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सत्यमेव जयते

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PART-I

TECHNICAL PAPERS

Measuring Households' Multidimensional Vulnerability Due To Health Shocks: Evidence From National Sample Survey 71st Round Data

- Subrata Mukherjee¹ and Priyanka Dasgupta²

Abstract

A large body of empirical literature, examining the degree and extent of households' vulnerability due to health shock, has applied a concept of *catastrophic healthcare expenditure* suggested by Wagstaff and van Doorslaer (2003). In this approach, a household is considered to have incurred *catastrophic health expenditure* if its out-of-pocket health expenditure exceeds a certain percentage of its capacity to pay, where capacity to pay is household's consumption expenditure or non-food expenditure. The major limitations of this approach are the following: (i) it solely relies on consumption expenditure data generally collected through cross sectional survey; (ii) it ignores other forms of vulnerability such as avoidance, delay and use of low quality inexpensive health care and (iii) it does not distinguish households with different likelihood of facing health shocks and different capacities to absorb the shocks. Borrowing the conceptualisation of multidimensional poverty developed by Alkire and Foster (2008), this paper goes beyond a money-centric measure of vulnerability based on consumption expenditure data and offers a multidimensional measure which is free from some of the limitations of the approach suggested by Wagstaff and van Doorslaer. The multidimensional measure of *vulnerability due to health shock* suggested in this paper considers four dimensions of a household viz. Illness, Utilisation, Capacity and Observed Vulnerability and uses 16 available indicators to capture all four dimensions. Validity and mutual connections of these indicators are examined using regression and correlations techniques. In the first stage, we fix indicator-specific cut-offs based on distributional features of variables (measured by estimated parameters) and evidence from literature. In the second stage the cut-off for aggregate vulnerability score is fixed considering its comparability with the Wagstaff-van Doorslaer's approach. Our results suggest that multidimensional measure of *vulnerability due to health shock* is more convincing one compared to catastrophic health expenditure measure suggested by Wagstaff and van Doorslaer. However, equal weightage to all indicators and limiting the suggested measure to headcount ratio are two limitations of the new approach in its present form.

Keywords: health catastrophe, vulnerability, multidimensional, NSSO, India

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1. Introduction

1.1 Health care financing in many low and middle income countries is still dominated by out-of-pocket (OOP) expenses made by the households. A high OOP health expenditure, most of the time, turns out to be catastrophic for many households, especially for the poor ones and for those who are not covered by adequate health expenditure protection schemes (such as insurance). In such situations households are forced to spend on health care by compromising other necessities such as nutrition and education which may lead to long-term welfare loss. A large OOP health expenditure, when it is financed by depleting savings or selling of productive assets such as land, cattle etc., also has negative implications for household's long-term income and welfare (Berki 1980; Peters *et al.* 2002; Wagstaff and van Doorslaer 2003; Xu *et al.* 2003; Damme *et al.* 2004; Krishna 2004; Rusell 2004; Garg and Karan 2005; Su *et al.* 2006; McIntyre 2006; van Doorslaer *et al.* 2006; Schneider and Hanson 2006).

1.2 Wagstaff and van Doorslaer (2003) identifies a household incurring catastrophic health expenditure if its out-of-pocket medical expenses exceeds a certain fraction or proportion of its income or available resources or capacity to pay, generally measured by household's total consumption or non-food expenditure. Following this approach, a large body of empirical literature has been developed to quantify the incidence and intensity of catastrophic health expenditure experienced by households in different contexts. In many of these empirical studies a household spending more than 10 per cent of its total consumption expenditure or more than 40 per cent of its non-food expenditure on health is considered as households with *catastrophic health expenditure*.

1.3 Majority of the literature, primarily coming from the developing countries context where large part of the population is not covered by effective insurance coverage, have found type of care utilised (inpatient care), type of provider utilised (private facilities), place of residence (rural areas), presence of chronically ill, presence of elderly, presence of children in the household, household size (big households), capacity to pay (poor), employment status (labour/household with unemployed members), insurance coverage (no or public insurance) as key determinants of catastrophic health expenditure (Su *et al.* 2006; Vainshnavi and Das 2009; Berman *et al.* 2010; Mondal *et al.* 2010; Shi *et al.* 2011; Fang *et al.* 2012; Ye Li 2012; Abolhallaje *et al.* 2013; Brinda *et al.* 2014; Oyinpreye and Moses 2014; Rashad and Sharaf 2015; Kumara and Samaratunge 2016; Kien *et al.* 2016; Rashidul *et al.* 2017). Though not many empirical studies have mentioned them, there are other factors such as presence of disabled member, incidence of accident and injury in the household, female headed households, education of the head, living conditions of the household etc. that are found to have influence on catastrophic health expenditure (Malik and Syed 2012; Buigut *et al.* 2015; Kumar *et al.* 2015; Molla *et al.* 2017; Rashidul *et al.* 2017). There are also some studies which have identified macro-level factors (such as state, public expenditure on health, quality of government facilities) having influence on catastrophic health expenditure (Bonu *et al.* 2007; Samadi and Homaie 2013).

1.4 In spite of its ease of interpretation, popularity and widespread applications, certain drawbacks of the Wagstaff and van Doorslaer's approach cannot be ignored. First, in this approach the whole exercise of identifying a household with *catastrophic health expenditure* and measuring the intensity of catastrophe is based only on money-metric consumption data collected through cross sectional surveys. The accuracy of the catastrophic measure, therefore, depends on the quality and completeness of consumption expenditure data.

Second, ignoring various household characteristics which show strong relation with a household's need for health care, its access to health care and the capacity to incur OOP health expenditure prevents us from distinguishing between households with similar level of out-of-pocket health expenditure in a given year but with different levels of health care need and capacity to satisfy the need. Third, there may be occasions when households avoid or delay health care utilisation fearing high OOP health expenditure or go for less expensive low-quality health care. The measure of catastrophic health expenditure suggested by Wagstaff and van Doorslaer is limited in its scope to address these limitations and we argue that a measure which addresses these limitations as much as possible may portray a more accurate picture of the households' vulnerability due to health shock. Therefore, against this background, this paper takes up the following two objectives: (i) to develop a multidimensional measure for capturing households' vulnerability due to health shock; and (ii) provide some empirical illustrations of the new measure and assess its comparative advantages over existing measure of Wagstaff and van Doorslaer.

2. Data and Methods

2.1 The paper uses data from National Sample Survey's 71st round survey data on "Social Consumption: Health" which was conducted during January – June, 2014. The survey collected detailed information on reported illness, utilisation of health care and expenditure on health care including coping strategies to meet the OOP health expenditure from 65,932 households living all across the country.

2.2 The paper attempts to go beyond the concept of *catastrophic health expenditure* incurred by households as suggested by Wagstaff and van Doorslaer (2003) and applied in a large number of empirical studies. Though the idea of vulnerability was never explicitly mentioned in the conceptualisation of catastrophe suggested by Wagstaff and van Doorslaer, the implication of health expenditure catastrophe on vulnerability was obvious. It is quite evident that a household spending large share of its accessible monetary resources on health care will be constrained to spend for other necessities, especially for poor households as well non-poor households with little savings. Incurring high OOP health expenditure may force households to deplete their savings, sale productive assets (such as land, cattle), borrow money on high rates of interest. Fear for high OOP health expenditure may discourage households to seek health care on time (i.e. avoiding or delaying treatment) even seeking healthcare from less expensive low quality providers. It is not difficult to foresee that many of these coping strategies may result in adverse consequences (such as increased severity or complication of ailments) finally affecting the level of vulnerability in worse way.

2.3 We define vulnerability, in our context, as a difference between household's exposure to risk due to health shock or illness and its capacity to absorb the health shock. Risk is an essential component of vulnerability due to uncertainty associated with illness and resultant out-of-pocket expenditure. Some households, due to their demographic compositions, presence of ill members and other factors, are more prone to health shock than others. Similarly, some households due to their better access to health care, higher purchasing power, secured occupational nature, better insurance coverage, are more protected to absorb the health shock than others. Going beyond the money-metric measure suggested by Wagstaff and van Doorslaer, our approach attempts to capture these multiple characteristics of a household which have direct and indirect bearing on its vulnerability due to health shock. Since our measure relies on multiple characteristics of a household, it faces the standard challenges that any multi-dimensional measure encounters while summarising the population.

2.4 To assess its level of vulnerability, we propose to look at each household in terms of four different dimensions:

- (a) Dimension capturing the risk of illness: Under this dimension we look at characteristics of the household which positively contribute to the likelihood of illness. (Dimension I)
- (b) Dimension capturing the utilisation of health care by the household during a particular time period. This dimension captures to what extent risk of illness gets translated into utilisation through realisation of illness. (Dimension U)
- (c) Dimension capturing the household's lack of capacity or inability to utilise healthcare in the face of an illness and also its lack of capacity of absorb the risk of high OOP health expenditure. Illness results in utilisation only when it is backed by capacity to access health care. (Dimension C)
- (d) Dimension capturing household's observed vulnerability to health shock during a particular time period. This is observed when there is a mismatch between realised illness and/or utilisation and capacity to pay. (Dimension O).

2.5 It must be noted that Dimensions I and C are more deterministic in nature and having less influenced by probabilistic elements. In other words, a household which has all preconditions present to induce health shock but does experience illness or report utilisation of health care in a particular time period is purely due to random chance and should not be excluded in vulnerability count. Utilisation of health care (captured under dimension U) contribute OOP health expenditure. However, utilisation which can also be termed as effective demand for health care is expected to depend on two factors namely need for health care (as felt by the household) as well as its capacity to translate that need into effective demand. While the former is captured by dimension I to a great extent, dimension C is a reasonable aspect to capture the latter. For a given capacity of household (captured by Dimension C), one would expect a positive relation between need for health care (captured by Dimension I) and utilisation of health care (Dimension U). Similarly for a given level of need for health care (captured by Dimension I), lower capacity of the household (Captured by Dimension C) would result in lower utilisation (Dimension U). Vulnerability is observed or predicted when there is a mismatch between need (Dimension I) and/or utilisation (Dimension U) on the one hand and capacity of the household (Dimension C) on the other hand. Dimension D is crucial to observe such mismatch. We propose to include all these four dimensions in a multi-dimensional measure to capture household's vulnerability to health shock.

2.6 The information collected by NSSO allows us to construct an exhaustive list of indicators which fairly captures these multiple dimensions. These indicators are chosen observing their importance in the empirical literature. The list of dimensions and indicators are presented in Table 1. The table also presents the threshold value for each indicator which is discussed later. Under dimension I, 5 four indicators are considered: (i) size of the households; (ii) number of elderly persons in the household; (iii) number of chronically ill persons in the household, (iv) number of women belonging to reproductive age group and (v) number of children (0-5 years). Higher values of these indicators are expected to increase a household's need for health care and when supported by favourable access to health care conditions, it would result in higher utilisation of health care by the household. A set of five indicators have been considered to capture Dimension U and they are (i) number of

hospitalisations episodes; (ii) number of hospitalisations in private facilities;³ (iii) number of hospitalisations outside the state; (iv) number of private OP visits and (v) number of OP visits outside the state. Four indicators are used to capture Dimension C, which are (i) economic status of the household (proxied by per capita consumption expenditure), (ii) place of residence of the household; (iii) occupational nature of the household; and (iv) proportion of household members who are covered by health insurance or similar health expenditure protection mechanism. Finally, two indicators are considered to capture the observed vulnerability due to health care: (i) out-of-pocket health expenditure as a percentage of household consumption expenditure; and (ii) source of finance for meeting the out-of-pocket expenses

2.7 One may argue that taking two similar indicators under one dimension may lead to double counting of the same dimension of vulnerability. For example any household reporting at least one episodes of hospitalisations gets value 1 (otherwise 0) showing a vulnerability on this particular sub-dimension/indicator. Again when we consider another sub-dimension/indicator such as hospitalisations at private facility, a household which is reporting at least one episode of hospitalisations at private facility gets value 1 (otherwise 0). This is surely a double counting but this double counting allows us to give higher values of vulnerability if the household happened to have at least one episode of hospitalisations at private facility. In other words, this double counting may lead to a total vulnerability count (score) in the desirable direction. The mean and median out-of-pocket costs of hospitalisations per household reporting at least one case of hospitalisations (irrespective or public or private) are Rs.19048 and Rs.6700. The mean and median out-of-pocket costs of hospitalisations per household reporting at least one episode of hospitalisations as well as at least one episode of private hospitalisations are Rs 29919 and Rs. 15460 respectively. The mean and median out-of-pocket costs of hospitalisations per household reporting at least one episode of hospitalisations, at least one episode of hospitalisations at a private facility and at least one episode of hospitalisations outside the home state are Rs. 48757 and Rs. 20600 respectively. We, therefore, argue that the double counting is basically facilitating to attach higher values to the vulnerability score of the households.

2.8 To identify the households which are vulnerable in our multidimensional measure, we follow the approach suggested by Alkire and Foster (2008) for their conceptualisation of multidimensional poverty. We use cut-off at two stages: in the first stage for each individual indicator we set our threshold or cut-offs to identify if a household shows vulnerability with regard to that particular indicator. Following this process for all seventeen indicators allows us to know on how many indicators/counts a particular household is vulnerable. In the

³ One may argue that having both the indicators such as the number of hospitalisations and number of hospitalisations in private facilities may lead to double counting of vulnerability. However, when the thresholds are set for each individual indicator in the first stage, having both hospitalisations (any and at private facilities) indicators allow us to attach vulnerability scores in the desired direction. For example, any household reporting at least one episodes of hospitalisations gets value 1 (otherwise 0) showing vulnerability on this particular sub-dimension/indicator. Further, any household reporting at least one episodes of hospitalisations at a private facility gets value 1 (otherwise 0). When these two indicators along with their respective thresholds are considered together, households having no hospitalisations, atleast one hospitalisations in public facility and atleast one hospitalisations in private facility get vulnerability scores 0, 1 and 2 respectively. We have some evidence to show that this particular order of the scores has a one-to-one correspondence with how much out-of-pocket expenses households incur for hospitalisations. Whereas the mean and median out-of-pocket hospitalisations expenses incurred by a household with atleast one hospitalisations (no hospitalisations at a private facility) are Rs. 5974 and Rs. 2200 respectively, the corresponding figures for households with at least one hospitalisations at private facilities are Rs. 31,706 and Rs. 16,100 respectively.

second stage, we set another cut-off for the total count to identify a household vulnerable due to health shock.

2.9 Like multidimensional poverty measurement, in our approach household is the unit of analysis for vulnerability measurement. Once a household is identified as *vulnerable due to health shock* a simple measure of headcount ratio is estimated to measure the extent of vulnerability for the entire population. To avoid any arbitrariness in setting up cut-off for the indicators in the first stage we take a mixed approach. For majority of the indicators the cut-off is set by looking at the estimated distributional parameters of those indicators. For most of the indicators with count or measurement data, the integer value of the indicator higher than *mean plus one standard deviation* is considered as threshold. This rule is followed for the following indicators: household size, number of elderly person, number of children, number of chronically ill persons, number of women in the reproductive age group, number of hospitalisations, number of private hospitalisations, number of private OP visits, number of OP visits outside the state and nature of finance for meeting OOP health expenses (Table A1). The available existing evidence guides us to choose threshold for rest of the indicators. We have taken the poverty line (Rs 1000) for urban India (Tendulkar Method on Mixed Reference Period) for the year 2011-12 to define poor and non-poor. The rural population's poor access to health care in comparison to their urban counter part and financial constraints faced by casual labour households in accessing health care is well documented in the literature. To define high OOP health care expenditure, we have relied upon the existing definition of catastrophic health expenditure proposed and popularised by Wagstaff and van Doorslaer. For majority of the studies households spending more than 10 per cent of their consumption expenditure on health care is considered as catastrophic and we have taken that as threshold value. Only for insurance coverage, we have arbitrarily chosen 50 per cent or half of the family members having insurance coverage as threshold. In the second stage the cut-off has been fixed to make the new multidimensional measure comparable with the results obtained from Wagstaff-van Doorslaer's approach. In other words, in the second stage we choose the cut-off in such a way which gives similar percentage of households with catastrophic health care payments.

3. Results

3.1 The household level averages of all indicators under four dimensions (outlined in Table 1) along with their 95 per cent confidence intervals are presented Table 2. The average household size of our all India sample is approximately 4.5 and data shows that almost three-fourth of country's households have five or less members. According to the latest Census (2011) data, elderly accounts for 8.0 per cent of India's population. In our sample, the average number of elderly is 0.35 indicating that there is roughly one elderly per 3 households. On an average there is one chronically ill person per five households (mean 0.218). Similarly, on an average each household has more than one woman (of reproductive age group) and child (0-5 years). The percentage of household members covered under some kind of health expenditure protection has not exceeded 20 per cent even by now (16.89 per cent). The distribution of households by their occupational type shows that little less than half of our households are self-employed (46.95 per cent), followed by casual labour (little more than a quarter, precisely 26.14 per cent) and regular wage or salary earning households is roughly one-fifth of the total number of households (19.9 per cent). During one year preceding the survey, 220 episodes of hospitalisations were observed per 1000 households, out of which 125 hospitalisations were in private hospitals and 13 hospitalisations took place outside the native state of utilisers. During last 15 days preceding the survey, 286 private OP visits were observed per 1000 households, out of which 17 were outside the state.

Households, on an average, spend more than 12 per cent of their consumption expenditure on health care and 8.1 per cent households reported to have borrowed money and sold assets to finance their OOP health expenditure.

3.2 Since number of hospitalisations and OP visits are all count data, Poisson or Negative Binomial regression models are suggested to model them instead of Linear Regression Model because of using OLS regression models for count data might result in biased and inefficient estimates for count data analysis (Cameron and Trivedi 2005). The negative binomial regression has an advantage over Poisson regression in this regard as it is a better fit for over-dispersed count outcome variables and gives more precise results.⁴ Table 3 presents results of Negative Binomial regressions for five utilisation variables, namely, number of hospitalisations, number of hospitalisations at private facilities, number of hospitalisations outside states, number of private OP visits and number of OP visits outside state. Except private OP visit, household size is positively associated with all four utilisation variables. As found in the literature, both number of elderly members and number of chronically ill members in household are positively associated with all or four utilisation variable. There is no statistical evidence of association between number of women in a household and utilisation variables, especially for outpatient care utilisation. As expected, household's capacity to pay (proxied by per capita consumption expenditure and transformed to logarithmic values in order to remove skewness of the distribution) is positively associated with utilisation of all types. It is surprising to see that having more members covered under insurance in a household reduces the average values of the utilisation variables. This is an indication that utilisation is more influenced by the objective healthcare need of the household and there is no evidence of moral hazard (i.e. overuse of health care due to insurance coverage). The association of household's occupational type with utilisation does not follow uniform pattern, though some categories are significant.

3.3 Dimension O in our approach aims to capture a household's observed *vulnerability due to health shock* observed during a particular reference period (say, a year). Due to data constraints, we are able to observe only two indicators under this dimension, namely, catastrophic health expenditure; distress financing (to meet out-of-pocket health expenditure) and untreated illness. Following the definition of Wagstaff-van Doorslaer's, a household spending more than 10 per cent of its consumption expenditure on health is considered to have incurred catastrophic health expenditure. A household which has resorted to borrowing, selling of assets or similar means for financing the OOP health expenditure a clear indication of distress financing. Each of these variables, capturing the observed vulnerability, is converted into binary variables and used as dependent variables to explore their association with various household level characteristics using logistic regression techniques. The results of the logistic regressions are presented in Table 4.

3.4 The first odds ratio column in Table 4 shows the association between catastrophic households and indicators used for capturing dimensions U and C. Though most of the variables are significant and having odds ratios higher than one, three points must be noted. First, utilisation of private facilities both for inpatient and for outpatient care is showing stronger association with catastrophic health expenditure (OR=7.36 for number of private hospitalisation; OR = 11.87 for private OP visits). Second, households staying in the rural

⁴ The distribution of the parameter of the negative binomial distribution is considered as a random variable and can account for cases when the variance of the data is larger than its mean. Thus for those cases where the majority of households in the data set did not seek hospitalization, but a few households sought inpatient care more than once, negative binomial regression yields better results than any other count data regression models.

areas are more likely to incur catastrophic health expenditure than households staying in the urban areas. Third, households' occupational type may not make a difference in its likelihood of incurring catastrophic health expenditure and the effect is probably captured by household's economic status or ability to pay. Except for one variable, 'households reported distress financing' to meet out of pocket expenditure, all the odds ratios are significant. There are two points to observe: first, having higher proportion of members covered under some kind of health expenditure protection reduces the likelihood of distress financing. Second, compared to regular wage/salaried and self-employed, casual labour households have higher likelihood of distress financing. Pair-wise correlation between all indicators in their vulnerable and non-vulnerable dichotomisation are presented in Table 5. The binary dichotomisation of all indicators between vulnerable and non-vulnerable is presented in Table A2. Table 5 indicates that not all dimensions and their constituent parts are significantly and positively correlated. By including dimensions which are contradictory to each other, we are perhaps able to include the variability of the factors which are conceptually linked to vulnerability. For example, the negative correlation between chronically ill and being in the rural areas is puzzling. Due to lack of awareness about chronic illness and people's poor access to proper care, chronic illness is grossly under-reported in the rural areas. But the influence of urban life style (which promotes more chronic illness) and larger share of elderly population in the urban areas who are more prone to chronic illness could also be equally important reason.

3.5 The first set of cut-off allows us to identify the indicators where a household shows its vulnerability. Since our data allows us to rely on 16 indicators to capture four dimensions, a household's vulnerability scores could sum up to 16 at the maximum if a household shows vulnerability in all indicators. Similarly, if a household does not show vulnerability in any of these 16 indicators, its vulnerability score should become zero. Therefore, theoretically the vulnerability score is expected to vary between 0 and 16 (inclusive of both the scores). Figure 1 presents both the histogram of the vulnerability score (panel A) as well as cumulative relative frequency curve of the vulnerability score (Panel B). Households' vulnerability scores seem to follow a mild positively skewed distribution with a long right tail. However, if one ignores its long right tail, the histogram is fairly symmetric with fewer proportions of households having very low and very high count of vulnerability scores and majority of the households have vulnerability scores ranging from 3 to 6. (The estimated data used for drawing Figure 1 are presented in Appendix Table A3).

3.6 The second stage cut-off is set by comparing it with the percentage of households incurring *catastrophic health expenditure* for different cut-offs as per the method suggested by Wagstaff and van Doorslaer. This is done for making our results comparable with results accruing from Wagstaff and van Doorslaer's approach. This equivalence is required to compare the merits and demerits of our results with results obtained by using the methods of Wagstaff and van Doorslaer.

3.7 Following Wagstaff and van Doorslaer's method, the percentage of households having incurred *catastrophic health expenditure* falls as we increase the catastrophe cut-off (share of out-of-pocket expenditure in total consumption expenditure). This is presented in Figure 2 and the estimated data for drawing Figure 2 are provided in Appendix Table A4. A comparison of Figure 1 (or Table A3) and Figure 2 (or Table A4) shows that a 5% cut-off according to Wagstaff and van Doorslaer's method is comparable to a cut-offs of 5 or more dimensions according to multidimensional method. In other words, percentage of households who are incurring OOP health expenditure more than 5 per cent of their total consumption

expenditure is almost equivalent to percentage of households who are vulnerable in 5 or more dimensions. Both the figures are close to 31 per cent. In a similar way, percentage of households who are incurring OOP health expenditure more than 17 per cent of their total consumption expenditure is almost equivalent to percentage of households who are vulnerable in 6 or more dimensions. Both are closer to 17-18 percentages. Though there does not seem to be a need for equating the percentage of vulnerable households based on Wagstaff-van Doorslaer's method and the method suggested in this paper, we insisted for this equivalence (i) to make both the methods comparable when at least some crucial parameter is similar and (ii) then for exploring the distributive results that these two separate methods generate. We have chosen cut-off at 17 percent for Wagstaff and van Doorslaer's method and a cut-off of 6 or more dimensions for multidimensional method for illustration purposes. In other words, we would like to see even if we compel both the methods to generate same average of vulnerable households by choosing appropriate cut-off points, whether the same average get distributed across income and social classes in the very similar way in both the methods. Our emphasis on the examination of vulnerability across sub-population groups suggests us to fix some parameter only for the sake of comparability and fixing the average percentage of vulnerable population appears as most acceptable strategy.

3.8 How the percentage of multidimensionally vulnerable households for the whole population is distributed across PCCE quintiles is presented in Figure 3. The same figure also shows how the percentage of households with catastrophic health expenditure (Wagstaff – van Doorslaer's method) is distributed across the same PCCE quintiles. Whereas there is no significant variation in the percentage of households with catastrophic health expenditure across PCCE quintiles, the variation is substantial and on expected lines for multidimensionally vulnerable households based on our method. The multidimensional vulnerability shows a clear positive gradient as we move from bottom PCCE quintile to the top PCCE quintile. Figure 4 presents similar observations by household castes. The percentage of households with catastrophic health expenditure shows a clear positive gradient as we move from ST group to Other (General) group – a pattern goes against our intuition. It is intuitively difficult to accept a social group (ST) as least *vulnerable due to health shock* where there is an overwhelming evidence of their vulnerability in terms of many other indicators of wellbeing (Kabeer 2002; Mukherjee *et al.* 2011). However, this intuitively unacceptable perverse ordering is not observed in the multidimensional measure. Other (General) caste shows the lowest incidence of vulnerability in comparison to all caste groups and ST households show vulnerability well above the Other (General) castes. The multidimensional vulnerability seems to be highest for the SC households but less than OBC and Other (General) caste groups. The percentages of households with catastrophic health care expenditure and multidimensionally vulnerable due to health shock are given in Table 6. The table also shows the ranking of the states based on two measures. It is important to notice that though many of the states are able to retain their relative positions in both the measures, for some states these two measures give completely different ranking.

3.9 It would have been more interesting from the policy point of view to explore how vulnerability of the households vary depending upon the types of institution (public or private) utilised by the household. However, such analysis is constrained by our conceptualisation of vulnerability. First, we are defining the vulnerability count at the household level. Second, a single household may report both outpatient care and inpatient care. Finally, an outpatient or inpatient (hospitalisations) care be obtained from both public and private providers. Since we are doing the analysis at the households level, we are not able to get separate estimates of vulnerability for those household which resorted to public

hospitals and those who resorted to private hospitals. However, it is perfectly feasible to show how total vulnerability counts respond to the utilisation of public facilities and private facilities for both outpatient and inpatient care. An exploratory regression results show connection between total vulnerability count (score), number of hospitalisations at public facilities, number of hospitalisations at private facilities, number of public OP visits and number of private OP visits (Table A7) . The results clearly show the degree of association between total vulnerability count of a household and its utilisation of outpatient and inpatient care at both public and private facilities. Two important points are evident from this exploratory regression: First, the contribution of inpatient care utilization in increasing the total vulnerability score of a household is much stronger than that of outpatient care utilisation. Second, utilisation at private facilities is more vulnerability-score enhancing than utilisation at government facilities. In short, the order of the coefficient values are also in the expected lines.

4. Conclusion

4.1 The evidence generated by our analysis seems to suggest that multidimensional measure presents a more accurate picture of *vulnerability due to health shock* in comparison with Wagstaff and van Doorslaer's method of identifying households with *catastrophic health expenditure*. Many of the dimensions that we have considered show significant and positive correlation with Wagstaff and van Doorslaer measure indicating that multidimensional measure is in line with the well-received notion of vulnerability due to health expenditure catastrophe. However, multidimensional measure has also considered indicators which either show insignificant or negative relation with Wagstaff and van Doorslaer's measure but important on their own right to capture a somewhat complete picture of *vulnerability due to health shocks*. Our comparison of results based on Wagstaff – van Doorslaer's approach and multidimensional approach clearly shows that even if we fix same average rate of vulnerability by appropriately choosing the cut-off / threshold points, the methods give completely different distribution of vulnerability across economic and social classes and the method suggested in this paper gives us more convincing results. The distribution of vulnerability due to catastrophe across class and caste groups that Wagstaff-van Doorslaer's approach suggests is not intuitively convincing – a limitation that multidimensional measure of vulnerability does not suffer from. Moreover two constituent dimensions of this approach, namely, Dimensions I and C have little probabilistic elements. This may help targeting of households in order to protect them from health shock induced vulnerability in an efficient way.

4.2 However, the multidimensional approach, in its present form, suffers from two limitations: First, all indicators have been given equal weightage (indicating dimensions are given unequal weightage) which may not be acceptable from a theoretical point of view. Second, we have only considered the headcount measure of vulnerability. The concept of catastrophic health expenditure by Wagstaff and van Doorslaer has gone beyond simple headcount measure and suggests measures capturing intensity of catastrophe (viz. overshoot and mean positive overshoot). In multidimensional poverty approach, the measure is extended beyond the headcount ratio and offers measures of higher degrees. An extension and more refined version of the current approach is capable of addressing these limitations.

References

- Abolhallaje M, Hasani S, A, Bastani, P et al. (2013): 'Determinants of Catastrophic Health Expenditure in Iran', *Iranian Journal of Public Health*, Vol. 42, Supple.1, pp: 155-160
- Alkire, S. and Foster, J. (2008): 'Counting and Multidimensional Poverty Measurement'. OPHI Working Paper 7, Oxford University.
- Berki, S. (1986): 'A Look at Catastrophic Medical Expenses and the Poor', *Health Affairs*, 5(4): 138-145.
- Berman, P., Ahuja, R., and Bhandari, L. (2010): 'The Impoverishing Effects of Healthcare Payments in India: New Methodology and Findings', *Economic & Political Weekly*, 45(16): 65-71.
- Bonu S, Bhushan I, and Peters D.H. (2007): 'Incidence, Intensity, and Correlates of Catastrophic Out-of-Pocket Health Payments in India', *ERD Working Paper No. 102*. Asian Development Bank.
- Brinda E.M., Andrés, R.A. and Enemark, U. (2014): 'Correlates of out-of-pocket and catastrophic health expenditures in Tanzania: results from a national household survey', *BMC International Health and Human Rights*
- Buigut S., Ettarh R., and Amendah, A, D. (2015) : 'Catastrophic health expenditure and its determinants in Kenya slum communities', *International Journal for Equity in Health*, 14:46
- Cameron A C and P K Trivedi (2005): *Micro econometrics: Methods and Applications*, Cambridge University Press.
- Chowdhury S. (2009) : 'Health shocks and urban poor: A case study of slums in Delhi', Paper presented at the Fifth Annual Conference on Economic Growth and Development, New Delhi, Indian Statistical Institute. Retrieved 27 March 2017, from <http://umconference.um.edu.my/upload/43-1/papers/121%20SamikChowdhury.pdf>
- Damme, V. W., Leemput, L. V., Por, I., Hardeman, W., and Meessen, B., (2004): 'Out-of-pocket health expenditure and debt in poor households: Evidence from Cambodia', *Tropical Medicine and International Health*. 9:273-80
- Fang K, Jiang Y, Shia B, Ma S (2012): 'Impact of Illness and Medical Expenditure on Household Consumptions: A Survey in Western China', *PLoS ONE* 7(12): e52928.
- Garg, C. C., and Karan, A.K., (2005): Health and Millennium Development Goal 1: 'Reducing out-of-pocket Expenditures to Reduce Income Poverty—Evidence from India'. Working Paper No.15, EQUITAP Project, Institute of Health Policy, Colombo.
- Kabeer N. (2002): Safety Nets and Opportunity Ladders: Addressing Vulnerability and Enhancing Productivity in South Asia; *Development Policy Review*, 2002, 20 (5): 589-614

- Kien V. D, Minh H. V, Giang K.B. et al. (2016): ‘Socioeconomic inequalities in catastrophic health expenditure and impoverishment associated with non-communicable diseases in urban Hanoi’, *Vietnam International Journal for Equity in Health*. 15:169
- Krishna, A., (2004): ‘Escaping Poverty and Becoming Poor: Who Gains, Who Loses, and Why?’ *World Development* Vol. 32, No. 1, pp. 121–136, 2004.
- Kumar K, Singh A, Kumar S, Ram F, Singh A, Ram U, et al. (2015): ‘Socio-Economic Differentials in Impoverishment Effects of Out-of-Pocket Health Expenditure in China and India: Evidence from WHO SAGE’, *PLoS ONE* 10(8): e0135051.
- Kumara A.S and Samaratunge .R (2016): ‘Patterns and determinants of out-of-pocket health care expenditure in Sri Lanka: evidence from household surveys’, *Health Policy and Planning*, Volume 31, Issue 8.pp 970–983
- Li Y., Wu Q., Xu. Ling et al (2012): ‘Factors affecting catastrophic health expenditure and impoverishment from medical expenses in China: policy implications of universal health insurance’, *Bull World Health Organ*; 90:664–671
- Limwattananon S., Tangcharoensathien, V., and Prakongsai, P., (2007): ‘Catastrophic and poverty impacts of health payments: Results from national household surveys in Thailand’. *Bulletin of the World Health Organization*. 85:600–606.
- McIntyre, D., Thiede, M., Dahlgren, G., and Whitehead, M., (2006): ‘What are the economic consequences for households of illness and of paying for health care in low-and middle-income country contexts?’ *Social Science and Medicine*, 62:858–865.
- Moghadam, M., Banshi, M., Javar, M., Amiresmaili, M., & Ganjavi, S. (2012). ‘Iranian Household Financial Protection against Catastrophic Health Care’. *Iran J Public Health*, 41(9), 62-70.
- Molla A. , Chi, C and Mondaca A.L.N. (2017): ‘Predictors of high out-of-pocket healthcare expenditure: an analysis using Bangladesh household income and expenditure survey,2010’, *BMC Health Services Research*,17:94
- Mondal S., Kanjilal B., Peters D. and Lucas H. (2010). “Catastrophic out-of-pocket payment for health care and its impact on households: experience from West Bengal, India”, CPRC website, University of Manchester, UK.
- Muhammad Malik and Azam Syed (2012): ‘Socio-economic determinants of household out-of-pocket payments on healthcare in Pakistan’, *International Journal for Equity in Health* 2012, 11:51
- Mukherjee S, S Haddad and D Narayana (2011): ‘Social class related inequalities in household health expenditure and economic burden: evidence from Kerala, south India’, *International Journal for Equity in Health*, 10:1
- Njuguna K. D., Kimani D.N. and Kinyanjui B. (2017) : ‘Determinants and Distribution of Catastrophic Health Expenditures and Impoverishment in Kenya’, *Public Health Research*,7(3): 55-61

- O'Donnell, O, E van Doorslaer et al (2007): 'The Incidence of Public Spending on Healthcare: Comparative Evidence from Asia', *The World Bank Economic Review*, 21(1): pp. 93-123.
- Oyinpreye A. T and Moses K.T. (2014): 'Determinants of Out-Of-Pocket Healthcare Expenditure in the South-South Geopolitical Zone of Nigeria', *International Journal of Economics, Finance and Management*. Vol. 3, No. 6
- Peters, D. H., Yazbeck, A, S., Sharma, R., Ramana,G, N, V.,Pritchett, L., and Wagstaff, V., (2002): 'Better Health Systems for India's Poor: Findings, Analysis, and Options', Washington DC: The World Bank.
- Ranson, M, K.,(2002):'Reduction of Catastrophic health care expenditure by community based health insurance scheme in Gujarat, India: current experience and challenges', *Bull World Health Organ*, 80:613-621
- Rashad A.S and Sharaf M.F. (2015): 'Catastrophic and Impoverishing Effects of Out-of-Pocket Health Expenditure: New Evidence from Egypt', *American Journal of Economics 2015*, 5(5): 526-533.
- Rashidul Alam Mahumud, Sarker A.R., Sultana M, Islam Z, Khan, J and Morton, A.(2017): 'Distribution and Determinants of Out-of-pocket Healthcare Expenditures in Bangladesh', *Journal of Preventive Medicine and Public Health*; 50:91-99.
- Rezapour A, Arabloo J, Tofighi S, Alipour V, Sepandy M, Mokhtari P, Ghanbary A. (2016): 'Determining equity in household's health care payments in Hamedan province, Iran', *Arch Iran Med*; 19(7):480 – 487
- Russell, S., (2004):'The economic burden of illness for households in developing countries: a review of studies focusing on malaria, tuberculosis, and human immunodeficiency virus/acquired immunodeficiency syndrome', *American Journal of Tropical Medicine and Hygiene*, 71:147–155.
- Samadi A., and Homaie Rad E. (2013): 'Determinants of healthcare expenditure in Economic Cooperation Organization (ECO) countries: evidence from panel co integration tests', *International Journal of Health Policy and Management*; 1: 63-68.
- Schneider, P., and Hanson, K., (2006):'Horizontal equity in utilization of care and fairness of health financing: a comparison of micro-health insurance and user fees in Rwanda', *Health Economics*; 15: pp. 19–31.
- Shi W., Chongsuvivatwong V., Geater A. et al. (2011): 'Effect of household and village characteristics on financial catastrophe and impoverishment due to health care spending in Western and Central Rural China: A multilevel analysis', *Health Research Policy and Systems*, 9:16
- Su, T, T., Kouyate, B., and Flessa, S.,(2006):'Catastrophic household expenditure for healthcare in a low-income society: a study from Nouna District, Burkina Faso', *Bull World Health Organisation*,84, No.1:21-27

- Vaishnavi S.D and Dash U. (2009): 'Catastrophic Payments for Health Care among Households in Urban Tamil Nadu, India', *Journal of International Development* 21, 169-184.
- van Doorslaer, E, O'Donnell O, Rannan-Eliya RP, Somanathan A, Adhikari S R, Garg CC, Harbianto D, Herrin AN, Huq MN, Ibragimova S, et al (2006): 'Effect of payments for health care on poverty estimates in 11 countries in Asia: an analysis of household survey data'. *Lancet*, 368: pp.1357–1364.
- Wagstaff, A., and van Doorslaer, E., (2003): 'Catastrophe and Impoverishment in Paying for Healthcare: With Applications to Vietnam 1993-98', *Health Economics*, 12:921-34.
- Waters, H., Anderson, G., Mays, J., (2004): 'Measuring Financial protection in health in the United States'. *Health Policy* 69 (3), 339-349.
- Xu, K., Evans, D., Kawabata, K., Zeramdini, R., and Murray, C., (2003): 'Household Catastrophic Health Expenditure: A Multi country Analysis', *Lancet*, 362:111-17.

Tables

Table 1: Dimensions, indicators and threshold values

Dimensions	Indicators	Threshold for vulnerability
Dimension I: Illness inducing factors	Household size	≥ 7
	Number of elderly persons	≥ 1
	Number of children (0-5 years)	≥ 3
	Number of chronically ill persons	≥ 1
	Number of women belonging to reproductive age group	≥ 3
Dimension U: Utilisation of health care	Number of hospitalisation	≥ 1
	Number of private hospitalisation	≥ 1
	Number of hospitalisation outside the state	≥ 1
	Number of outpatient visit	≥ 1
	Number of outpatient visit outside state	≥ 1
Dimension C: Inability or negative capacity of the household	Per capita consumption expenditure (PCCE)	Poor households (households with less than Rs. 1000 PCCE)
	Location of residence	Household living in rural areas
	Number of members having insurance coverage	More than half of the members not having insurance coverage
	Occupational type of household	Casual labour households
Dimension O: Observed vulnerability	Out-of-pocket health expenditure as a proportion total consumption expenditure	≥ 10 per cent
	Nature of finance for meeting out-of-pocket expenditure	At least one incidence of borrowing/selling any asset for meeting hospitalisation expenses

Table 2: Household level summary statistics of the indicators

Variables/Indicators (sample size)	Mean (95% Confidence Intervals)
Household size (n=333,104)	4.51 (4.49,4.53)
Number of elderly members (n=27,245)	0.35 (0.35,0.36)
Number of children (n=47,949)	1.126 (1.116,1.136)
Number of chronically ill members (n=18,212)	0.218 (0.214, 0.222)
Number of females in the reproductive age (n=88,440)	1.194 (1.188,1.200)
Per capita consumption expenditure (Rs.) (number of households with PCCE <Rs.1000 = 16,740)	1848 (1835,1860)
Number of households residing in rural areas (n=36,480)	0.674 (0.670,0.677)
Number of households residing in urban areas (n=29,452)	0.325 (0.322,0.329)
Percentage of households members with insurance coverage (n=50,234)	16.89 (16.25, 17.53)
Number of self-employed households (n=31,615)	0.469 (0.465,0.473)
Number of regular wage/salaried households (n=15,723)	0.198 (0.195,0.202)
Number of casual labour households (n=14,255)	0.261 (0.258,0.264)
Number of households engaged in other occupations (n=4339)	0.070 (0.068,0.0721)
Number of hospitalization events (n=55,026)	0.220 (0.216, 0.224)
Number of private hospitalization events (n=30,017)	0.125 (0.1225,0.128)
Number of hospitalization events outside state (n=3821)	0.013 (0.012,0.014)
Number of outpatient visits in private facilities (n=19,747)	0.286 (0.281,0.291)
Number of outpatient visits outside state (n=1437)	0.017 (0.0160,0.018)
Out-of-pocket health expenditure as a percentage of total consumption (n=29,645)	12.479 (12.106,12.851)
Number of households reporting borrowing/selling of assets to as major source to finance health care (n=12,391)	0.081 (0.079,0.083)

Source: Estimated from 71st round unit level data

Table 3: Results of the Negative Binomial regressions

Variables	Hospitalization	Hospitalization in private facilities	Hospitalization outside state	Outpatient visits in private facilities	Outpatient visits outside state
	IRR	IRR	IRR	IRR	IRR
Household size	1.129*	1.177*	1.296*	1.023	1.195*
Number of elderly members	1.174*	1.206*	1.154*	1.062*	1.069
Number of children	1.128*	1.070*	1.070	1.121*	0.973
Number of chronically ill members	1.528*	1.618*	1.321*	3.211*	3.060*
Number of women in the reproductive age	1.142*	1.129*	1.102	1.035	1.006
Log of per capita consumption expenditure	1.375*	2.040*	1.753*	1.277*	0.886
Number of members having insurance coverage	0.978*	0.983*	0.818*	1.008	0.771*
Place of residence (Ref: Urban)					
<i>Rural</i>	1.118*	1.103*	1.049	0.919*	0.729
Household's occupational type (Ref: Regular wage/salaried)					
<i>Self employed</i>	0.986	0.991	1.279*	0.944	2.111*
<i>Casual Labour</i>	1.088*	0.898*	0.934	0.912	1.721*
<i>Others</i>	0.992	1.011	1.015	1.061	2.046*
Constant	0.007*	0.0002*	0.0001*	0.021*	0.018*

Note: * indicates 5% level of significance.

Source: Estimated from NSS 71st Round unit level data

Table 4: Results of the logistic regressions

Variables	Catastrophe	Distress financing
	Odds Ratio	Odds Ratio
Total number of hospitalization events	3.281*	3.354*
Total number of hospitalization events in private institutions	7.367*	1.632*
Total number of hospitalization events outside state	1.760*	1.598*
Total number of outpatient visits in private institutions	11.873*	1.419*
Total no. of outpatient visits outside state	5.476*	1.374*
Percent of members having insurance coverage	1.002*	0.993*
Log of per capita consumption expenditure	0.507*	0.695*
Place of residence (Ref: Urban)		
<i>Rural</i>	1.246*	1.215*
Household occupational type (Ref: Regular wage/salaried)		
<i>Self employed</i>	0.966	0.953
<i>Casual labour</i>	0.998	1.472*
<i>Others</i>	1.897*	1.581*
Constant	6.046*	0.748

Notes: Definitions of dependent variables - **Catastrophe**: = 1 if a household's out-of-pocket health expenditure is more than 10 % of its consumption expenditure, = 0 otherwise; **distress financing** = 1 if household resorts to selling of assets, borrowing and contribution from others to finance health care, =0 otherwise; * indicates 5% level of significance.

Source: Estimated from NSS 71st Round unit level data.

Table 5: Correlation matrix of the dimensions

Dimensions/ Indicators	Big household	Elderly	Children	Chronically III	Women	Poor	Rural	No insurance	Labour	Hospitalisation	Private hospitalisation hospitalization	Out of state hospitalisation outside state	Private OP visit	Outside state OP visit	Catastrophic health expenditure	Distance financing
Big household																
Elderly	0.172*															
Children	0.396*	-0.023*														
Chronically III	0.031*	0.237*	-0.057*													
Women	0.0323*	0.004	0.034*	.0108*												
Poor	0.177*	-0.007	0.239*	-0.102*	0.052*											
Rural	0.075*	0.021*	0.104*	-0.076*	0.004	0.276*										
No Insurance	0.078*	-0.031*	0.086*	-0.130*	0.028*	0.087*	0.045*									
Labour	-0.036*	-0.086*	0.043*	-0.047*	-0.035*	0.193*	0.175*	0.017*								
Hospitalisation	0.139*	0.079*	0.073*	0.123*	0.068*	-0.019*	0.006	-0.014*	-0.011*							
Private hospitalisation	0.092*	0.090*	0.021*	0.136*	0.055*	-0.082*	-0.043*	-0.025*	-0.055*	0.691*						
Outside state hospitalisation	0.016*	0.020*	-0.002	0.034*	0.008*	-0.030*	-0.009*	-0.053*	-0.020*	0.225*	0.224*					
Private OP visits	0.051*	0.133*	-0.003	0.386*	0.017*	-0.076*	-0.072*	-0.068*	-0.048*	0.049*	0.079*	0.008*				
Outside OP visit	0.004	0.041*	-0.019*	0.136*	-0.011*	-0.037*	-0.011*	-0.098*	-0.010*	0.029*	0.036*	0.220*	0.052*			
Catastrophic health expenditure	0.056*	0.152*	0.004	0.416*	0.028*	0.002	0.004	-0.023*	-0.024*	0.368*	0.414*	0.128*	0.331*	0.153*		
Distress financing	0.026*	0.062*	0.003	0.223*	0.009*	0.006	0.029*	-0.075*	0.034*	0.352*	0.329*	0.134*	0.079*	0.065*	0.271*	

Note: * indicates significant phi values (5 per cent)

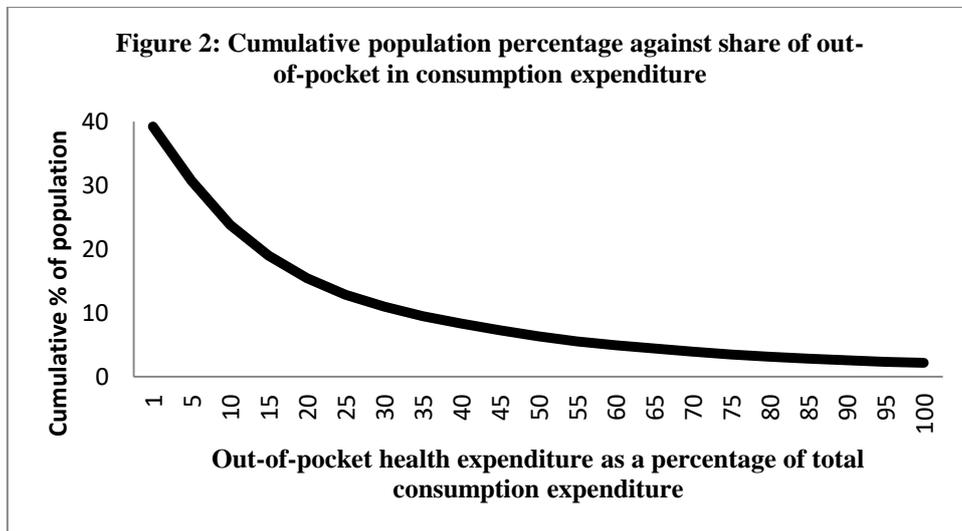
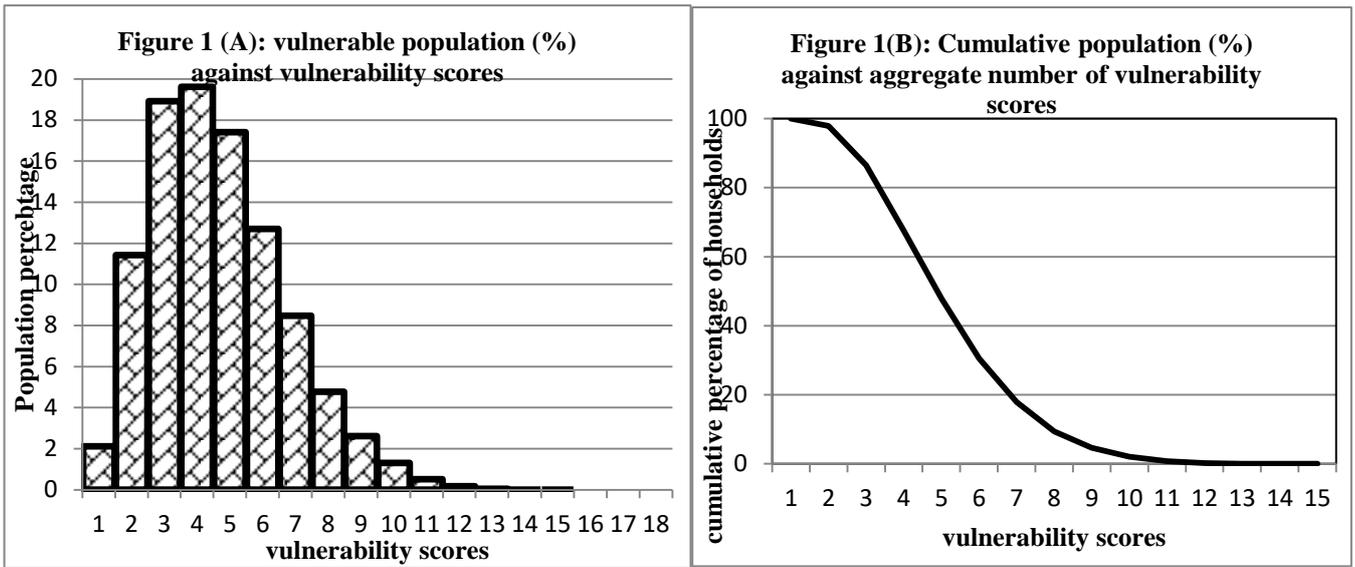
Source: Estimated from NSS 71st round unit level data

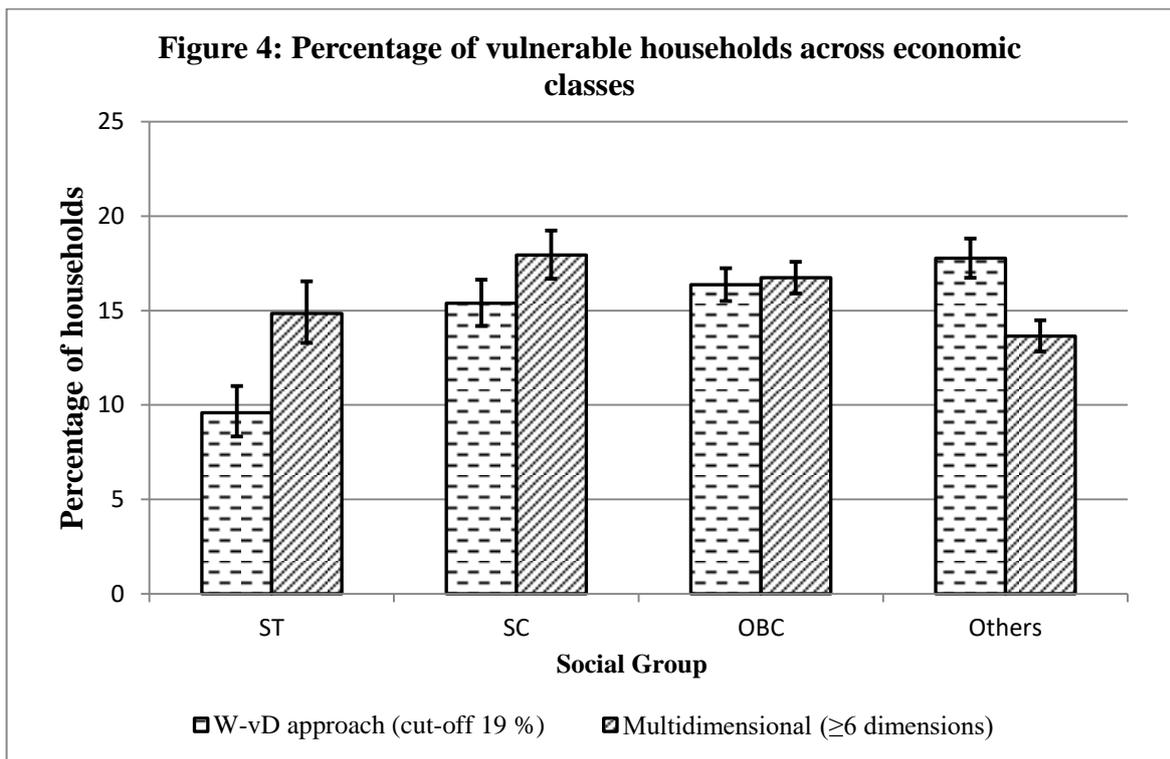
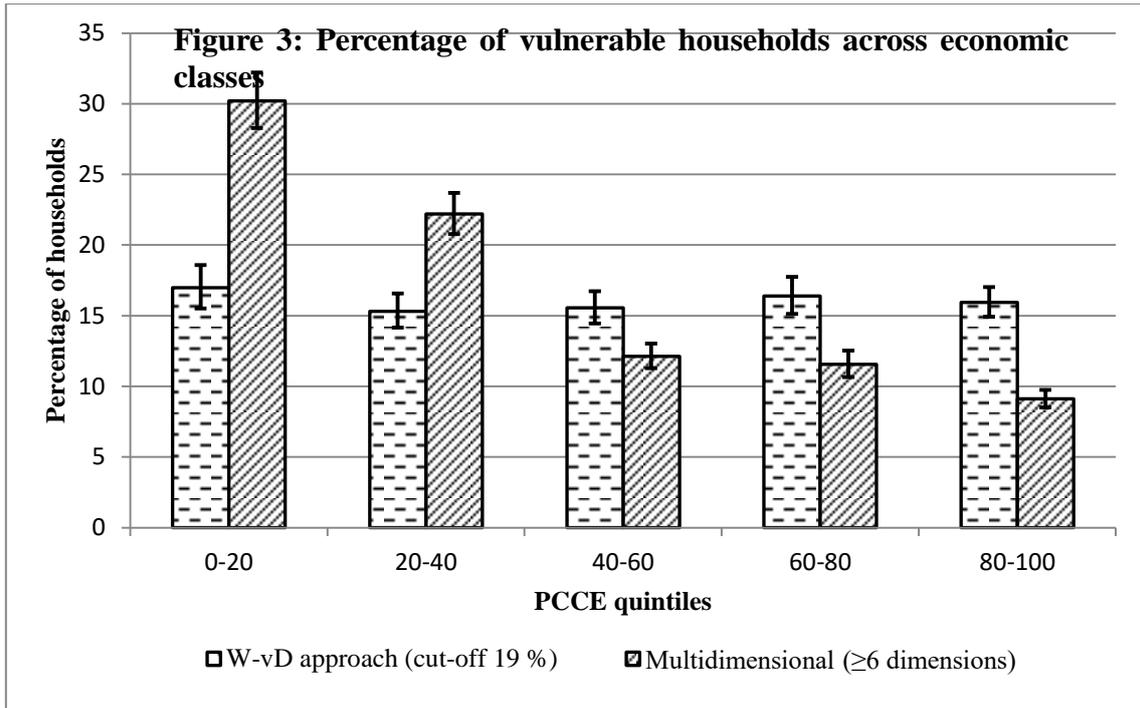
Table 6: Percentage of households with catastrophic health care payments and multidimensionally vulnerable due to health shock across select Indian states and all India

Select State & all India	Households with catastrophic health expenditure (Wagstaff-van Doorslaer Method :17% cut-off)		Households vulnerable due to health shock (new multidimensional Method: 6 dimension cut-off)	
	percentage	rank	Percentage	Rank
Andhra Pradesh	21.98	6	13.84	16
Assam	8.84	20	8.66	20
Bihar	13.29	15	23.29	3
Chhattisgarh	9.21	19	13.01	18
Delhi	4.09	21	1.99	21
Gujarat	10.54	18	14.88	15
Haryana	16.09	11	16.4	11
Jharkhand	11.07	17	20.83	4
Jammu &Kashmir	17.68	9	15.97	13
Karnataka	18.29	7	18.14	7
Kerala	28.98	1	27.45	1
Maharashtra	15.95	12	16.06	12
Madhya Pradesh	15.37	13	17.59	10
Odisha	23.94	2	17.67	8
Punjab	23.77	3	19.41	5
Rajasthan	12.48	16	15.79	14
Telengana	22.8	5	18.64	6
Tamil Nadu	17.15	10	13.13	17
Uttar Pradesh	18.1	8	24.19	2
Uttarakhand	13.64	14	9.81	19
West Bengal	23.55	4	17.64	9
All India	17.24		17.75	

Source: Estimated from NSS 71st unit level data

Figures





Appendix Tables

Table A1: Summary statistics and calculated threshold for select indicators

Variables	Mean	Standard Deviation	Mean + SD	Threshold
Household size	4.51	2.155	6.665	7
Number of elderly members	0.35	0.633	0.983	1
Number of children	1.126	1.284	2.41	3
Number of chronically ill members	0.218	0.527	0.745	1
Number of females in the reproductive age	1.194	0.825	2.019	3
Number of hospitalization events	0.22	0.538	0.758	1
Number of private hospitalization events	0.125	0.421	0.546	1
Number of hospitalization events outside state	0.013	0.136	0.149	1
Number of outpatient visits in private facilities	0.286	0.664	0.95	1
Number of outpatient visits outside state	0.017	0.151	0.168	1
Number of households reporting borrowing/selling of assets to as major source to finance health care	0.081	0.273	0.354	1
Number. of households with no care despite severe illness	0.001	0.031	0.032	1

Table A2: Binary vulnerability indicators and their definitions

Variables	Definitions
Big house	7 or more persons (1); 1-6 persons (0)
Elderly	At least one elderly (1); no elderly (0)
Children	3 or more children (1); 2 or less children (0)
Chronic	At least one chronically ill person (1); no chronically ill person (0)
Female	3 or more females of reproductive age group (1); 2 or less female of reproductive age group (0)
Poor	Household with PCCE <Rs1000 (1); household with PCCE >= Rs. 1000 (0)
Rural	Residing in rural area (1); residing in urban area (0)
Insurance	More than half of the family members are having no insurance coverage (1); more than half of the family members are having insurance coverage (0)
Labour	Casual labour households (1); self-employed, regular wage/salaried or other households (0)
Hospitalisation	Any episode of hospitalisation (1); no episode of hospitalisation (0)
Private hospitalisation	At last one episode of hospitalisation in private hospital (1); no case of private hospitalisation (0)
Outside state hospitalisation	At least one episode of hospitalisation outside state (1); no episode of hospitalisation outside state (0)
Private OP visits	1 or more OP visit to private facility (1); no visit to private facility (0)
Outside state OP visit	At least one OP visit outside state (1); no OP visit outside state (0)
Catastrophic health expenditure	Out-of-pocket health expenditure as a percentage of household consumption expenditure > 10% (1); <=10 % (0)
Distress finance	For at least one episode of hospitalisation, the major source of financing out-of-pocket expenditure is by borrowing or selling assets (1); by other sources (0)

Table A3: Absolute and cumulative percentage of vulnerable households by vulnerability to health shock scores

Vulnerability to health shock scores	Percentage of vulnerable households	Cumulative vulnerability to health shock scores	Cumulative population percentage
0	2.16	≥ 0	100
1	11.89	≥ 1	97.84
2	20.09	≥ 2	85.95
3	20.73	≥ 3	65.85
4	17.41	≥ 4	45.12
5	11.82	≥ 5	27.71
6	7.66	≥ 6	15.89
7	4.18	≥ 7	8.22
8	2.35	≥ 8	4.04
9	1.07	≥ 9	1.69
10	0.43	≥ 10	0.62
11	0.14	≥ 11	0.19
12	0.05	≥ 12	0.05
13	0.01	≥ 13	0.01
14	0.00	≥ 14	0.00
15	0.00	≥ 15	0.00
16	0.00	≥ 16	0.00
17	0.00	≥ 17	0.00

Source: Estimated from the NSS 71st round unit level data

Table A4: Cumulative percentage of households with catastrophic health care expenditure by threshold percentages

Threshold (Out-of-pocket health expenditure as percentage of total consumption expenditure)	Cumulative percentage of households
≥1	39.23
≥2	36.72
≥3	34.41
≥4	32.60
≥5	30.74
≥6	29.01
≥7	27.55
≥8	26.25
≥9	24.77
≥10	23.81
≥11	22.53
≥12	21.59
≥13	20.66
≥14	19.84
≥15	19.01
≥16	18.12
≥17	17.26
≥18	16.57
≥19	16.01
≥20	15.44
≥25	12.85
≥30	10.99
≥35	9.48
≥40	8.37
≥45	7.28
≥50	6.33
≥55	5.57
≥60	4.94
≥65	4.42
≥70	3.94
≥75	3.49
≥80	3.16
≥85	2.85
≥90	2.60
≥95	2.32
≥100	2.18

Source: Estimated from the NSS 71st round unit level data

Table A5: Percentage of households with catastrophic health expenditure and multi dimensionally vulnerable households by PCCE quintiles

PCCE Quintiles	Catastrophic household (W-vD method with cut-off at 19 %)	Multidimensionally vulnerable households with (cut-off at ≥ 6 dimensions)
Bottom (0-20)	16.99 (15.52,18.58)	30.20(28.27,32.20)
2 nd (20-40)	15.32 (14.15,16.57)	22.2(20.78,23.69)
Middle (40-60)	15.55 (14.45,16.73)	12.13(11.29,13.03)
4 th (60-80)	16.39 (15.12,17.74)	11.56(10.66,12.52)
Top (80-100)	15.94 (14.93,17.02)	9.11(8.50,9.76)
Total	15.97 (15.43,16.52)	15.89 (15.38,16.41)

Note: Figures in the brackets show 95% confidence intervals.

Source: Estimated from the NSS 71st round unit level data

Table A6: Percentage of households with catastrophic health expenditure and multi dimensionally vulnerable households by Caste groups

Caste (Social group)	Catastrophic household (W-vD method with cut-off at 19 %)	Multidimensionally vulnerable households with (cut-off at ≥ 6 dimensions)
ST	9.59 (8.338,11.01)	14.85(13.29,16.55)
SC	15.38 (14.19,16.64)	17.93(16.69,19.24)
OBC	16.37 (15.53,17.25)	16.73(15.91,17.58)
Others	17.76 (16.74,18.82)	13.64(12.83,14.48)
Total	15.97 (15.43,16.52)	15.89 (15.38,16.41)

Source: Estimated from the NSS 71st round unit level data

Table A7: Exploration regression showing the association between household's vulnerability score and utilisation of outpatient and inpatient care at public and government facilities.

Dependent variable = total vulnerability score of a household				
Independent variables	Coefficient	Robust SE	t	P > t
Total number of public OP visit	0.6242	0.0373	16.71	0.000
Total number of private OP visit	0.8653	0.0225	38.38	0.000
Total number of hospitalisation at public hospitals	1.4448	0.0267	54.01	0.000
Total number of hospitalisation at private hospitals	1.9994	0.0287	69.56	0.000
Constant	2.9534	0.0166	178.14	0.000
Number of observations	65932			
R-squared	0.3472			

Source: Estimated from NSS 71st round unit level data

Resampling Procedures in Poolability Test of NSS data

- N. K. Singh¹, M. F. Khan² and B.N.Mohanty²

Abstract

National Statistical Commission (NSC) has suggested procedures for testing state and central sample data for pooling (combining) to get more precise estimates, especially at region and district level. As per guidelines of NSC, non-parametric tests like Kolmogorov-Smirnov test, Wald-Wolfowitz run test, Median test *etc.* may be used for testing purposes. This paper explores the challenges in applying such tests on data collected through complex survey design of NSS. By using NSS 66th round (rural) data of Odisha, such challenges are demonstrated. How resampling techniques like bootstrap may be used to meet challenges in applying traditional statistical tests on data collected through complex survey design has also been discussed.

Key Words: Poolability test, Confidence interval, Wald-Wolfowitz run test, Resampling, Bootstrap, National Sample Survey

JEL Codes: C12, C14, C18, D12

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1. Introduction

1.1 National Sample Survey Office (NSSO), Government of India, conducts socio-economic surveys on various subject matters of importance every year and disseminates data for public use. Each survey is being undertaken in a round, where a round covers a year or sometimes for six months. Both NSSO and State Directorate of Economics and Statistics (DES) participate in the surveys on matching sample basis to collect data on the same subjects following same concepts, definitions, sampling design, questionnaires *etc.*

1.2 One of the objectives of state's participation in the NSS programme is to provide a mechanism by which sample size will be increased and the pooling of the two sets of data (central and state sample) would provide better estimates at sub state level, particularly at district level. At the state level, this will result in increased precision of the estimates and at disaggregated level, estimates will be more stable and reliable.

1.3 Although pooling provides possibility for better estimates for state and sub state level, pooled estimates may be misleading for given characteristics (like per capita consumption), if both (center and state) provide reasonably different results.

1.4 This paper attempts to examine methodology of pooling suggested by National Statistical Commission (NSC) and discuss problems in applying poolability test. This paper also analyzes NSS 66th round consumption expenditure data(rural) to test similarities of centre and state sample and introduces alternative methods to meet those challenges in the way of testing similarity of central and state sample data for the purpose of pooling.

2. Problems in poolability test suggested by NSC

2.1 In 2010, NSC constituted a committee on pooling of central and state samples of NSS data under the Chairmanship of Prof. R. Radhakrishna for fixing standardized procedure for poolability test. Section 3.2.3 of the report (Radhakrishna, 2011) mentions

Let x_1, x_2, \dots, x_m be iid observations from state sample with distribution function F_s and y_1, y_2, \dots, y_n be iid observations from central sample with distribution function F_c . Since two agencies are involved, non-sampling errors are likely to be different. Therefore, one should test the null hypothesis $H_0: F_c = F_s$. For this one need to use nonparametric tests. If H_0 is not accepted, perhaps there is no gain in pooling the estimates.

2.2 Many non-parametric tests were suggested by NSC, Wald- Wolfowitz run test is one of them. In this test, two different random samples from different populations with different continuous cumulative distribution functions are obtained assuming the observations of both samples are *iid*.

2.3 The null hypothesis is assumed that there is no statistically significant difference between the two continuous cumulative distribution functions.

2.4 As suggested by NSC, for performing this test, the two data sets are pooled and observations from the independent samples are ranked in increasing order of any selected indicator like per capita consumption, for which similarity has to be tested. Then each value is coded as 0 or 1 (0 for state and 1 for central sample), and the total number of runs (say U) is summed up and used as the test statistics. The number of runs U is a random variable whose distribution for large sample can be treated as normal with:

$$\mu = \text{Mean}(U) = \frac{2mn}{m+n} + 1 \text{ and } \sigma^2 = \text{variance}(U) = \frac{2mn(2mn-m-n)}{(m+n)^2(m+n-1)} \quad (2.1)$$

Hypothesis may be tested (or p value may be calculated) through observed value of U in the distribution specified by $N(\mu, \sigma^2)$

2.5 However, there is a flaw in the above mentioned procedure. Concept of *iid* (independently identically distributed) is generally associated with infinite population model. It is based on probability of occurrence of event (like occurrence of head/tail in a coin toss). Each observation has the same probability and occurrence of any observation is independent of other observation. On the other side, finite population techniques are based on selection of item from finite population according to design fixed by surveyor, which relates to non iid data. In this way, finite population setup doesn't fit in the frame of *iid*. Due to non *iid* nature of complex survey data like NSS, it is difficult to apply traditional hypothesis testing procedures like *t-test* or *run test* or any type of statistical modelling like regression. Resampling techniques are emerging as a powerful tool for handling estimation and testing of such data.

2.6 So it is not advisable to apply statistical tests to NSS data, as recommended by NSC, without appropriate assumption. The empirical study based on NSS 66th round (rural) data of Odisha in the next section provides insight on problems in pooling of two sets of data i.e., center and state sample.

3. Poolability test for NSS data: Different perspectives

3.1 There may be different perspective for evaluating whether central and state samples exhibit similar pattern so that they may be pooled for better results. Even NSC has recommended more than one type of statistical tests for testing the poolability. However, it is not necessary that conclusions based on different perspectives will be same. Hence, testing of poolability has some subjective components, it is not totally mechanical (cookbook approach).

3.2 In the following perspective, evaluating similarities of distribution between two groups has been demonstrated using NSS 66th round (rural) household consumption data collected by DES (Odisha) and data collected by NSSO. For validating the poolability test of two sets of data, its result is compared with confidence interval (CI) technique. Monthly Per Capita Expenditure (MPCE) based on mixed recall period (MRP) of 66th round (rural), is considered as variable for testing in this paper.

3.3 Estimates of MPCE, its standard error (SE) and 95% confidence interval (CI) for NSS 66th round (rural) data by two agencies are as follows:

Table-1: MPCE of Central and State Sample, NSS 66th round (Rural)

Agency	Sample Size	MPCE(Rs)	SE	95% confidence interval
Central sample	2975	715	12.60	690 - 740
State sample	2976	672	8.11	655 - 690

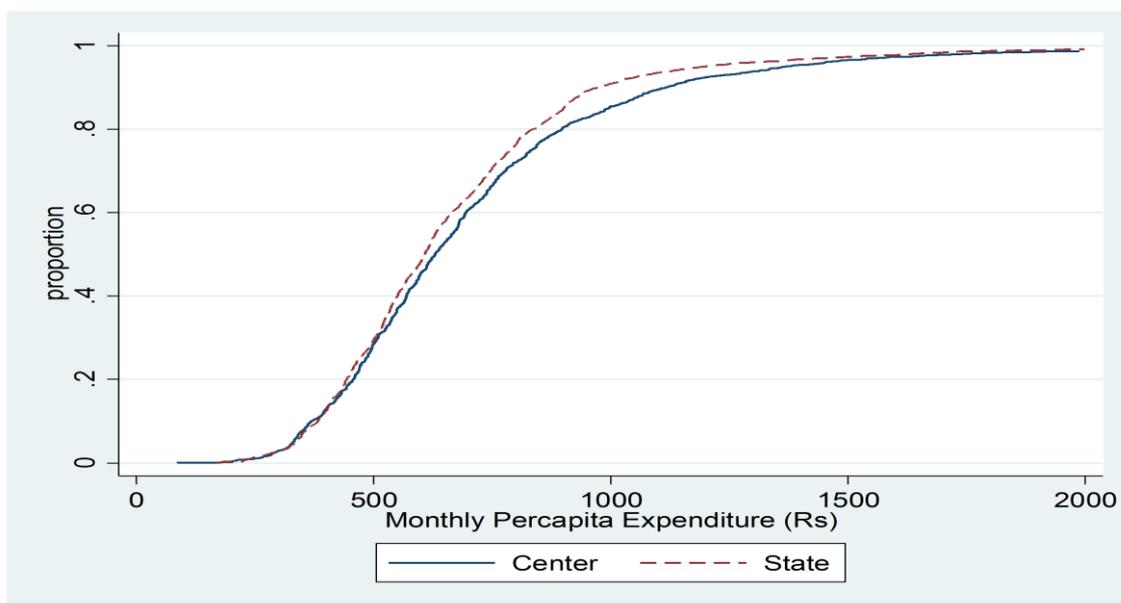
3.4 It is observed from Table-1 that mean MPCE of central data (Rs 715) does not lie within confidence interval of state sample (655-690) and vice versa. It means for state sample, central sample data cannot be considered to be collected from same population.

Similarly, for central sample; result shows that state sample is drawn from different population. Hence both data sets cannot be pooled.

3.5 Run test (by using Stata command or computed through formula given by NSC), gives result contrary to CI based result. It says, difference between distribution of MPCE based on central sample F_c and state sample F_s is not significant. It means population represented by center and state datasets may be considered similar. Hence both data sets may be pooled. However, significance test is not sufficient for binary conclusion between acceptance or rejection (American Statistical Assoc., 2016), especially in the context of contradictory conclusion with respect to interval based result. It must be verified with other angles.

3.6 The differences in two sets of data can also be visualized through distributions of MPCEs (Figure 1), which depicts cumulative distribution (proportion) of persons over MPCE for central and state sample data. For the sake of clarity, MPCE less than Rs 2000 have been considered. About 97% persons have been covered within this range. Graph shows systematic difference in central and state sample data. Central sample is showing lower proportion of persons for entire range of MPCE. If distributions were similar, intermingled distribution curve would have been obtained.

Figure 1: Distribution (cumulative proportion of persons) over MPCE (MRP) based on NSS 66th (rural)



3.7 Thus, out of three perspectives, two (CI based and distribution of MPCE) are in favour of rejecting similarity of central and state sample.

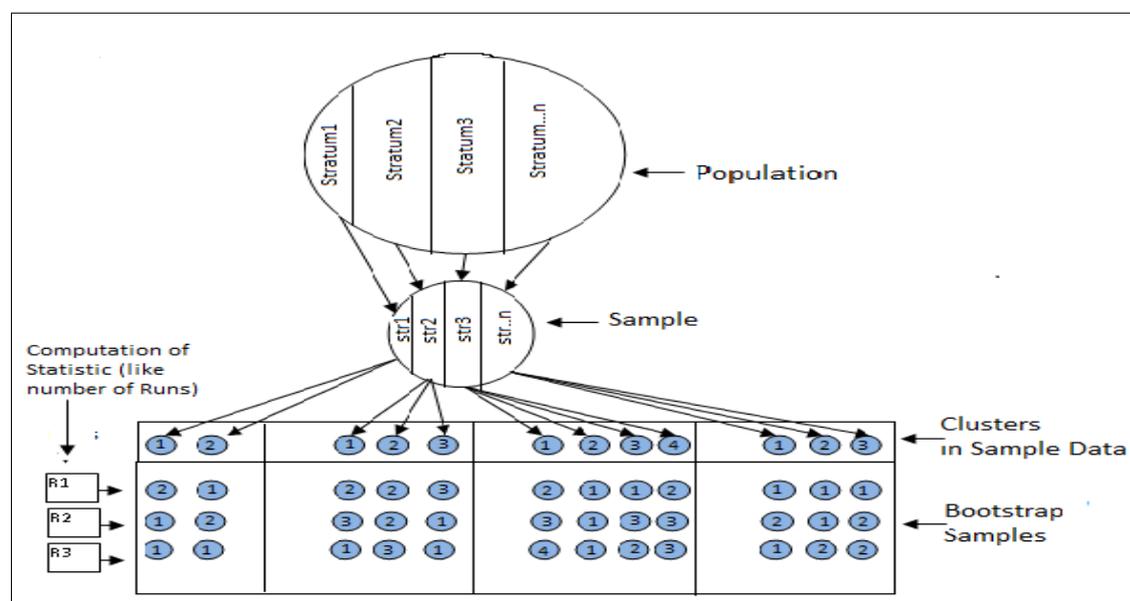
3.8 Intuitively, one of the reasons of failure of run test is clustered data of NSS. It increases number of runs even if distributions are not similar and hence make the difference between distributions non-significant. Major challenge for applying run test is to create *iid* data from clustered data and use of this data to estimate runs. Bootstrap techniques may help in creating *iid* data.

4. Resampling: Computational method for estimating sampling distribution of statistic

4.1 Resampling refers to the use of the observed data or of a data generating mechanism to produce new hypothetical samples (resamples) that represents the underlying population. There are various methods like bootstrap, jackknife, Balanced Repeated Replication (BRR) *etc.*, under the arena of resampling³ and these methods are mainly used for variance estimation. Based upon estimate of variance, standard error and confidence interval of statistic may be calculated. However, bootstrap can also be used for estimating sampling distribution.

4.2 Sampling distribution of statistic is core concept of statistical inference problems. It is difficult to apply parametric or non-parametric tests without sampling distribution. However, in finite population case with complex survey design, it is difficult to estimate sampling distribution. Without proper estimate of sampling distribution, it is not possible to apply classical tests (like run test) in setup of complex survey design. Bootstrap method provides computational technique to fulfil this need (Fig. 2).

Figure 2: Bootstrap scheme for complex survey design



4.3 Like other resampling methods, bootstrap is a computationally intensive statistical method which may be used for generating empirical sampling distribution of any statistic (like mean, median, odds ratio, Gini coefficient or runs of run test *etc.*) on the basis of available data. For its implementation, repeated samples (bootstrap samples) are drawn from collected sample (current data) by considering it as bootstrap population. For each bootstrap sample, value of desired statistic is calculated. On the basis of calculated values of statistic, empirical distribution may be estimated. Mathematical basis for this method for estimation of sampling distribution of required statistics under *iid* conditions has been discussed in Efron (1979).

4.4 Gross (1980), McCarthy and Snowden (1985), Kovar *et al* (1988), and Rao and Wu (1988) extended the idea of bootstrapping from *iid* to complex survey designs and detailed

³[https://en.wikipedia.org/wiki/Resampling_\(statistics\)](https://en.wikipedia.org/wiki/Resampling_(statistics))

the mathematical basis. Lahiri (2003) presented use of bootstrap for complex surveys and described the bootstrap as “probably the most flexible and efficient method of analysing survey data since it can be used to solve a variety of challenging statistical problems (*e.g.*, variance estimation, imputation, small-area estimation, *etc.*) for complex surveys involving both smooth and non-smooth statistics.

4.5 Implementation of bootstrap is somehow different for complex surveys than that of *iid* case. For complex surveys, it hinges upon three core ideas- stratum, cluster and lowest level of unit in the collected sample data. Through stratum, bootstrap program knows how collected sample data is partitioned in homogenous groups to represent whole population according to sample design. Cluster informs bootstrap program what unit should be sampled for creating bootstrap samples.

4.6 In case of bootstrap for *iid*, repeated samples of same size (as size of given sample) are drawn with replacement. In case of multistage complex survey design, same number⁴ of clusters as in original sample, are randomly drawn with replacement within each stratum. It means, 2976+2975 (2976 households from state dataset and 2975 households from central datasets) households would have been selected in each bootstrap sample if data were *iid*. For complex survey design, in each bootstrap sample, selection of same number of cluster (in our case, it is SSS) is ensured. In each bootstrap sample, number of households depends on size of selected cluster in particular bootstrap sample. Within each selected cluster in bootstrap sample, lowest unit in data (like household or individual) is randomly selected with replacement. At the lowest unit of data, sampling weight (multiplier) is attached⁵.

4.7 As mentioned above, for NSS consumption data, two design properties *i.e.*, districts (as stratum) and village (as cluster) are important for drawing bootstrap samples from available data. In each bootstrap sample, it should be ensured that clusters of each district will be drawn randomly as many times as number of clusters for those districts in original sample. For example, if district A comprises ten clusters and district B comprises five clusters in original sample, in each bootstrap sample, ten clusters from district A and five clusters from district B will be randomly drawn with replacement following equal probability.

4.8. Fixing bootstrap cluster according to NSS design is somehow tricky. In NSS consumption survey (or in most of the household surveys), villages are divided in relatively homogenous groups by creating hamlets (within village) which is further divided into second stage stratum (SSS). The SSS may consist of households (in case of NSS 66th round consumption survey for rural) classified into three different groups like SSS₁ for relatively affluent households, SSS₂ for remaining households having principal earning from non-agricultural activity and SSS₃ for other households⁶. The SSS within hamlets of village is considered as cluster and it will increase sample units for bootstrap samples in comparison to considering village as cluster. The variance of estimated run for SSS as cluster will be decreased. Hence considering SSS as cluster for NSS data is better than considering village as cluster.

⁴ Discussion regarding fixing number of clusters in bootstrap samples was made by Rao and Wu (1988, Sec 2.5)

⁵ J.N.K. Rao, “Resampling Methods for Complex Surveys”, Section 2

https://ww2.amstat.org/sections/srms/Proceedings/papers/1994_005.pdf, Accessed Feb9,2018

⁶http://mospiold.nic.in/Mospi_New/upload/nss0/ins.66_%2000.pdf

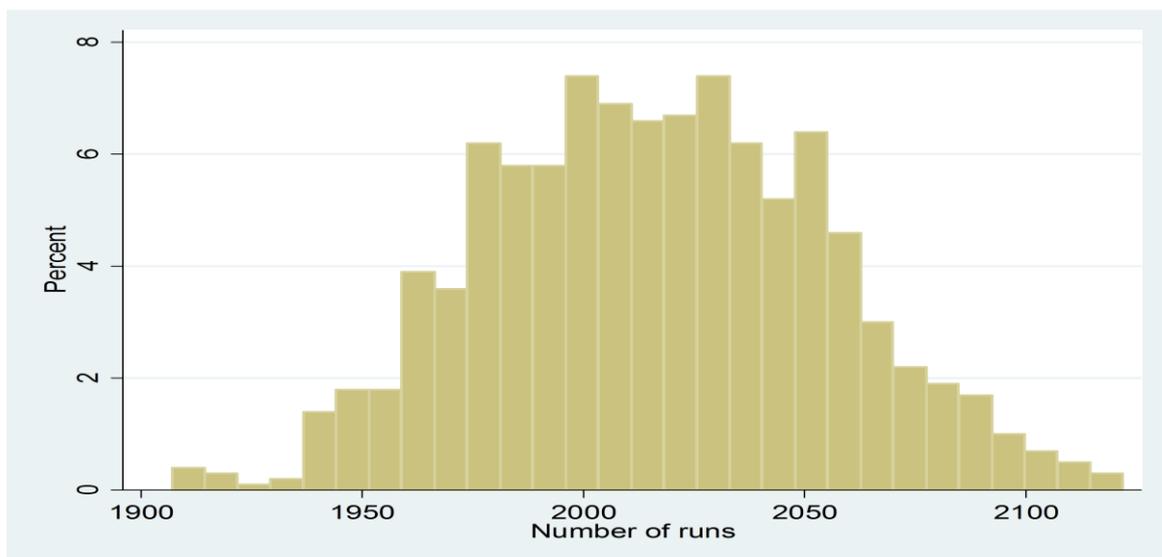
5. Distribution of runs through Bootstrap

5.1 Sampling distribution of runs is required for estimation of run. As mentioned in section two, if data were *iid*, sampling distribution will normal. However if data were collected under to complex survey design, it is difficult to fix mathematical expression of distribution as in formula (2.1). Bootstrap technique helps in getting empirical distribution of runs.

5.2 Drawing bootstrap samples requires complex algorithm. Statistical software like Stata, SPSS, R provide useful platform for implementing bootstrap. Using these software, bootstrap samples can be easily drawn by fixing stratum and cluster according to sampling design. For this paper, bootstrap command of Stata is used for drawing bootstrap samples. The following steps have been outlined for estimating sampling distribution runs on the basis of MPCE of NSS 66th round data.

1. 2976 households of state data set and 2975 households of central data sets were pooled (all households of central sample were placed along with households of state sample).
2. One thousand bootstrap samples were drawn through bootstrap command of Stata with fixing district as stratum and SSS within hamlets of village as cluster. It is pertinent to note that in each bootstrap sample same number of SSSs, as in original data, are ensured and not 2976+2975 households (2976 households from state dataset and 2975 households from central datasets).
3. For all selected bootstrap samples, runs were counted after sorting data on MPCE and stored in separate file.
4. On the basis of thousand values of runs estimated empirical distribution was analysed.

Figure 3: Histogram of Estimated Number of Runs through bootstrap



5.3 Distribution of runs through bootstrap has been presented in Figure 3. It is observed that average number of runs is 2013 and SE of runs was 38. It may be observed that number

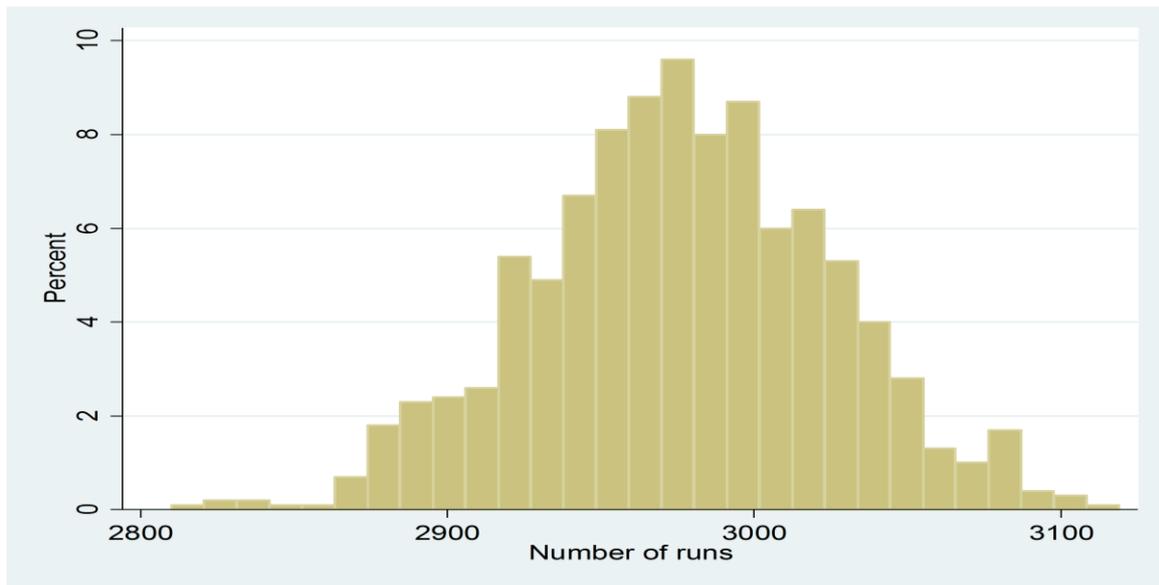
of estimated runs (2013) based on bootstrap samples is much lower than number of estimated runs (2975)⁷ under *iid* case.

6. Distribution of runs under null hypothesis

6.1 In the context of finite population complex survey design, bootstrap methodology has been mostly discussed for variance estimation and confidence interval as in case of other type of resampling methods. However, few studies are available for using bootstrap for hypothesis testing. Since sampling distribution of test statistic through bootstrap samples may not be sampling distribution under null (if data might be drawn from population which is far from null hypothesis H_0), test statistic based on bootstrap sample cannot be used for hypothesis testing directly.

6.2 For example, suppose MPCE of current round of NSS data is Rs. 1500, which was Rs. 1200 in last quinquennial round. For testing the hypothesis whether sample of current data confirm the same population of MPCE as in last quinquennial round, null hypothesis may be $H_0: \mu=1200$. For testing the null hypothesis through bootstrap, sampling distribution of MPCE generated through bootstrap samples directly will represent $H_0: \mu=1500$ in place of $H_0: \mu=1200$. Hall and Wilson (1991) has provided a solution for it. According to guidelines suggested in their paper, sampling distribution based upon subtraction of Rs. 1500 (MPCE of current sample) from MPCE of each bootstrap sample will provide sampling distribution under null. On this sampling distribution, one should see whether difference in MPCE in both round ($300 = 1500 - 1200$) looks extreme or not for rejecting null.

Figure 4: Distribution of Runs under Null Hypothesis $H_0: F_s = F_c$



6.3 Efron and Tibshirani (1993) recommended apparently different modification, subtracting Rs 300 (difference between current and null MPCE) from each bootstrap sample in calculation of test statistic for generating bootstrap sampling distribution under null hypothesis and see whether current MPCE (1500) looks extreme or not for rejecting null. However, they provided equivalence with Hall and Wilson (1991).

⁷ By using formula 2.1 ($\mu = \frac{2mn}{m+n} + 1$)

6.4 The procedure mentioned above is for one sample test. There may be various two sample tests for confirming similarity of populations of MPCE from which central and state sample data have been collected. However, run test (as per recommendation of NSC) is used for this purpose. For generating empirical distribution of runs under null hypothesis, random bootstrap samples were drawn in same setting as in Sec. 5. Since, under null hypothesis both distributions, *i.e.*, distribution based on central and state sample are assumed to be the same, sampled households in each bootstrap samples are randomly assigned to state or central agency (modification in test statistic in light of null hypothesis) and then runs were counted with same procedure as in Sec. 5. Random assignment of “state” or “center” label with each household is made for each selected bootstrap sample as follows.

- A column (say X) of random number is generated.
- Data is sorted on X.
- Lowest 50 percent households are assigned “centre label” and rest assigned as “state label” (because number of households in central and state sample is almost same in original sample)

6.5 Figure 3 shows that distribution of runs under null hypothesis is quite different from that of distribution of actual runs as in Figure 4 (see to shift of center). Average estimate of runs under null hypothesis is 2977 with 95% Confidence interval (2880, 3074). The Critical region (CR) for rejection of null hypothesis is (0, 2889) at 0.05 significance level. The average estimate runs of 2013 based on bootstrap samples (section 5) lies outside the CR as well as Confidence interval of runs and hence null hypothesis is rejected.

7. Conclusion

7.1 The use of classical non parametric tests like run test, K-S test and median test based on assumption of *iid* as suggested by NSC may not be appropriate for complex survey design like NSS data. The concept of *iid* is generally associated with infinite population model, where in each observation is independent like coin tossing. But in complex survey data, samples are clustered due to use of multistage design and observations within the same cluster are dependent. Thus complex survey data and *iid* are to be understood separately. Alternative concept, like bootstrap technique, for implementing classical tests (like run test) in complex survey setup may be useful. It is computationally intensive statistical method which may be used for generating empirical sampling distribution for calculation of standard error as well as confidence interval.

7.2 Due to complexity in generating sampling distribution under null hypothesis through data in hand, use of bootstrap for hypothesis testing pose different type of challenge than that of calculation of standard error. Various approaches are suggested for one sample and two sample problem. One type of test may not be sufficient for final conclusion. Final conclusion should be drawn after testing data from different angles.

7.3 The suggested procedure is not only intuitive but it has mathematical base also. Bootstrap distribution is an empirical distribution and hence it has many nice asymptotic properties. However further study in this direction is needed to establish testing of hypothesis in bootstrap sample.

8. Disclaimer

8.1 The opinions expressed in this paper are those of the authors and do not reflect the view of the PHDMA and Directorate of Economics and Statistics, Odisha.

References

- American Statistical Association (2016). Statement on p-values, statistical significance and p values. North Washington.
- Efron, B. (1979). Bootstrap Methods: Another look at the jackknife. *Annals of Statistics*, 7, 1–26.
- Efron, B. and Tibshirani, R. (1993). Chapter 16: Hypothesis testing with the bootstrap. In *An introduction to the bootstrap* (pp. 220–236).
- Gross, S. (1980). Median estimation in sample surveys. *Proc. Surv. Res. Meth. Sect. Am. Statist. Ass.*, 181–184.
- Hall, P. and Wilson, S.R. (1991). Two guidelines for bootstrap. *Biometrics*, 47, 757–762.
- Kovar, J.G., Rao, J.N.K. and Wu, C.F.J. (1988). Bootstrap and other methods to measure errors in survey estimates. *Canadian Journal of Statistics*, 16, 25–45.
- Lahiri, P. (2003). On the Impact of Bootstrap in Survey Sampling and Small-Area Estimation. *Statistical Science*. 18(2), 199-210.
- McCarthy, P. J. and Snowden, C.B. (1985). The bootstrap and finite population sampling. *Vital and Health Statistics Washington, DC: US Government Printing Office*, 2–95.
- Pfeffermann, D. (2011). Modelling of Complex Survey Data: Why Model? Why is it a Problem? How can We Approach It? *Survey Methodology*, Vol. 37(No.2), 115–136.
- Radhakrishna, R. (2011). *Report of the Committee on Pooling of Central and State Data*. National Statistical Commission, New Delhi, India.
- Rao, J.N.K. and Wu, C.F.J. (1988). Resampling inference with complex survey data. *Journal of the American Statistical Association*, 83, 231–241.

Scheduled Tribe Workforce in Contemporary World: Some Evidences from Census of India, 2011

- Binod Kumar Singh¹ and Ashutosh Ojha²

Abstract

Changes in the size of the work force are determined by population growth and work participation rates. Population growth depends upon fertility, mortality and migration. Rapid tribal population growth in India causes problem in the labour market. Only a part of the entire tribal population of the country is engaged in the production of goods and services. Census data clearly shows that tribal workers are entering the labour market in search of employment, but are forced into marginal and low wage work in order to economize on their survival. This trend seems to have intensified in the last decade. The present paper aims to study the trends in the tribal workforce. The study analysed the tribal workforce in terms of child labour (5-14 years), regular workforce (15-59 years) and elderly workforce (60 years and above). These three categories give us indications of the broad impact of neo-liberalism on different sections of the tribal workers. The changes in the Scheduled Tribe workforce between 2001 and 2011 revealed that there has only been a marginal decline in the total workforce, the greatest fall of employment is seen in the case of regular workers (15-59 years). There is also a decline in child labour. Secondly, the decline in employment is probably driven by the lack of work in the rural areas. It is evident that the urban areas have not seen the same level of decline. Rather there has been a rise in the urban workforce and this is largely driven by the rise in female urban work participation. Thus it seems that though the decline in the regular female workforce has been the largest in the rural areas, women work participation has risen by about half a million female workers or a proportionate increase of 2.68 percent. In contrast, the female rural workforce has gone up by 3.2 million female workers with a negative growth of 1.84 percent. The rural male workforce has seen a marginal gain of half a percent or about 4.2 million people. But this gain is in the marginal workforce; whereas the female main workers have declined at a much slower rate of less than 2 percent. This loss of main work and the virtual replacement of female marginal workers by male marginal agricultural workers signify both underemployment and distress employment in the rural sector. Third, there has been a significant rise in the total workforce of elderly people above 60 years. Here too, the largest rise is seen in the female workforce of elderly people especially in the rural areas by about half a million women workers. This clearly indicates that more vulnerable women are forced to work in a situation where regular workers are finding it hard to get gainful employment.

Keywords: Tribal population, Workforce, Work Participation Rate, Fertility, Mortality, Migration, Goods, Services, Development, Planning.

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1. Introduction

1.1 Article 366 (25) of the Constitution of India refers to Scheduled Tribes as those communities, who are scheduled in accordance with Article 342 of the Constitution. This Article says that only those communities who have been declared as such by the President through an initial public notification or through a subsequent amending Act of Parliament will be considered to be Scheduled Tribes. The list of Scheduled Tribes is State/UT specific and a community declared as a Scheduled Tribe in a State need not be so in another State. The inclusion of a community as a Scheduled Tribe is an ongoing process. Tribal communities live, in various ecological and geo-climatic conditions ranging from plains and forests to hills and inaccessible areas. Tribal groups are at different stages of social, economic and educational development. The Scheduled Tribes are notified in 30 States/UTs and the number of individual ethnic groups, etc. notified as Scheduled Tribes is 705. The tribal population of the country, as per 2011 census, is 10.43 crore, constituting 8.6% of the total population. About 90.0 percent of them live in rural areas and 10.0 percent in urban areas. The decadal population growth of the tribals from Census 2001 to 2011 has been 23.7% against the 17.7% of the entire population.

1.2 Only a part of the entire tribal population of the country is engaged in the production of goods and services. The labour force of a country is comprised of persons who can work and choose to do so while the work force consists of only those persons who are employed fully or partially. Changes in the size of the tribal workforce are determined by growth of tribal population and work participation rates. Tribal population growth depends upon fertility, mortality and migration. For the country as whole the migration factor has been quite insignificant. It is not only studied in economics but also in various other disciplines like demography, sociology and geography. Now with the growing emphasis on the regional and community based planning the study of work participation is becoming indispensable for the socio economic development of any society or region. The total number of workers in labour supply is highly affected by the social configuration. Social differential among the number of male and female workers in the total workforce is significant. Census of India, 2011 reveals that among the total population of 1210.9 million persons in the country there are 481.9 million workers. Among the total workers of the country, there are 82.3 million Scheduled Castes (17.1%), 50.9 million Scheduled Tribes (10.6%) and 348.7 million persons from other social communities (72.4%). This would mean that the proportion of SC and ST workers among total workers is higher than their proportions among total population. SC and ST population constitute 16.6 and 8.6 percent, respectively, to total population. The tribal workforce constitutes more than a tenth (10.6%) of the total workforce of the country. The work participation rate among the tribal population is 48.7 percent against 40.9 percent for SC population and 38.5 percent for other population against the overall of 39.8 percent. During 2001-2011, India witnessed an increase of about 80.0 million workers, grew by 22.2 percent. Of the total increase of workforce, ST workers contributed about 9.6 million or 12 percent and ST workers grew by 23.1 percent during the period. The growth of tribal workers has not matched the tribal population growth resulting in higher dependency ratios and sizeable unemployment or underemployment.

2. Objective

2.1 The labour force consists of all persons whether employed, underemployed or unemployed, while the workforce consists of only those persons who are employed fully or partially. Due to limitations of data availability, the present study covers only the work force of the country and not the labour force. The objective of the present study is to describe trends and patterns of the tribal workforce in India. These trends have strong implications for

economic and social development planning. The study examines the tribal population growth and changes in workforce participation, in comparison to total population in general and SC and non-SC/ST population in particular, using the census data of 2001 and 2011 for India and its States and Union Territories. The work participation by sex and rural/urban areas are also presented. Further, trends in the composition of workers by occupational classification are also discussed.

3. Methods

3.1 Tribal workforce between 2001 and 2011 are analysed in terms of child labour (5-14 years), regular workforce (15-59 years) and elderly workforce (60 years and above). These three categories give us indications of the broad impact of neo-liberalism on different sections of the tribal workers. The changes in the Scheduled Tribe workforce between 2001 and 2011 have been discussed by residence and gender.

3.2 Descriptive research design has been adopted for this study. The purpose of this research design is to describe the problems and other units under investigation like socio-economic background and elicit new information about the selected group of tribal population through the present study based on secondary source of data, the nature of research is exploratory and data collected from the two consecutive decadal censuses (2001 and 2011) of India. The terminology such as work, workforce, worker, main workers, marginal workers, non-workers, occupational structure and work participation as defined in census 2011 has been adopted in this study for analysis and interpretation of results. Work was defined in the 2011 census terminology as participation in any economically productive activity with or without compensation or profit (one year preceding the date of enumeration). Such participation may be physical or mental in nature. Work involves not only the physical work but also includes supervision and direction given to other workers. Work is taken as basis to identify workers. We find that since 1981 the census definition of work remains unchanged, but more efforts have been made to enumerate female workforce in later censuses. In the 2011 census, attempt was made to get a detailed profile of the working characteristics of the population. Also, usual status of the work was given emphasis instead of the current status of the work. A question was to divide the population who have worked any time and not worked at all during the last year. Those who have worked any time in the last one-year were categorised as workers, and those who did not work at all were classified as non-workers.

3.3 GIS software - ArcGIS 10.0 version for windows is used for thematic mapping, statistical computation and graphical presentation in relation to selected geographic areas. Statistical analyses are performed on the data which helped to determine trends, and Maps are drawn to show the geographic distributions of the data which helped to locate "problem areas" or areas of potential growth and to visualize situations.

4. Brief Literature Review

4.1 Work participation is one of the most significant features of a population of a nation as it has multilateral involvement in the economic production and planning. It provides information about the human resources and the nature and extent of their utilization (Agrawal, 1971). Work Participation has great subjective significance with growing emphasis on regional planning and regional approach to the population policy and utilization of human resources (Franklin, 1958). It is an important indicator of the economic composition of a region. The degree of employment or unemployment exerts its influence as one of the chief determinants of several socio-economic and demographic characteristics of the population

(Ray, 1978). The socio-economic development of any region is mainly related to degree of work participation and the proportion of workers in different sectors of economy (Chaudhary, 2007). Work participation refers to economic activities in which workers are differentiated (Jaffe and Stewart, 1951). Using employment data from different rounds of the National Sample Survey (NSS), a number of papers/reports have examined the employment situation in India in the post-reform period in comparison with that in the pre-reform period (Sundaram, 2001a, 2001b; Chadha and Sahu, 2002; Government of India, 2002; Sundaram and Tendulkar, 2002; Dev, 2002; Chadha, 2003; Sundaram and Tendulkar, 2004; Sundaram, 2004; and Bhattacharya and Sakthivel, 2005a, 2005b). A major conclusion that one may draw from these studies is that there has been a marked slowdown in employment growth in India in the post-reform period compared to the pre-reform period, and that this slowdown has been relatively more marked in the case of female employment and that too in rural areas.

4.2 It is observed that adivasis as a whole have gained least and lost most from six decades of Democracy and development in India (Guha, 2007). Again the World Bank also observed that while the success story of growth of Indian economy and its poverty reduction in the recent past is well appraised, marginalized sections such as the adivasis or STs are 20 years behind the average performances (World Bank, 2011). Although the fact that these marginalized sections benefited from the growth that witnessed over time cannot be denied, its impact is not be substantial enough to break the shackles of their backwardness. It is because of the social exclusion that these marginalized groups in India, was rooted in historical division of society along lines of caste, tribe and gender. Therefore, these inequalities were structural in nature and as these groups were trapped in this structure, they were unable to take advantage of the opportunities offered by economic growth (World Bank, 2011). Thus, the policy effort in the Inclusive growth regime must be to do away with such disadvantages of these social groups.

4.3 The inclusive growth concept is broader than the pro-poor growth which indicates an income dimension of the growth in favour of the poor. In fact, the pro-poor growth debate revolved around the relative approach of higher growth of income for poor than that of non-poor (Kakawani, 2000; Kakawani and Pernia, 2000; Zheng, 2011), absolute approach of any rise in income that reduces the poverty level (Ravallion, 2001, 2004; Ravallion and Chen, 2001; Zheng, 2011), and moved to rate of decline over the past benchmark (Osmani, 2005, Zheng, 2011).

4.4 The inclusive growth is broad based growth intended to benefiting all sectors and all sections of people (World Bank, 2011). It brought in not only the outcome but also the process. Besides, it is argued that inclusive growth is a process that enables non-discriminatory participation and disadvantage reducing (Klasen, 2010; Thorat, 2012). It involves the better employment opportunities and productivity of employment (World Bank, 2011). By generating and providing productive employment opportunities especially those of disadvantaged groups, people belonging these groups would be enabled and empowered to contribute to the growth and benefit from it (ibid).

4.5 The literature on regional disparity and tribal's work participation are vast and mixed. The available literature concentrated on different aspect of participation: the extent of disparity in tribal's workforce participation and how they are different from workers of social communities in labour market. Using data from different decades of Census of India, a large number of papers, analytical reports have examined the workforce of tribal population. In the literature on tribal workforce participation, standard sources begin with the work participation of tribal women in India with a development perspective (Naresh, 2014). In this study some

high gender work participation disparity is observed in the states like Uttar Pradesh, Bihar, Punjab, Kerala, West Bengal and Odisha. Stagnant Structure of Workforce among Scheduled Tribes (STs) in Andhra Pradesh has been analysed in a macro view (Motkuri, 2013). In this study it is observed that the low level of socio-economic development of the ST communities in the state, which comprised eight percent of the state's total population in Andhra Pradesh, definitely affect the average level of human development of all social groups.

5. Analysis and Results

5.1 Growth of Tribal Population and Workers

5.1.1 The decadal growth of tribal population was 21.3 percent for rural areas, and 49.7 percent for urban areas. The higher growth rate observed in the urban areas is probably due to in-migrants searching for employment, education, and urban facilities, in addition to the natural growth. In the urban areas, males showed a growth of 47.0 percent and females of 52.6 percent, the corresponding figures for the rural areas being 20.7 percent and 21.9 percent respectively. The growth of tribal women is higher both in rural and urban areas than tribal males. The growth of non-SC/ST population (population excludes SC and ST population) is 16.4 percent which is about 45.0 percent lower than the ST and 27.0 percent lower than the SC population (Table 1).

5.1.2 Table 1 shows the growth rates (percent) of population, workers, main workers and marginal workers by sex and residence according to social groups for India during 2001-2011. The growth of tribal workers during 2001-2011 was 24.5 percent for males and 20.7 percent for females. In fact, the growth of tribal male workers is significantly higher than that of tribal male population as greater proportions of men are observed into the work force. This may be due to increase in male literacy, the availability of jobs for men, and expansion of service sectors. The table shows that the number of tribal male workers has increased at a higher rate than the tribal females. The growth of tribal female workers, however, has not kept pace with the growth in tribal female population. One reason for this may be limited employment generation and not desired changes in the outlook for the working tribal women. The growth of tribal workers is invariably higher in urban areas than in rural areas both for males and females. In the urban areas, tribal female workers showed a growth of 71.6 percent and tribal male workers of 56.5 percent, the corresponding figures for the rural areas being 18.7 percent and 21.9 percent, respectively. The growth of non-SC/ST workers is 18.8 percent which is about 3.4 percentage points lower than the SC workers and 4.0 percentage points lower than the ST workers.

Table 1: Decadal Growth of Population and Workers by Social Groups according to Sex and Residence, 2001-2011, India

Sex and Place of Residence	Decadal Growth Rates (%)															
	Overall				Scheduled Castes				Scheduled Tribes				Non-SC/ST			
	Population	Workers	Main Workers	Marginal Workers	Population	Workers	Main Workers	Marginal Workers	Population	Workers	Main Workers	Marginal Workers	Population	Workers	Main Workers	Marginal Workers
Total																
Person	17.7	19.8	15.8	33.7	20.8	22.2	18.4	32.5	23.7	22.8	15.4	39.3	16.4	18.8	15.3	32.8
Male	17.1	20.7	13.7	68.4	20.3	25.1	17.2	62.8	22.9	24.5	13.3	74.7	15.8	19.3	13.1	69.1
Female	18.3	17.8	22.6	11.4	21.5	16.9	21.9	10.8	24.4	20.7	19.2	22.5	17.0	17.4	23.4	8.9
Rural																
Person	12.3	12.5	7.2	27.3	15.7	15.4	9.8	28.7	21.3	20.4	12.1	38.2	10.1	10.2	5.8	24.3
Male	12.1	14.0	5.3	63.9	15.3	18.3	8.4	61.0	20.7	21.9	9.9	74.3	10.0	11.8	3.9	62.7
Female	12.5	9.6	12.7	6.1	16.0	10.6	13.6	7.2	21.9	18.7	16.0	21.6	10.2	7.1	11.6	1.6
Urban																
Person	31.8	44.3	39.2	94.4	41.3	58.0	55.6	72.4	49.7	61.1	58.9	71.7	30.0	41.9	36.6	101.2
Male	29.8	38.0	33.9	94.7	39.6	54.2	51.5	75.5	47.0	56.5	52.9	83.3	28.0	35.5	31.3	99.9
Female	34.0	74.1	69.0	93.9	43.2	70.5	71.5	67.7	52.6	71.6	76.0	60.5	32.1	75.0	68.2	103.4

Source: Author's calculation based on data of 2001 and 2011 censuses.

5.1.3 The growth of all tribal main workers during 2001-2011 was 15.4 percent, 13.3 percent for tribal males and 19.2 percent for tribal females. However, the growth of tribal marginal workers was 39.3 percent, 74.7 percent for males and 22.5 percent for females. The table shows that the number of tribal female main workers has increased at higher rate than the tribal male main workers both for rural and urban areas, while, the growth of tribal male marginal workers is much higher than that of tribal female marginal workers both in rural and urban areas of the country. The growth of tribal main and marginal workers is consistently lower in rural areas than in urban areas both for males and females. It is interesting to note that the decadal growth of ST population is quite higher than the growth of SC and overall population both in rural and urban areas of the country. However, the decadal growth of tribal male workers is lower than that of the SC male workers but higher than the overall male workers. The growth of non-SC/ST main workers is 15.3 percent which is 0.1 percentage point lower than the ST main workers and 3.1 percentage points lower than the SC main workers. However, the growth of non-SC/ST marginal workers is 32.8 percent which is 6.5 percentage points lower than the ST marginal workers while, 0.3 percentage point higher than the SC marginal workers.

5.2 Work Participation Rate among Tribal Population

5.2.1 Work Participation Rate (WPR) is defined as the number of workers per 100 population. Table 2 gives the Work Participation Rates for main, marginal and total workers by sex and residence in the 2001 and 2011 censuses. The work participation rate for tribals was 48.7 percent, 53.9 percent for tribal males and 43.5 percent for tribal females in 2011. For tribals it decreased slightly from 49.1 percent in 2001, for males it increased slightly from 53.2 percent in 2001, while for females it decreased marginally from 44.8 percent in 2001. As

a consequence, the proportion of tribal males in total tribal workforce rose from 54.8 to 55.6 percent in 2011 (Census 2011). Work participation rates are lower in urban areas than in rural areas for tribal irrespective of sex differential. While the work participation rates for tribal main workers showed a decreasing trend in rural areas while increasing trend in urban areas. However, the work participation rates for tribal marginal workers showed an increasing trend both in rural and urban areas of the country. Contrary to the general trend, the work participation rates for tribal female marginal workers showed a decreasing trend in rural area and increasing trend in urban area. The ST work participation rate was marginally higher than the overall work participation rate during 2001. The similar pattern is also observed for the period of 2011. The ST work participation rate is considerably higher both in rural and urban than the national average. The ST work participation rate is found substantially higher than national average during both the censuses. This pattern holds true for rural and urban areas of the country. ST female work participation is substantially higher than the national average and also higher than the SC female work participation rate. The work participation rate for non-SC/ST was 37.7 percent in 2001 and 38.5 percent in 2011. The non-SC/ST work participation rate is found considerably lower than the ST WPR and marginally lower than the SC WPR during both the censuses. This pattern holds true for rural and urban areas of the country. The WPR of non-SC/ST population was about 26.5 percent lower than the ST and 6.3 percent lower than the SC population. In the past decade 2001-11, the WPR in urban areas increased from around 4.0 percent in SC, 3.0 percent in non-SC/ST and ST population. However, the WPR in rural areas decreased from 0.1 percentage point SC, 0.4 percentage point in ST and 1.2 percent age points in non-SC/ST population (Table 2).

5.2.2 Census 2011 data of the workforce can be analysed in terms of child workforce or child labour (5-14 years), regular workforce (15-59 years) and elderly workforce (60 years and above). These three categories give us indications of the broad impact of neo-liberalism on different sections of the tribal workers. The changes in the Scheduled Tribe workforce between 2001 and 2011 show the following scenario: Some significant prelude conclusions can be drawn from the table 3. First though there has only been a marginal decline in the total workforce, the greatest fall of workforce is noticed in the case of regular workers (15-59 years). There is also a decline in child labour. Second the decline in workforce is probably driven by the lack of work in the rural areas. It is evident that the urban areas have not seen the same level of decline. Rather there has been a rise in the urban workforce and this is largely driven by the rise in female urban work participation.

Table 2: Work Participation Rates (%) for Marginal, Main and Total Workers by Social Groups, India, 2001 and 2011

Place of Residence and Social Groups	Category of Workers	2001			2011		
		Persons	Males	Females	Persons	Males	Females
Scheduled Tribes							
Total	(a) Marginal	15.2	9.7	20.9	17.2	13.7	20.6
	(b) Main	33.8	43.5	23.9	31.5	40.1	22.9
	(c) Total	49.1	53.2	44.8	48.7	53.9	43.5
Rural	(a) Marginal	16.1	10.0	22.3	18.3	14.5	22.2
	(b) Main	34.3	43.7	24.6	31.7	39.8	23.4
	(c) Total	50.4	53.8	46.9	50.0	54.3	45.6
Urban	(a) Marginal	5.8	5.5	6.1	6.7	6.9	6.4
	(b) Main	28.7	41.3	15.5	30.5	42.9	17.8
	(c) Total	34.6	46.8	21.6	37.2	49.8	24.3
Scheduled Castes							
Total	(a) Marginal	10.9	8.8	13.2	12.0	11.9	12.0
	(b) Main	29.5	41.9	16.2	28.9	40.8	16.3
	(c) Total	40.4	50.7	29.4	40.9	52.8	28.3
Rural	(a) Marginal	12.5	9.7	15.5	13.9	13.5	14.3
	(b) Main	30.0	41.9	17.4	28.5	39.3	17.0
	(c) Total	42.5	51.6	32.9	42.4	52.9	31.3
Urban	(a) Marginal	4.7	5.4	3.9	5.7	6.8	4.6
	(b) Main	27.4	42.0	11.6	30.2	45.6	13.9
	(c) Total	32.1	47.4	15.6	35.9	52.4	18.5
Non-SC/ST							
Total	(a) Marginal	7.5	5.7	9.4	8.5	8.4	8.7
	(b) Main	30.3	46.0	13.3	30.0	44.9	14.0
	(c) Total	37.7	51.7	22.7	38.5	53.3	22.8
Rural	(a) Marginal	9.7	7.0	12.6	11.0	10.3	11.6
	(b) Main	30.6	45.0	15.3	29.4	42.5	15.5
	(c) Total	40.3	52.0	27.9	40.4	52.9	27.1
Urban	(a) Marginal	2.6	3.1	2.1	4.1	4.8	3.3
	(b) Main	29.6	48.1	8.9	31.1	49.3	11.4
	(c) Total	32.2	51.1	11.1	35.2	54.1	14.7
All							
Total	(a) Marginal	8.7	6.6	11.0	9.9	9.4	10.3
	(b) Main	30.4	45.1	14.7	29.9	43.8	15.2
	(c) Total	39.1	51.7	25.6	39.8	53.3	25.5
Rural	(a) Marginal	10.9	7.8	14.1	12.3	11.4	13.3
	(b) Main	30.9	44.3	16.6	29.5	41.6	16.7
	(c) Total	41.7	52.1	30.8	41.8	53.0	30.0
Urban	(a) Marginal	3.0	3.4	2.5	4.4	5.1	3.5
	(b) Main	29.3	47.2	9.4	30.9	48.7	11.9
	(c) Total	32.3	50.6	11.9	35.3	53.8	15.4

Source: Author's calculation based on data of 2001 and 2011 censuses.

5.2.3 Thus it seems that though the increase in the regular female workforce has been the largest in the urban areas, analysis of 2001 and 2011 census data reveals that women work participation has risen by about half a million female workers or a proportionate increase of 2.68 percent. In contrast, the female rural workforce has gone up by 3.4 million female workers with a negative growth of 1.24 percent. The rural male workforce has seen a marginal gain of half a percent or about 4.7 million people. But this gain is in the marginal workforce where as the female main workers have declined at a much slower rate of less than 2 percent. This loss of main work and the virtual replacement of female marginal workers by male marginal agricultural workers signify both underemployment and distress employment in the rural sector. Third, there has been a significant rise in the total workforce of elderly people above 60 years. Here too, the largest rise is seen in the female workforce of elderly people especially in the rural areas by about half a million women workers. This clearly indicates that more and more vulnerable women are forced to work in a situation where regular workers are finding it hard to get gainful work or employment.

Table 3: Percentage Change in Scheduled Tribe Work Participation Rates, India during 2001 and 2011

Workforce by Selected Age Group and Residence	Total Workers			Main Workers			Marginal Workers		
	Person	Male	Female	Person	Male	Female	Person	Male	Female
Total Workforce									
Total	-0.34	0.67	-1.31	-2.24	-3.39	-0.96	1.90	4.06	-0.35
Child Workforce (5-14 years)	-3.36	-2.64	-4.13	-1.51	-1.55	-1.46	-1.85	-1.09	-2.67
Regular Workforce (15-59 years)	-4.18	-3.13	-5.18	-6.61	-9.36	-3.68	2.43	6.23	-1.49
Elderly Workforce (Above 60 years)	2.51	0.69	4.30	-1.12	-4.73	2.30	3.63	5.42	2.01
Rural Workforce									
Total	-0.37	0.53	-1.24	-2.58	-3.91	-1.14	2.21	4.44	-0.10
Child Workforce (5-14 years)	-3.59	-2.83	-4.40	-1.61	-1.66	-1.54	-1.98	-1.17	-2.86
Regular Workforce (15-59 years)	-4.09	-3.21	-4.93	-7.11	-10.17	-3.93	3.02	6.96	-1.00
Elderly Workforce (Above 60 years)	3.03	1.15	4.87	-1.03	-4.74	2.48	4.06	5.89	2.40
Urban Workforce									
Total	2.62	3.03	2.68	1.76	1.66	2.36	0.85	1.37	0.32
Child Workforce (5-14 years)	-0.08	0.11	-0.28	-0.24	-0.14	-0.34	0.16	0.25	0.06
Regular Workforce (15-59 years)	0.14	-0.06	1.50	-0.51	-1.53	1.72	0.65	1.47	-0.22
Elderly Workforce (Above 60 years)	0.75	-0.21	1.57	0.35	-1.12	1.63	0.39	0.91	-0.06

Source: Author's Calculation based on data from Census 2001 and Census 2011 B Series Tables B01 ST

5.3 Intensifying Unemployment among Tribal Population

5.3.1 Table 4 gives the decadal percentage change in the proportion of tribal marginal workers and non-workers seeking or available for work during 2001-11. The proportion of tribal marginal workers seeking or available for work to total marginal workers and non-workers seeking or available for work to total non-workers are calculated and figures thus derived for census 2001 are subtracted from the 2011. Even though employment is declining amongst the STs, it is significant that more and more men, women and children are entering the labour market in search of work. The table 4 below shows the following trend:

5.3.2 One of the most significant conclusions that arise from the table 4 is that though child labour has decreased within the total workforce, the number of the children entering the labour market has increased. This clearly indicates that the decline in child labour has not

necessarily occurred because of the impact of the educational policies of a neo-liberal government, but probably more able bodied workers are entering the labour market and are willing to work for lower wages. Hence, we see that the proportion of child/elderly marginal workers seeking work is higher than that of regular workers in urban areas. It is also interesting to note that in the case of rural regions both men and women regular work seekers have increased, whereas in the urban regions it is mainly regular female workers who are looking for work. Seen in the light of the fact that the urban male work participation rate amongst regular workers is declining, it appears that male workers are once again reverting back in search of rural employment, largely for agricultural work. But this search for work does not necessarily imply a revival of the agrarian economy. Rather it may imply underemployment within the rural sector leading to depressed wages and abysmal working conditions.

5.3.3 As indicated in the analysis above, the census data indicates that tribals are entering into the labour market in higher numbers and are becoming an increasingly important part of the reserve volume of labour that is essential for maintaining the current form of capitalism. Thus there is a diverse and complex relationship between underemployment in rural regions, the increasing volume of tribal workers ‘seeking’ but not getting work and the patterns of tribal dispossession under contemporary capitalism.

Table 4: Decadal Percentage Change in Scheduled Tribes Seeking or available for work, India during 2001-2011

Workforce by Selected Age Group and Residence	Marginal Workers Seeking/Available for Work			Non-Workers Seeking/Available for Work		
	Person	Male	Female	Person	Male	Female
Total Workforce						
Total	21.67	17.83	21.31	1.88	1.27	2.39
Child Workforce (5-14 years)	11.75	11.64	11.63	0.08	0.09	0.07
Regular Workforce (15-59 years)	22.00	15.56	22.10	2.70	-0.57	4.30
Elderly Workforce (Above 60 years)	18.94	21.25	16.38	1.29	1.27	1.29
Rural Workforce						
Total	22.15	18.67	21.54	1.97	1.36	2.48
Child Workforce (5-14 years)	11.64	11.55	11.51	0.08	0.09	0.06
Regular Workforce (15-59 years)	22.54	16.41	22.37	3.57	0.34	5.19
Elderly Workforce (Above 60 years)	19.22	21.74	16.54	1.39	1.38	1.39
Urban Workforce						
Total	7.78	1.73	12.78	0.62	-0.30	1.32
Child Workforce (5-14 years)	13.59	12.41	14.55	0.02	-0.04	0.08
Regular Workforce (15-59 years)	7.15	0.40	12.77	-0.67	-4.50	1.12
Elderly Workforce (Above 60 years)	10.08	9.48	10.31	0.35	0.30	0.36

Source: Author's Calculation based on data from Census 2001 and Census 2011 B Series Tables B01 ST

5.4 State Differentials

5.4.1 During the decade 2001-2011, the tribal population of India increased by 24.0 percent. Table 5 gives the growth of population and workers by social group, residence and age group. It is evident that the child workers (5-14 years) have declined among all sub-groups of population ranging from 17.4 percent among non-SC/ST to 25.2 percent among ST. Contrary to the general pattern, the child population has increased across all social groups, however, the highest growth is recorded for ST (12.2%) followed by SC (4.6%) and the lowest is for non-SC/ST. The lowest decadal growth is recorded for both non-SC/ST

population and workers, while the highest is recorded for both ST population and workers (Table 5).

5.4.2 Among the rest of the states and union territories, tribal population growth varies between 85.2 percent in Sikkim and 6.6 percent in Lakshadweep. The table 5 reveals that the aggregate tribal workforce in India has been growing at a slightly slower rate than the tribal population.

Table 5: Decadal Growth rate and Percentage Change in Work Participation Rate by Social Group Residence and Age, India during 2001-2011

Population by Social Group and Residence	Age group	Decadal Growth Rate (%) during 2001-11						Decadal Percentage Change in Work Participation Rate (%) during 2001-11		
		Population			Workers			Persons	Males	Females
		Persons	Males	Females	Persons	Males	Females			
Total Population										
Total	All Ages	17.7	17.1	18.4	19.8	20.7	17.9	0.7	1.6	-0.1
	5-14	2.6	2.5	2.6	-20.0	-17.3	-23.2	-1.1	-1.0	-1.2
	15-59	24.7	23.8	25.6	19.3	20.2	17.4	-2.6	-2.3	-2.6
	60+	35.5	35.2	35.8	39.8	35.6	51.8	1.3	0.2	2.5
Rural	All Ages	12.3	12.1	12.5	12.5	14.1	9.7	0.1	0.9	-0.8
	5-14	-0.1	-0.4	0.2	-28.6	-25.9	-31.5	-1.7	-1.5	-1.9
	15-59	18.8	18.8	18.9	12.1	13.7	9.2	-3.8	-3.6	-4.0
	60+	27.6	26.9	28.2	33.4	28.5	45.9	2.1	0.8	3.4
Urban	All Ages	31.8	29.8	34.0	44.3	38.0	74.1	3.1	3.2	3.6
	5-14	10.8	11.4	10.0	53.3	40.8	78.4	0.8	0.7	0.9
	15-59	37.9	34.6	41.7	42.3	36.0	72.3	1.5	0.8	3.8
	60+	59.3	60.2	58.5	73.0	67.3	100.2	2.3	1.9	2.4
SC Population										
Total	All Ages	20.8	20.3	21.5	22.2	25.1	16.9	0.5	2.0	-1.1
	5-14	4.6	3.7	5.6	-24.0	-20.8	-27.7	-1.5	-1.3	-1.6
	15-59	30.2	29.8	30.7	22.3	25.4	16.6	-4.0	-2.8	-5.1
	60+	37.4	37.0	37.9	40.9	36.6	51.1	1.1	-0.2	2.5
Rural	All Ages	15.7	15.3	16.0	15.4	18.3	10.6	-0.1	1.3	-1.5
	5-14	2.2	1.2	3.4	-30.1	-27.1	-33.3	-1.9	-1.7	-2.1
	15-59	23.8	23.9	23.7	15.3	18.4	10.1	-4.8	-3.8	-5.9
	60+	31.2	30.6	31.8	36.2	31.5	47.0	1.8	0.5	3.3
Urban	All Ages	41.3	39.6	43.2	58.0	54.2	70.5	3.8	5.0	3.0
	5-14	14.7	14.6	14.8	43.9	39.0	52.1	0.6	0.6	0.6
	15-59	53.2	50.4	56.3	57.0	53.2	69.8	1.2	1.4	2.1
	60+	70.2	71.6	68.9	79.0	75.5	88.9	1.6	1.1	1.8
ST Population										
Total	All Ages	24.0	23.2	24.7	23.1	24.8	21.1	-0.3	0.7	-1.3
	5-14	12.2	11.1	13.4	-25.2	-20.9	-29.0	-3.4	-2.6	-4.1
	15-59	31.2	30.6	31.9	24.3	25.8	22.5	-4.2	-3.1	-5.2
	60+	40.3	39.5	41.0	47.1	40.9	57.3	2.5	0.7	4.3
Rural	All Ages	21.7	21.0	22.3	20.8	22.3	19.0	-0.4	0.5	-1.2
	5-14	10.9	9.7	12.1	-26.5	-22.5	-30.1	-3.6	-2.8	-4.4
	15-59	28.3	28.0	28.7	21.9	23.3	20.4	-4.1	-3.2	-4.9
	60+	37.7	36.9	38.4	45.5	39.2	56.0	3.0	1.1	4.9
Urban	All Ages	49.7	47.0	52.6	61.1	56.5	71.6	2.6	3.0	2.7
	5-14	27.9	27.7	28.1	24.8	31.7	17.2	-0.1	0.1	-0.3
	15-59	60.3	55.8	65.1	60.7	55.7	72.5	0.1	-0.1	1.5
	60+	78.8	78.9	78.8	82.8	78.1	92.4	0.7	-0.2	1.6

Non-SC/ST Population										
Total	All Ages	16.4	15.8	17.0	18.8	19.3	17.4	0.8	1.6	0.1
	5-14	0.9	1.2	0.5	-17.4	-15.4	-19.9	-0.8	-0.8	-0.8
	15-59	22.9	21.9	23.9	17.9	18.5	16.5	-2.3	-2.2	-2.1
	60+	34.8	34.5	35.0	38.8	34.9	50.9	1.1	0.1	2.2
Rural	All Ages	10.1	10.0	10.2	10.3	11.8	7.1	0.1	0.9	-0.8
	5-14	-2.5	-2.4	-2.6	-28.8	-26.5	-31.5	-1.4	-1.3	-1.5
	15-59	16.3	16.3	16.3	9.5	11.2	6.1	-3.8	-3.6	-3.9
	60+	25.7	25.1	26.3	31.1	26.6	43.6	1.9	0.8	3.1
Urban	All Ages	30.0	28.0	32.1	41.9	35.5	75.0	3.0	3.0	3.6
	5-14	9.5	10.4	8.6	56.6	41.5	88.9	0.9	0.7	1.0
	15-59	35.4	32.1	39.1	39.7	33.4	72.8	1.5	0.7	4.0
	60+	57.8	58.7	56.9	72.0	66.1	103.0	2.3	2.1	2.4

Source: Author's Calculation based on data from Census 2001 and Census 2011.

5.4.3 The tribal workforce grew slowly than the tribal population only in Goa, Uttar Pradesh, Jammu & Kashmir, D & N Haveli, Mizoram, Bihar, A & N Islands, Arunachal Pradesh, Meghalaya, Gujarat, West Bengal, Himachal Pradesh, Madhya Pradesh, Chhattisgarh and Tamil Nadu. It is also observed that the growth of tribal workers in age group 5-14 is higher than the growth of tribal population in the same age in India as a whole and in the states/UTs of Lakshadweep, Nagaland, Himachal Pradesh, Manipur and Uttarakhand. In case of working age population (15-59), Nagaland, Lakshadweep and Manipur has registered higher growth for tribal workers than the tribal population during 2001-11. As many as 14 states/union territories of India has registered higher growth for tribal workers than the tribal population during 2001-11 for people age 60 and above (Table 6). Figure-1 displays the regional patterns in growth of tribal population and tribal workers during 2001-2011.

Table 6: Decadal Growth Rate and Percentage Change in Scheduled Tribe Work Participation, India, States and Union Territories during 2001 and 2011

India/States/UTs	Decadal Growth Rate (%) during 2001-2011								Decadal Percentage Change in Tribal Work Participation by Age Group			
	Tribal Population by Age Group				Tribal Workers by Age Group				Total	5-14	15-59	60
	Total	5-14	15-59	60	Total	5-14	15-59	60				
INDIA	23.7	12.2	31.2	40.3	22.8	-25.2	24.3	47.1	-0.3	-3.4	-4.2	2.5
Jammu & Kashmir	35.0	27.1	34.8	36.4	10.0	-27.9	12.2	25.9	-8.1	-5.1	-12.0	-4.1
Himachal Pradesh	60.3	32.4	72.3	77.2	57.2	69.1	55.6	65.5	-1.0	2.9	-7.8	-4.0
Uttarakhand	14.0	-8.5	27.7	42.2	25.8	10.0	23.3	55.1	4.3	1.1	-2.2	4.9
Rajasthan	30.2	22.6	40.3	44.3	32.1	-19.3	34.6	69.4	0.7	-3.9	-3.3	8.4
Uttar Pradesh	950.6	889.4	1004.8	1224.5	864.1	434.5	869.2	1183.3	-3.3	-4.5	-8.4	-1.7
Bihar	76.2	74.2	76.4	110.5	59.9	11.9	58.0	126.8	-4.2	-3.4	-7.9	4.1
Sikkim	85.2	51.3	106.9	115.1	89.4	-2.7	97.2	97.6	1.1	-4.7	-3.4	-4.6
Arunachal Pradesh	35.0	24.1	48.3	24.8	26.5	-1.6	28.0	24.1	-2.7	-1.3	-9.9	-0.4
Nagaland	-3.6	-13.4	-0.8	10.7	12.2	35.9	10.8	11.1	6.9	5.0	7.3	0.2
Manipur	57.5	43.5	64.1	53.7	69.4	78.0	68.8	71.5	3.3	1.8	1.8	7.1
Mizoram	23.4	9.1	29.0	38.5	4.4	-71.7	8.4	20.1	-8.0	-9.2	-12.4	-7.9
Tripura	17.5	-6.6	29.7	26.5	20.5	-44.3	22.6	21.7	1.1	-1.7	-3.8	-2.2
Meghalaya	28.3	18.3	34.3	30.9	20.6	-19.5	23.3	20.2	-2.5	-2.8	-5.9	-5.2
Assam	17.4	-1.1	27.1	37.3	19.5	-33.6	21.5	36.7	0.8	-2.9	-3.0	-0.3
West Bengal	20.2	-2.9	31.8	54.2	16.7	-45.1	18.2	43.5	-1.4	-3.3	-8.1	-2.9
Jharkhand	22.0	12.3	26.3	44.8	23.7	-8.0	23.1	58.6	0.7	-1.7	-1.9	4.8
Odisha	17.7	9.9	20.5	37.7	19.5	-16.8	19.9	39.2	0.7	-2.1	-0.4	0.5

Chhattisgarh	18.2	8.5	25.8	25.5	16.9	-38.8	20.0	25.4	-0.6	-5.2	-3.9	0.0
Madhya Pradesh	25.2	17.8	34.0	30.5	23.8	-34.8	27.7	41.2	-0.6	-5.9	-4.0	4.5
Gujarat	19.2	10.5	22.4	38.1	14.6	-12.2	13.0	49.5	-2.0	-1.6	-6.3	4.2
Daman & Diu	9.8	-12.9	20.7	28.3	12.3	-58.1	14.0	17.6	1.0	-2.5	-3.6	-3.1
D & N Haveli	30.1	26.8	39.4	46.8	6.8	-62.6	9.8	31.5	-9.1	-7.7	-17.9	-5.2
Maharashtra	22.5	10.4	31.9	30.9	24.8	-9.5	24.4	42.2	0.9	-1.3	-4.6	4.6
Andhra Pradesh	17.8	-4.3	28.5	58.2	18.6	-46.0	19.6	72.8	0.4	-6.0	-5.9	4.9
Karnataka	22.7	-3.6	34.3	49.2	24.9	-52.2	27.7	60.0	0.9	-5.8	-3.8	3.3
Goa	26273.7	18426.8	28266.8	90356.3	25255.8	8400.0	24860.9	87560.0	-1.7	-5.1	-7.9	-1.0
Lakshadweep	6.6	-20.3	19.4	41.2	25.1	220.8	26.2	-4.8	4.0	0.5	2.1	-5.7
Kerala	33.1	35.6	33.7	63.6	36.4	-1.6	34.6	70.1	1.1	-0.6	0.4	1.5
Tamil Nadu	22.0	13.4	26.6	35.8	21.3	-42.5	22.6	46.8	-0.3	-4.7	-2.5	4.6
A & N Islands	-3.2	-25.0	1.9	-0.7	-15.6	-56.4	-14.3	-16.5	-6.0	-2.4	-10.6	-7.7

Source: Author's Calculation based on data from Census 2001 and Census 2011 PCA ST.

Figure 1

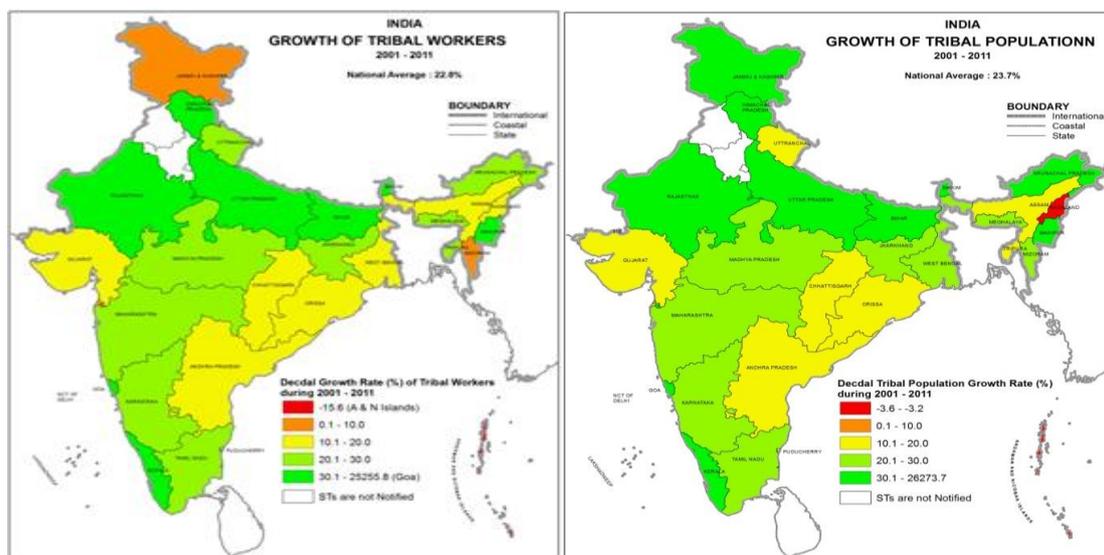
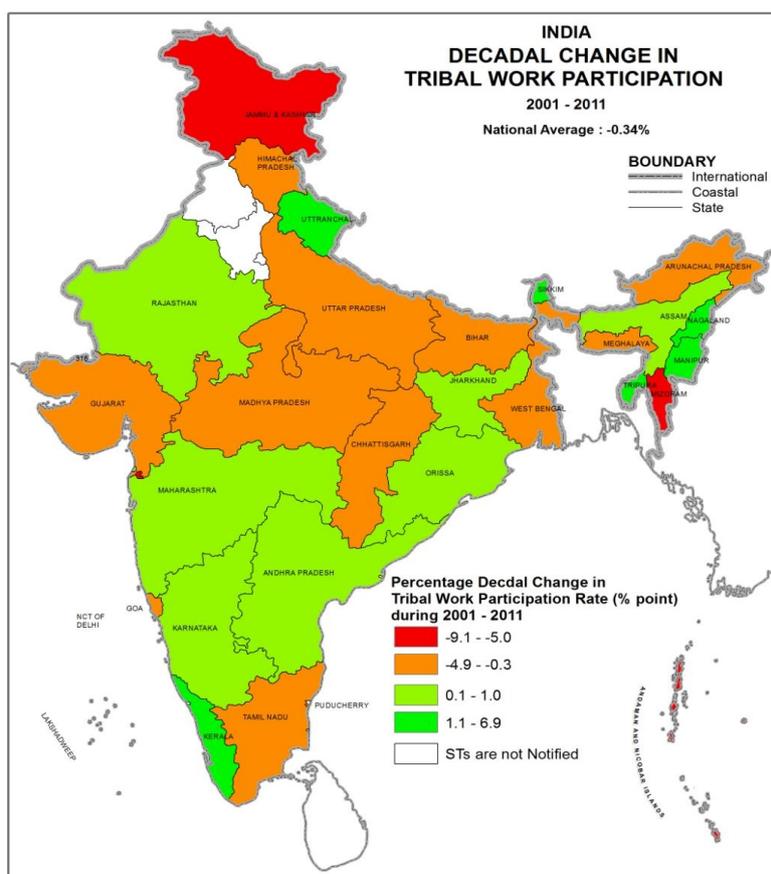


Figure 2



5.4.3 It is evident from the 2011 census data that the number tribal population in Goa has increased unprecedentedly from 566 in 2001 to 149275 in 2011 due to inclusion of three new tribal communities (Gawda, Velip and Kunbi) first time in 2011 Census. Similarly, abnormal increase in the number tribal population in has also observed in Uttar Pradesh from 1,07,963 in 2001 to 11,34,273 in 2011 due to inclusion of ten new tribal communities (Agariya, Baiga, Bhuiya/Bhuinya, Chero, Gond, Kharwar, Pankha, Parahiya and Saharya) first time in 2011 Census (Table 6). However, the number of tribal population has decreased in Nagaland and Andaman & Nicobar Islands during 2001-11.

5.4.4 Table 6 also gives decadal percentage change in the tribal work participation rates for 2001 and 2011 in India and its states and union territories. The percentage change in work participation rate is calculated by subtracting the WPR of 2001 from WPR of 2011. The overall tribal work participation rate for the country as a whole has marginally decreased between 2001 and 2011 form 49.1 percent to 48.7 percent. The tribal work participation rate has noticeably decreased in D & N Haveli, Jammu & Kashmir, Mizoram, A & N Islands, Bihar, Uttar Pradesh, Arunachal Pradesh, Meghalaya, Gujarat, Goa, West Bengal, Himachal Pradesh, Chhattisgarh, Madhya Pradesh and Tamil Nadu. It is also observed that the tribal work participation in age group 5-14 is has increased only Nagaland, Himachal Pradesh, Manipur, Uttarakhand and Lakshadweep.

5.4.5 In case of working age population (15-59), Nagaland, Lakshadweep, Manipur and Kerala has registered increase in tribal work participation during 2001-11. As many as 14

states/union territories of India have registered increase in tribal work participation during 2001-11 for people age 60 and above. Figure-2 displays the regional patterns in work participation rates by states for 2001 and 2011 respectively.

5.5 Distribution of Tribal Workers by Economic Activity

5.5.1 The classification of workers by category of economic activity can give an indication of the level of economic development. In other words the shift of workers from the cultivation and agriculture sector in the economy to household industry and 'Other works' follows the industrialisation and development of the economy. The four categories of workers by economic activity have been considered in Census 2011, are given below.

1. *Cultivator* relates to a worker who is engaged in cultivation of land owned or held from government or from private person(s) or institution for payment in money, kind or share. Cultivation also includes effective supervision or direction in cultivation. Cultivation does not include plantation crops like tea, coffee, rubber, coconut and betel-nuts (areca).
2. *Agricultural Labourer* includes worker who works on another person's land for wages in kind or cash or share. Agricultural Labourer has no risk in the cultivation, but merely works on another person's land for wage. Agricultural Labourer has no right of lease or contract on land on which she/he works.
3. *Worker Household Industry* includes worker who works in a household Industry. Household Industry is defined as an industry conducted by one or more members of the household at home or within the village in rural areas and only within the precincts of the house where the household lives in urban areas.
4. *Other Workers* are all those workers who have been engaged in some economic activity during the last one year, but are not Cultivators or Agricultural Labourers or Workers in Household Industry. The type of workers that come under this category include all government servants, municipal employees, teachers, factory workers, plantation workers, those engaged in trade, commerce, business, transport, banking, mining, construction, political or social work, priests, entertainment artists, etc.

Table 7: Distribution (%) of Total, Tribal, SC, and Non-SC/ST Workers by Economic Activity, India, 2001 and 2011

Sector/Workers	Total Workers						Tribal Workers					
	2001			2011			2001			2011		
	P	M	F	P	M	F	P	M	F	P	M	F
1. Cultivators												
Total	31.7	31.1	32.9	24.6	24.9	24.0	44.8	47.7	41.3	34.5	38.2	29.9
Rural	40.2	42.0	37.1	33.0	35.2	28.8	47.2	51.1	42.6	36.9	41.6	31.3
Urban	2.8	2.5	4.1	2.8	2.7	3.1	6.5	5.6	8.7	5.8	5.4	6.7
2. Agricultural Labourers												
Total	26.5	20.8	38.9	30.0	24.9	41.1	36.8	30.2	44.7	44.5	37.5	53.3
Rural	33.0	27.5	43.0	39.3	34.4	48.5	38.3	31.9	45.7	47.1	40.3	55.3
Urban	4.7	3.4	10.7	5.5	4.6	9.0	12.4	9.2	19.8	13.3	10.6	19.0
3. Workers in Household Industry												
Total	4.2	3.2	6.5	3.8	2.9	5.7	2.1	1.5	2.9	1.8	1.3	2.4
Rural	3.9	3.0	5.5	3.4	2.6	5.0	2.1	1.4	2.8	1.7	1.2	2.3
Urban	5.2	3.6	12.8	4.8	3.7	8.8	2.9	1.9	5.2	2.5	1.9	3.8

4. Other Workers												
Total	37.6	44.9	21.7	41.6	47.2	29.2	16.3	20.6	11.0	19.2	23.0	14.5
Rural	22.8	27.5	14.4	24.3	27.8	17.7	12.5	15.6	8.8	14.3	16.9	11.2
Urban	87.3	90.4	72.5	86.9	89.0	79.1	78.2	83.4	66.3	78.3	82.1	70.4
Sector/Workers	SC Workers						Non-SC/ST Workers					
	2001			2011			2001			2011		
	P	M	F	P	M	F	P	M	F	P	M	F
1. Cultivators												
Total	20.0	21.0	18.1	14.8	15.5	13.4	32.5	31.4	35.3	25.5	25.5	25.6
Rural	23.5	25.6	19.9	18.2	19.7	15.5	43.4	44.7	40.8	36.3	38.3	32.2
Urban	1.8	1.6	2.2	1.7	1.7	1.8	2.8	2.6	4.2	2.9	2.8	3.1
2. Agricultural Labourers												
Total	45.6	39.2	57.4	45.9	41.0	55.7	20.7	16.0	32.4	24.1	20.0	34.3
Rural	52.2	46.5	61.8	55.2	50.8	63.0	27.0	22.1	36.7	33.4	29.1	42.2
Urban	11.0	8.3	20.1	10.5	8.7	15.8	3.6	2.7	8.3	4.5	3.8	7.1
3. Workers in Household Industry												
Total	3.9	3.0	5.6	3.2	2.4	4.8	4.6	3.4	7.5	4.2	3.3	6.7
Rural	3.7	2.9	5.0	3.0	2.3	4.4	4.3	3.3	6.4	3.9	2.9	5.9
Urban	4.8	3.3	9.9	4.0	3.0	7.0	5.3	3.7	13.8	5.0	3.9	9.5
4. Other Workers												
Total	30.5	36.7	19.0	36.1	41.1	26.1	42.2	49.3	24.9	46.2	51.3	33.4
Rural	20.6	25.0	13.2	23.6	27.2	17.1	25.3	29.9	16.1	26.5	29.8	19.7
Urban	82.4	86.8	67.8	83.8	86.6	75.4	88.2	91.0	73.7	87.7	89.5	80.3

Source: Author's Calculation based on data from Census 2001 and Census 2011 B Series Tables B01 ST

5.5.2 Census gives the broad classification of workers by economic activity as cultivators, agricultural labourers, household industry workers and other workers. Table 7 gives the percentage change between 2001 and 2011 of tribal workers by economic activity with respect to total workers. Workers move from the cultivation or agricultural activity to the household industry and other activity as economy develops. Large proportions of India's tribal working population are engaged in the cultivation or agriculture despite the massive investments being made under the Five Year Plans. However, this proportion continues to decline with every increase in the industrialization of the country. The share of cultivators in tribal workers has decreased from 44.8 percent in 2001 to 34.5 percent in 2011, while, the share of agricultural labourers has increased to 44.5 percent in 2011 from 36.8 percent in 2001 (Table 7). The share of household industry workers in tribal workers has decreased marginally from 2.1 percent in 2001 to 1.8 percent in 2011. The share of SC and non-SC/ST workers in household industry has also declined during the decade 2001-11. However, the pace of decline was highest among SC followed by ST. In other economic activity, the proportion of ST workers has increased significantly from 16.3 percent in 2001 to 19.2 percent in 2011. It is worth to mention that the increase of workers in other activity is lowest among non-SC/ST (Table 7).

5.5.3 In case of tribal males, the share in the cultivation has decreased from 47.7 percent in 2001 to 38.2 percent in 2011; however, the proportion of male agricultural labourers has increased from 30.2 percent in 2001 to 37.5 percent in 2011. The share of tribal male workers in the household industry has also decreased from 1.5 percent in 2001 to 1.3 percent in 2011. The share of tribal male workers in the other sector of economy has increased from 20.6 percent in 2001 to 23.0 percent in 2011. With regard to tribal females, the share of cultivation

has decreased 41.3 percent in 2001 to 29.9 percent in 2011 and the share of female agricultural labourers has significantly increased from 44.7 percent in 2001 to 53.3 percent in 2011. The share of tribal female workers in household industry has also decreased from 2.9 percent in 2001 to 2.4 percent in 2011. The share of tribal female workers in the other economic activity has increased from 11.0 percent in 2001 to 14.5 percent in 2011 (Table 7).

5.5.4 The cultivation and agriculture sector remains the dominant source of employment generation for tribal population in India. Analysis of census data reveals that approximately 9.32 million new workers are observed into the tribal workforce from 2001 to 2011. Of these new workers, 67.6 percent are found to be engaged in agriculture/cultivation, 0.2 percent in household industry and 32.2 percent in the other economic activity. Employment generation in cultivation and agriculture is important for both sexes, but especially so for women. About 66.6 percent of the male entrants and 69.1 percent of the female entrants to the tribal workforce found employment in cultivation/agriculture during this period.

6. Conclusions

6.1 This paper attempts to describe some of the changes taking place in the work participation of tribals in the context of the growth of population and workers inhabited in rural and urban areas of India. The paper also evaluates the change in the distribution of workers in different economic activity. In this study, a comparison of the 2001 census is also made with 2011 census. More comprehensive studies that explore the links between specific policies, and their impact on working conditions and social structures, would be useful in taking our analysis forward.

6.2 During the 2001-2011 decade the tribal population of India increased at the rate of 23.7 percent and tribal workers grew by 22.8 percent. In absolute terms, there is a net addition of about 20.2 million persons in India's tribal population and tribal workers increased by 9.6 million during 2001-2011. The growth of tribal workers has not matched the tribal population growth resulting in higher dependency ratios and sizeable unemployment or underemployment. In fact, the growth of tribal male workers is significantly higher than that of tribal male population as greater proportions of men are observed into the work force. This may be due to increase in male literacy, the availability of jobs for men, and expansion of service sectors. The growth of tribal female workers, however, has not kept pace with the growth in female population. One reason for this may be limited employment generation and not desired changes in the outlook for working females. The growth of workers is invariably higher in urban areas than in rural areas both for males and females. The aggregate tribal workforce in India has been on its last legs at a slightly slower rate than the tribal population. The tribal workforce grew slowly than the tribal population only in Goa, Uttar Pradesh, Jammu & Kashmir, D & N Haveli, Mizoram, Bihar, A & N Islands, Arunachal Pradesh, Meghalaya, Gujarat, West Bengal, Himachal Pradesh, Madhya Pradesh, Chhattisgarh and Tamil Nadu. The aggregate picture, however, masks different trends by age group.

6.3 The tribal work participation rate is defined as the percentage of tribal workers to tribal population. The overall tribal work participation rate for the country as a whole has marginally decreased between 2001 and 2011, however increased among aged population (60+ years). The tribal work participation rate has noticeably decreased in large number of states and union territories. The share of tribal workers in cultivation or agricultural has decreased during 2001-2011. The share of cultivators in tribal workers has decreased, while the share of agricultural labourers has increased during the decade. The share of household industry workers in tribal workers has decreased. The cultivation/agriculture areas remain the dominant source of employment generation in India for tribals. Analysis of census data

reveals that approximately 9.32 million new workers are observed into the tribal workforce from 2001 to 2011. Of these new workers, 67.6 percent are found to be engaged in cultivation/agriculture, 0.2 percent in household industry and 32.2 percent in other economic activity. Cultivation/Agriculture employment generation is important for both sexes, but especially so for women. A shift from the cultivation/agriculture to the household industry and other economic activity is visible both in respect of males and females, but in the case of females the shift to the other economic activity is quite substantial. The employment in the cultivation/agriculture and household industry for tribal population is decreasing, though not at a fast rate, while employment in the other economic activity is increasing at faster rate.

6.4 The tribal child workers among both males and females (age group 5-14) have declined consistently from 2001 to 2011. The tribal child labour constitutes 3.0 percent of the male workforce and 3.8 percent of female workforce according to 2011 census. On the other hand, there is considerable increase in the tribal workforce of the elderly among both males and females in 2011. When we look at the age composition of tribal main and marginal workers separately, it is found that tribal child workers are predominantly employed as marginal workers, whereas elderly are engaged equally as main and marginal workers. A very high growth of marginal workforce among tribal females during 2001-11 shows an improvement of census enumeration of women workers. On the other hand, the increase in marginal workforce among males indicates about the changing employment of short duration because of greater casualisation of male workforce in both rural and urban areas.

6.5 The analysis of census data indicates that tribals are entering into the labour market in higher numbers but are forced into marginal and low wage work in order to economize on their survival. This shows that the tribals are becoming an increasingly important part of the reserve volume of labour that is essential for maintaining the current form of capitalism. Thus there is a diverse and complex relationship between underemployment in rural regions, the increasing volume of tribal workers 'seeking' but not getting work and the patterns of tribal dispossession under contemporary capitalism. In this situation, the democratic movement needs to intensify the fight for the basic rights of tribal workers by deepening its political organisation within this social group. However, this fight needs to be waged in the context of the larger unity amongst workers of all social groups so that a credible and militant challenge can be posed to the neo-liberal attack on the survival of the tribal worker.

References

- Agrawal, S.P. (1971), *Interrelation between Population and Manpower Problems: A Joint ECAFE-ILO Regional Seminar, UNO; Asian Population Studies, Series No. 7, Bangkok, pp. 71-76.*
- Bhattacharya, B.B. and S. Sakthivel (2005a), "Economic Reforms and Jobless Growth in India in the 1990s", In A.K. Sinha (eds), *India Towards Economic Superpower: A Journey of Economic Reforms*, New Delhi: Deep and Deep Publications
- (2005b), "Employment, Wage and Output Relationship in India: A Comparison of Pre and Post Reform Behaviour", *Indian Journal of Labour Economics*, vol. 48, no. 2, April-June, pp. 243- 258.
- Census of India, 2011: Primary Census Abstract, Data Highlights, India, Series 1.
- Chadha, G.K. and P.P. Sahu (2002), "Post-Reform Setbacks in Rural Employment: Issues that need further scrutiny", *Economic and Political Weekly*, May 25, pp.1998-2026.

- Choundhary, A.P. (2007), Structural Transformation in India- Growth of Service Sector, Indian Journal of Regional Science, Vol. XXXIX, No. 1, p. 94.
- Guha, Ramachandra (2007): "Adivasis, Naxalites and Indian Democracy", Economic and Political Weekly, Vol. 42, No. 32 (Aug. 11-17, 2007), pp. 3305-3312
- Gummadi, N. (2014), "Work Participation of Tribal Women in India: A Development Perspective", IOSR Journal of Humanities And Social Science (IOSR-JHSS), Volume 19, Issue 12, Ver. II (Dec. 2014), PP 35-38
- Jaffe, A.J. and Stewart, C.D. (1951), Manpower Resources and Utilization, Principle of Working Force Analysis, John Wiley and Sons Inc., New York, p. 17.
- Kakawani, N. (2000), "On Measuring Growth and Inequality Components of Poverty with Application to Thailand", Journal of Quantitative Economics, Vol. 16 (1), Pp. 67-79.
- Kakwani, N. and E. Pernia (2000), "What is Pro-poor growth?", Asian Development Review, Vol. 18, pp.1-16.
- Karlekar, Malavika (1989): "Education and Inequality", in Andre Beteille, (ed.) Equality and Inequality, OUP, New Delhi.
- Kothari, Ashish (2013), "Victims of Development", Review on 'A Rogue and Peasant Slave: Adivasi Resistance, 1800-2000', Frontline, Vol. 20 (26), 11 January.
- Government of India (2001), "Employment-Unemployment Situation in India 1999-2000", 55th Round, Report No. 458 -I and II, Ministry of Statistics and Program Implementation, Government of India, New Delhi.
- Osmani S. (2005): "Defining Pro-poor Growth", One Pager, Number 9, International Poverty Centre, Brazil.
- Office of the Registrar General & Census Commissioner, India 1988: Analysis of Work Force in India, Occasional Paper No. 8 of 1988.
- Ray, P. (1978), Quantitative Mapping of Working Population, Geographical Review of India, Vol. 40, No. 4, pp. 312-321.
- Ravallion, Martin (2001), "Growth, Inequality and Poverty: Looking Beyond Average", World Development, Vol. 29, pp. 1803-1815.
- Sundaram, K. (2001a), "Employment-Unemployment Situation in the Nineties: Some Results from NSS 55th Round Survey", Economic and Political Weekly, vol. XXXVI, No. 11 (March 11), pp.931-40.
- (2001b), "Employment and Poverty in 1990s, Further Results from NSS 55th Round Employment-Unemployment Survey, 1999-2000", Economic and Political Weekly, vol. XXXVI, no. 32 (August 11), pp.3039-49.

- (2004), "Growth of Work Opportunities In India: 1983 – 1999-2000", Working Paper No. 131, Center for Development Economics, Delhi School of Economics.
- Sundaram, K. and Suresh D. Tendulkar (2004), "The Poor in the Indian Labour Force in the 1990s", Working Paper No. 128, Center for Development Economics, Delhi School of Economics.
- Thorat, Sukhadeo K. (2012), "On Inclusive Growth: Reflections on the Concept in Indian Context", 11th CD Deshmukh Memorial Lecture, 24th December, Council for Social Development, Hyderabad.
- Venkatanarayana, M. (2013), "Stagnant Structure of Workforce among Scheduled Tribes (STs) in Andhra Pradesh: A Macro View. S. R. Sankaran Chair (Rural Labour), National Institute of Rural Development, Hyderabad February 2013 Online at <http://mpa.ub.uni-muenchen.de/56706/MPRA> Paper No. 56706, posted 18. June 2014 00:23 UTC.
- World Bank (2011), Poverty and Social Exclusion in India, Oxford University Press, New Delhi.
- Zheng, Buhong (2011), "Consistent Comparison of Pro-poor Growth", Social Choice Welfare, 37, pp. 61-79.

PART-II

Highlights of Report Released by NSSO

(The 'Highlights' are reproduced from related report prepared by Survey Design and Research Division (SDRD) of NSSO. For details, the reader may refer to the related Main Report)

Highlights of Recent Survey Report(s) Released by NSSO

1. In this part of the Journal, Highlights of the report based on 75th Round (July, 2017 – June, 2018) of NSS, released after publication of 105th issue of “SARVEKSHANA” are presented.
2. The highlights of the surveys during 75th Round of NSS, included in this issue, are taken from following report:

NSS Report on “Swachhta Status in India, July-December, 2017”

Highlights - Report on Swachhta Status in India, July-December, 2017

NSS 75th Round (July, 2017-June, 2018)

The highlights are based on the information collected through the Swachh Bharat Survey was conducted during July - December, 2017 along with the other surveys of NSS 75th round (July 2017 - June 2018). The Swachh Bharat Survey covered whole of the Indian Union *except the* villages in Andaman and Nicobar Islands which were difficult to access. The survey covered 7,134 FSUs (4,043 villages and 3,091 urban blocks) and 71,205 households (40,338 in rural areas and 30,867 in urban areas) at all India level.

Some of the highlights related to the Swachhta Status in India, July-December, 2017 as obtained from the survey are presented below:

- During the period between May - June 2015 and July - December 2017, the percentage of households having sanitary toilet increased from 45% to 64% in rural India and from 89% to 94% in urban India.
- During the period between May - June 2015 and July - December 2017, the percentage of households having water for use in the toilet increased from 43% to 62% in rural India and from 88% to 93% in urban India.
- Among rural households in India having sanitary toilet, about 96 percent of persons used any type of toilet (household/community toilet) during May - June 2015 while about 97 percent of persons used any type of toilet during July - December 2017.
- Among rural households in India not having sanitary toilet, about 8 percent of persons used any type of toilet (household/community toilet) during May - June 2015 while about 15 percent of persons used any type of toilet during July - December 2017.
- Among urban households in India having sanitary toilet, about 99 percent of persons used any type of toilet (household/community/public toilet) during May - June 2015 and July - December 2017.
- Among urban households in India not having sanitary toilet, about 46 percent of persons used any type of toilet (household/community/public toilet) during May - June 2015 while about 49 percent of persons used any type of toilet during July - December 2017.
- During the period between May - June 2015 and July - December 2017, the percentage of persons not using any type of toilet declined from 52% to 33% in rural India and from 8% to 4% in urban India.

- During the period between May -June 2015 and July - December 2017, the percentage of households where at least one member was not using any type of toilet declined from 55% to 36% in rural India and from 9% to 5% in urban India.
- During July - December 2017, among rural households in India, about 34% disposed of household garbage at a specified place outside the house, about 10% disposed of household garbage at a common place in the village and about 2% disposed of household garbage at biogas plant or manure pit.
- During July - December 2017, among urban households in India, about 50% disposed of household garbage at a specified place outside the house, about 39% disposed of household garbage at a common place in the locality/community and about 1% disposed of household garbage at biogas plant or manure pit.

खण्ड-III हिंदी

सर्वेक्षण

राष्ट्रीय प्रतिदर्श सर्वेक्षण कार्यालय
की पत्रिका

भाग-XXXIV सं० 3 और 4
अंक संख्या 106वां
मार्च, 2019



सत्यमेव जयते

राष्ट्रीय प्रतिदर्श सर्वेक्षण कार्यालय
सांख्यिकी और कार्यक्रम कार्यान्वयन मंत्रालय
भारत सरकार
नई दिल्ली

सम्पादकीय सलाहकार बोर्ड

1. डॉ. यू. संकर (अध्यक्ष), मानद प्रोफेसर, मद्रास स्कूल ऑफ एकनॉमिक्स, चेन्नई
 2. प्रो. टी.जे. राव, प्रोफेसर (सेवा-निवृत्त), भारतीय सांख्यिकी संस्थान, कोलकाता
 3. प्रो. ए.के. अधिकारी, प्रोफेसर (सेवा-निवृत्त), भारतीय सांख्यिकी संस्थान, कोलकाता
 4. डॉ. मनोज पांडा, निदेशक, आर्थिक विकास संस्थान, नई दिल्ली
 5. आर्थिक सांख्यिकी प्रभाग (ई.एस.डी.) के प्रतिनिधि, MoSPI, भारत सरकार, नई दिल्ली
 6. सर्वेक्षण अभिकल्प एवं अनुसंधान प्रभाग (एस.डी.आर.डी.) के प्रतिनिधि, MoSPI, भारत सरकार, कोलकाता
 7. समंक विधायन प्रभाग (डी.पी.डी.) के प्रतिनिधि, MoSPI, भारत सरकार, कोलकाता
 8. अपर-महानिदेशक, एनएसएसओ (सी.पी.डी.), MoSPI, भारत सरकार (प्रबंध संपादक), नई दिल्ली
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सम्पादकीय सचिवालय - समन्वय एवं प्रकाशन प्रभाग, राष्ट्रीय प्रतिदर्श सर्वेक्षण कार्यालय, सांख्यिकी एवं कार्यक्रम कार्यान्वयन मंत्रालय, संख्यिकी भवन, महर्षि वाल्मीकि मार्ग, नई दिल्ली-110032

1. श्री असित कुमार साधु, अपर महानिदेशक, एनएसएसओ (सी.पी.डी.)
2. डॉ. नियति जोशी, निदेशक, एनएसएसओ (सी.पी.डी.)
3. श्री सचिन कुमार, उप निदेशक, एनएसएसओ (सी.पी.डी.)
4. श्री अजय रावत, वरिष्ठ सांख्यिकी अधिकारी, एनएसएसओ (सी.पी.डी.)

सर्वेक्षण

भाग-XXXIV सं0 3 और 4

एनएसएसओ द्वारा जारी की गई रिपोर्ट की मुख्य बातें
(मुख्य बातें एनएसएसओ के एस.डी.आर.डी. प्रभाग द्वारा तैयार की गई सम्बंधित रिपोर्ट
से उद्धृत की गई हैं। विवरण के लिए पाठक सम्बंधित मुख्य रिपोर्ट देख सकते हैं)

मुख्य बातें – भारत में स्वच्छता की स्थिति संबंधी रिपोर्ट, जुलाई-दिसम्बर, 2017

रा. प्र. स. के 75वें दौर (जुलाई 2017 - जून 2018)

राष्ट्रीय प्रतिदर्श सर्वेक्षण (रा. प्र. स.) द्वारा स्वच्छ भारत सर्वेक्षण को जुलाई – दिसम्बर, 2017 के दौरान रा. प्र. स. के 75वें दौर (जुलाई, 2017 - जून, 2018) के अन्य सर्वेक्षणों के साथ संचालित किया गया। स्वच्छ भारत सर्वेक्षण में अण्डमान और निकोबार द्वीप समूह के उन ग्रामों को जहाँ कि पहुँचना कठिन था, छोड़कर सम्पूर्ण भारतीय संघ को सम्मिलित किया गया। इस सर्वेक्षण में अखिल भारतीय स्तर पर 7,134 एफएसयूएस (FSUs) (4,043 ग्रामों और 3,091 नगरीय खंडों) और 71,205 परिवारों (40,338 ग्रामीण क्षेत्रों और 30,867 नगरीय क्षेत्रों) को सम्मिलित किया गया।

1. इस सर्वेक्षण की मुख्य बातें निम्नलिखित हैं:—

- मई-जून 2015 और जुलाई-दिसम्बर 2017 के बीच की अवधि के दौरान सेनिटरी शौचालय रखने वाले परिवारों का प्रतिशत ग्रामीण भारत में 45% से बढ़कर 64% और नगरीय भारत में 89% से बढ़कर 94% हो गया।
- मई-जून 2015 और जुलाई-दिसम्बर 2017 के बीच की अवधि के दौरान शौचालय में उपयोग हेतु जल रखने वाले परिवारों का प्रतिशत ग्रामीण भारत में 43% से बढ़कर 62% और नगरीय भारत में 88% से बढ़कर 93% हो गया।
- मई-जून 2015 के दौरान भारत में सेनिटरी शौचालय रखने वाले ग्रामीण परिवारों में से लगभग 96 प्रतिशत व्यक्तियों ने किसी भी तरह के शौचालय (पारिवारिक/सामुदायिक) का उपयोग किया, जबकि जुलाई-दिसम्बर 2017 के दौरान लगभग 97 प्रतिशत व्यक्तियों ने किसी भी तरह के शौचालय का उपयोग किया।
- मई-जून 2015 के दौरान भारत में सेनिटरी शौचालय नहीं रखने वाले ग्रामीण परिवारों में से लगभग 8 प्रतिशत व्यक्तियों ने किसी भी तरह के शौचालय (पारिवारिक/सामुदायिक) का उपयोग किया, जबकि जुलाई-दिसम्बर 2017 के दौरान लगभग 15 प्रतिशत व्यक्तियों ने किसी भी तरह के शौचालय का उपयोग किया।
- मई-जून 2015 और जुलाई-दिसम्बर 2017 के दौरान भारत में सेनिटरी शौचालय रखने वाले नगरीय परिवारों में से लगभग 99 प्रतिशत व्यक्तियों ने किसी भी तरह के शौचालय (पारिवारिक/सामुदायिक/सार्वजनिक) का उपयोग किया।

- मई-जून 2015 के दौरान भारत में सेनिटरी शौचालय नहीं रखने वाले नगरीय परिवारों में सेलगभग 46 प्रतिशत व्यक्तियों ने किसी भी तरह के शौचालय (पारिवारिक/सामुदायिक/सार्वजनिक) का उपयोग किया, जबकि जुलाई-दिसम्बर 2017 के दौरान लगभग 49 प्रतिशत व्यक्तियों ने किसी भी तरह के शौचालय का उपयोग किया।
- मई-जून 2015 और जुलाई-दिसम्बर 2017 के बीच की अवधि के दौरान किसी भी तरह के शौचालय का उपयोग नहीं करने वाले व्यक्तियों का प्रतिशत ग्रामीण भारत में 52% से घटकर 33% और नगरीय भारत में 8% से घटकर 4% हो गया।
- मई-जून 2015 और जुलाई-दिसम्बर 2017 के बीच की अवधि के दौरान उन परिवारों का प्रतिशत जहाँ पर कम से कम एक सदस्य भी किसी भी तरह के शौचालय का उपयोग नहीं कर रहा था, ग्रामीण भारत में 55% से घटकर 36% और नगरीय भारत में 9% से घटकर 5% हो गया।
- जुलाई-दिसम्बर 2017 के दौरान भारत में ग्रामीण परिवारों के बीच लगभग 34% ने घरेलू कूड़े का निपटान घर के बाहर एक निर्दिष्ट स्थान पर किया, लगभग 10% परिवारों ने घरेलू कूड़े का निपटान गाँव के अंदर एक सामान्य स्थान पर किया एवं 2% परिवारों ने घरेलू कूड़े का निपटान बायोगैस प्लांट या खाद रुपी गड्ढे में किया।
- जुलाई-दिसम्बर 2017 के दौरान भारत में नगरीय परिवारों में लगभग 50% ने घरेलू कूड़े का निपटान घर के बाहर एक निर्दिष्ट स्थान पर किया, लगभग 39% परिवारों ने घरेलू कूड़े का निपटान समुदाय/स्थानीय इलाके में एक सामान्य स्थान पर किया एवं 1% परिवार ने घरेलू कूड़े का निपटान बायोगैस प्लांट या खाद रुपी गड्ढे में किया।

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