.un-ilibrary.org/content/publication/55eb9109-en](https://www.un-ilibrary.org/content/publication/55eb9109-en)
8. Kakwani N, Wagstaff A, Van Doorslaer E. Socio-economic inequalities in health: Measurement, computation, and statistical inference. J Econom. 1997; 77(1):87–103.
9. Wagstaff A. Poverty and health sector inequalities. Bull World Health Organ. 2002; 80(2):97–105. PMID: 11953787
10. Hosseinpoo AR, Van Doorslaer E, Speybroeck N, Naghavi M, Mohammad K, Majdzaede R, et al. Decomposing socio-economic inequality in infant mortality in Iran. Int J Epidemiol. 2006; 35(5):1211–9. [https://doi.org/10.1093ije/dyl164](https://doi.org/10.1093ije/dyl164) PMID: 16987648
11. Sundmacher L, Scheller-Kreisden D, Busse R. The wider determinants of inequalities in health: A decomposition analysis. Int J Equity Health. 2011; 10:1–13. https://doi.org/10.1186/1475-9276-10-1 PMID: 21214941

12. Nedjat S, Hosseinpoor AR, Forouzanfar MH, Golestan B, Majdadeh R. Decomposing socio-economic inequality in self-rated health in Tehran. J Epidemiol Community Health. 2012; 66(6):495–500. https://doi.org/10.1136/jech.2010.108977 PMID: 21282143

13. Wagstaff A, Doorslaer E V. Measuring and testing of inequity in the delivery of health care. In: Journal of Human Resources, Vol 35, No 4. 2000. p. 716–33.

14. CSDH. Closing the gap in a generation: Health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health. 2008;

15. Ministry of Health and Family Welfare Government of India. National health policy 2002 [Internet]. 2002. Available from: https://www.nhp.gov.in/sites/default/files/pdf/National_Health_Policy.pdf

16. Deaton A. Policy implications of the gradient of health and wealth. Health Aff. 2002; 21(2):13–30. https://doi.org/10.1377/hlthaff.21.2.13 PMID: 11900153

17. O’Donnell O, van Doorslaer E, Rannan-Eliya RP, Somanathan A, Adhikari SR, Harbiento D, et al. The incidence of public spending on health care: Comparative evidence from Asia. World Bank Econ Rev. 2007; 21(1):93–123.

18. Wagstaff A, Van Doorslaer E, Watanabe N. On decomposing the causes of health sector inequalities with an application to malnutrition inequalities in Vietnam. J Econ. 2003; 112(1):207–23.

19. Gwatkin DR, Rutstein S, Johnson K, Suliman E, Wagstaff A, Amouzou A. Socio-economic differences in health, nutrition, and population within developing countries: an overview. Niger J Clin Pract. 2007; 10(4):272–82. PMID: 18293634

20. Prinja S, Kanavos P, Kumar R. Health care inequities in north India: Role of public sector in universalizing health care. Indian J Med Res. 2012; 136(3):421–31. PMID: 23041735

21. Goli S, Singh L, Jain K, Pou LMA. Socio-economic Determinants of Health Inequalities Among the Older Population in India: A Decomposition Analysis. J Cross Cult Gerontol. 2014; 29(4):353–69. https://doi.org/10.1007/s10823-014-9251-8 PMID: 25349021

22. Joe W, Rudra S, Subramanian S V. Horizontal inequity in elderly health care utilization: Evidence from India. J Korean Med Sci. 2015; 30: S155–66. https://doi.org/10.3346/jkms.2015.30.S2.S155 PMID: 28617450

23. Pandey A, Ploubidis GB, Clarke L, Dandona L. Horizontal inequality in outpatient care use and untreated morbidity: Evidence from nationwide surveys in India between 1995 and 2014. Health Policy Plan. 2017; 32(7):969–79. https://doi.org/10.1093/heapol/cxx016 PMID: 28419286

24. Akhtar A, Ahmad N, Roy Chowdhury I. Measuring Socio-economic Inequality in Self-Reported Morbidity in India: Decomposition Analysis. Rev Dev Chang. 2020; 0972263120981631.

25. Ghosh S, Singh L, Jain K, Pou LMA. horizonal inequity in catastrophic health expenditure in India: Decomposition Analysis. Int J Equity Health. 2011; 10:1–13. https://doi.org/10.1186/1475-9276-10-1 PMID: 21214941

26. Planning Commission. Report of the expert group to review the methodology for estimation of poverty (Rangarajan Committee Report). 2014. New Delhi: Government of India.

27. National Sample Survey Office. Social Consumption: Health, NSS 75th Round: Jul 2017 –June 2018. New Delhi: Ministry of Statistics & Programme Implementation, Government of India 2019.

28. Roy K, Howard DH. Equity in out-of-pocket payments for hospital care: Evidence from India. Health Policy (New York). 2007; 80(2):297–307. https://doi.org/10.1016/j.healthpol.2006.03.012 PMID: 16678296

29. Kashyap GC, Singh SK, & Sharma SK. Catastrophic Health Expenditure and Impoverishment Effects of Out-of-pocket Expenses: A Comparative Study of Tannery and Non-tannery Workers of Kanpur, India. Indian Journal of Occupational & Environmental Medicine. 2018; 22(1), 22–28. https://doi.org/10.4103/ijom.IJOM_168_17 PMID: 29743781

30. Kastor A, Mohanty SK. Disease-specific out-of-pocket and catastrophic health expenditure on hospitalization in India: Do Indian households face distress health financing? PLoS One. 2018; 13(5):1–18. https://doi.org/10.1371/journal.pone.0196106 PMID: 29746481

31. Loganathan K, Deshmukh PR, & Raut AV. Socio-demographic determinants of out-of-pocket health expenditure in a rural area of Wardha district of Maharashtra, India. Indian Journal of Medical Research. 2017; 146(5), 654–661. https://doi.org/10.4103/ijmr.IJMR_256_15 PMID: 29512609

32. Akhtar A, Ahmad N, Roy Chowdhury I. Socio-economic inequality in catastrophic health expenditure among households in India: A decomposition analysis. Indian Econ Rev [Internet]. 2020; Available from: https://doi.org/10.1007/s41775-020-00093-3

33. National Health Systems Resource Centre (2017). National Health Accounts Estimates for India (2014–15). New Delhi, Ministry of Health and Family Welfare, Government of India. 2016–17
34. Mahal A, Yazbeck AS, Peters DH, Ramana GN V. The Poor and Health Service Use in India. HNP Discuss Pap. 2001;(August).

35. Saxena D, Vangani R, Mavalankar D V., Thomsen S. Inequity in maternal health care service utilization in Gujarat: Analyses of district-level health survey data. Glob Health Action. 2013; 6(1). https://doi.org/10.3402/gha.v6i0.19652 PMID: 23469890

36. Mohanty SK, Pathak PK. Rich poor gap in utilization of reproductive and child health services in India, 1992-2005. J Biosoc Sci. 2009; 41(3):381–98. https://doi.org/10.1017/S002193200800309X PMID: 18845026

37. Pathak PK, Singh A, Subramanian S V. Economic inequalities in maternal health care: Prenatal care and skilled birth attendance in India, 1992–2006. PLoS One. 2010; 5(10):1992–2006.

38. Ghosh A. Inequality in maternal health-care services and safe delivery in eastern India. WHO South-East Asia J Public Heal. 2013; 41(3):381–98. https://doi.org/10.1593/dem.2003.0028 PMID: 12962055

39. Prusty RK, Kumar A. Socio-economic dynamics of gender disparity in childhood immunization in India, 1992–2006. PLoS One. 2014; 9(6):1992–2006.

40. Singh PK. Trends in Child Immunization across Geographical Regions in India: Focus on Urban-Rural and Gender Differentials. PLoS One. 2013; 9(9). https://doi.org/10.1371/journal.pone.0073102 PMID: 24023816

41. Arokiasamy P, Jain K, Goli S, Pradhan J. Health inequalities among urban children in India: A comparative assessment of Empowered Action Group (EAG) and South Indian states. J Biosoc Sci. 2013; 45(2):167–85. https://doi.org/10.1017/S0021932012000211 PMID: 22943297

42. Acharya SS. Health Equity in India: An Examination Through the Lens of Social Exclusion. J Soc Incl Stud. 2018; 4(1):104–30.

43. Baru R V, Acharya A, Chaudhury R. Inequalities in Access to Health Services in India. Econ Political Weekly [Internet]. 2010; xlv (38):49–58. Available from: http://www.mendeley.com/research/inequalities-access-health-services-india/

44. Balarajan Y, Selvaraj S, Subramanian S V. Health care and equity in India. NIH Public Access. Lancet. 2011; 377(9764):505–15. https://doi.org/10.1016/S0140-6736(10)61894-6 PMID: 21227492

45. Kulikarni PM, Baraik. Utilization of Health Care Services by Scheduled Castes in India. Working Paper IIAS, New Delhi; 2003

46. National Sample Survey Office. Social Consumption: Health, NSS 71st Round: Jan–June 2014. New Delhi: Ministry of Statistics & Programme Implementation, Government of India 2015.
58. Berkman CS, Gurland BJ. The relationship among income, other socio-economic indicators, and functional level in older persons. J Aging Health. 1998; 10(1):81–98. https://doi.org/10.1177/08982649801000105 PMID: 10182419

59. Sahn DE, Younger SD. Microeconomic Evidence. Fisc Stud. 2000; 21(3):329–47.

60. Goli S, Arokiasamy P. Trends in health and health inequalities among major states of India: Assessing progress through convergence models. Heal Econ Policy Law. 2014; 9(2):143–68. https://doi.org/10.1017/S1744133113000042 PMID: 23442747

61. Purohit B. In equity in health care sector in India: A case study of district level in four Indian states. Theor Appl Econ. 2019; XXVI (1(618), Spring):129–50.

62. Tao Y, Henry K, Zou Q, Zhong X. Methods for measuring horizontal equity in health resource allocation: a comparative study. Health Econ Rev. 2014; 4(1):1–10. https://doi.org/10.1186/2191-1991-4-1 PMID: 24405520

63. Regidor E. Measures of health inequalities: Part 1. J Epidemiol Community Health. 2004; 58(10):858–61. https://doi.org/10.1136/jech.2003.015347 PMID: 15365113

64. Regidor E. Measures of health inequalities: Part 2. J Epidemiol Community Health. 2004; 58(11):900–3. https://doi.org/10.1136/jech.2004.023036 PMID: 15483304

65. Wagstaff A. The bounds of the concentration index when the variable of interest is binary, with an application to immunization inequality. Health Econ. 2005; 14(4):429–32. https://doi.org/10.1002/hec.953 PMID: 15495147

66. Patil AV, Somasundaram K V., Goyal RC. Current health scenario in rural India. Aust J Rural Health. 2002; 10(2):129–35. https://doi.org/10.1046/j.1440-1584.2002.00458.x PMID: 12047509

67. Perkins JM, Lee H, James KS, Oh J, Krishna A, Heo J, et al. Marital status, widowhood duration, gender and health outcomes: a cross-sectional study among older adults in India. BMC Public Health [Internet]. 2016; 16(1):1032. Available from: http://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-016-3682-9 PMID: 27716203

68. Williams K. The transition to widowhood and the social regulation of health: Consequences for health and health risk behavior. Journals Gerontol—Ser B Psychol Sci Soc Sci. 2004; 59(6):343–9. https://doi.org/10.1093/geronb/59.6.s343 PMID: 15576865

69. Basant R. Social, economic and educational conditions of Indian Muslims. Economic and Political Weekly, 2007; 42(10), 828–832.

70. Geruso M, Spears D. Sanitation and health externalities: Resolving the Muslim mortality paradox. Working Paper. Austin, TX. University of Texas, 2014.

71. Bhalaotra S, Valente C, van Soest A. The puzzle of Muslim advantage in child survival in India. J Health Econ [Internet]. 2010; 29(2):191–204. Available from: http://dx.doi.org/10.1016/j.jhealeco.2009.11.002 PMID: 19969383

72. Raushan R, Acharya SS. Morbidity and Treatment-seeking Behaviour Among Scheduled Tribe in India: A Cross-sectional Study. J Soc Incl Stud. 2018; 4(2):325–40.

73. Jacob I. Title: Health and Health Seeking Behaviour among Tribal Communities in India: A Socio-Cultural Perspective. J Tribal Intellect Collect India. 2014; 2(1):1–16.

74. McGrail KM, Van Doorslaer E, Ross NA, Sammartin C. Income-related health inequalities in Canada and the United States: A decomposition analysis. Am J Public Health. 2009; 99(10):1856–63. https://doi.org/10.2105/AJPH.2007.129361 PMID: 19150915

75. Winetrobe H, Rice E, Rhoades H, Milburn N. Health insurance coverage and health care utilization among homeless young adults in Venice, CA. J Public Heal (United Kingdom). 2016; 38(1):147–55. https://doi.org/10.1093/pubmed/fdv001 PMID: 25635142

76. Akowuah JA, Agyei-Baffour P, Awunyo-Vitor D. Determinants of antenatal health care utilization by pregnant women in third trimester in peri-urban Ghana. J Trop Med. 2018; 2018(2000).

77. Peters DH, Garg A, Bloom G, Walker DG, Brieger WR, Halizur Rahman M. Poverty and access to health care in developing countries. Ann N Y Acad Sci. 2008; 1136:161–71. https://doi.org/10.1196/annals.1425.011 PMID: 17954679

78. Ghosh S. and Arokiasamy P. Morbidity in India: Trends, Patterns and Differentials. Journal of Health Studies. 2009.

79. Mukherjee S, Levesque JF. Changing inequalities in utilization of inpatient care in rural India: Evidence from the NSS. Econ Polit Wkly. 2010; 45(46):84–91.

80. Leu RE, Schellhorn M. The evolution of income-related health inequalities in Switzerland over time. CESifo Econ Stud. 2006; 52(4):666–90.

81. Balsa Ana I., M’aximo Rossi, and Patricia Triunfo. 2011. Horizontal inequity in access to health care in four South American cities, Revista de Econom’iadel Rosario. 14 (1): Enero—Junio 2011. 31–56.
82. United Nations. Human Development Indices and Indicators 2018 statistical Update. United Nations Dev Program. 2018

83. Whitehead M. The concepts and principles of equity and health. Int J Heal Serv. 1992; 22(3):429–45. https://doi.org/10.2190/986L-LHQ6-2VTE-YRRN PMID: 1644507

84. Wagstaff A. Economics, health and development: Some ethical dilemmas facing the World Bank and the international community. J Med Ethics. 2001; 27(4):262–7. https://doi.org/10.1136/jme.27.4.262 PMID: 11479358

85. Ahmed SM, Tomson G, Petzold M, Kabir ZN. Socio-economic status overrides age and gender in determining health-seeking behavior in rural Bangladesh. Bull World Health Organ. 2005; 83(2):109–17. https://doi.org/10.1002/0042-96862005000020011 PMID: 15744403

86. Berman P, Ahuja R, Bhandari L. The impoverishing effect of health care payments in India: New methodology and findings. Econ Polit Wkly. 2010; 45(16):65–71.

87. Pal R. Measuring incidence of catastrophic out-of-pocket health expenditure: With application to India. Int J Health Care Finance Econ. 2012; 12(1):63–85. https://doi.org/10.1007/s10754-012-9103-4 PMID: 22351126

88. Sharma D, Prinja S, Aggarwal A, Bahuguna P, Sharma A, Rana S. Out-of-pocket expenditure for hospitalization in Haryana State of India: Extent, determinants & financial risk protection. Indian Journal of Medical Research, 2017; 146(6), 759–767. https://doi.org/10.4103/ijmr.IJMR_2003_15 PMID: 29664035

89. Pandey A, Ploubidis GB, Clarke L, Dandona L. Trends in catastrophic health expenditure in India: 1993 to 2014. Bull World Health Organ. 2018; 96(1):18–28. https://doi.org/10.2471/BLT.17.191759 PMID: 29403097

90. Central Bureau of Health Intelligence. National Health Profile 2019 (14th issue). Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India. 2019.