

Basic concepts of Sample survey techniques and sampling techniques used in large scale sample surveys in India

A. Basic concepts of Sample survey techniques

Suppose we want to measure the literacy rate in India. Then we can either record level of education of each and every person of India or we can take a sample of persons and based on the information available from these sample persons we can comment on the literacy rate of India. The principal advantages of taking a sample as compared to complete enumeration are: (i) reduced cost, (ii) greater speed, (iii) greater scope and (iv) even greater accuracy.

Laboratory diagnoses about the state of our health are made from a few drops of blood. This is based on the assumption that one drop tells the whole story of the circulating blood of our body. Here, the material from which sampling is done is uniform. But when the material from which sample is drawn is not uniform, the method of getting proper sample to comment on the whole is critical. Sample survey techniques deal with the procedure that ensures a trustworthy sample from a non uniform domain. Sample survey techniques make sample more efficient to get reliable estimates.

Surveys vary greatly in their complexity. The steps that are usually involved in the planning and execution of a survey are specified below:

1. Statement of the objective of the survey
2. Definition of the population to be sampled
3. Determination of the data to be collected
4. Methods of measurement
5. Choice of sampling unit
6. Selection of the sample
7. Organisation of the field work
8. Summary and analysis of the data
9. Information gained for future surveys

A lucid statement regarding the objectives of the survey is helpful. Without this, objectives of the survey may be forgotten in a complex survey. In the sample survey techniques, the word population is used to denote the aggregate from which sample is drawn. There is frequently a tendency to collect too many data from a survey. But care should be taken so that all data should meet the purpose of the survey. Information in a survey may be collected through response of the informant or through record based. The manners and the order in which questions are asked may also produce substantial differences in the results. The sampling unit together comprises the whole of the population. Every element in the population belongs to one and only one of the sampling units. There are variety of procedures by which sample may be selected. Some of these are (i) Simple random sampling, (ii) Systematic sampling, (iii) Stratified sampling, (iv) Multistage sampling etc. The personnel involved in collection of data must be trained regarding purpose of the survey, concepts and definitions to be followed in the survey. The field works need to be supervised adequately. Efforts are to be made to control non-sampling errors. Instructions manuals written clearly may help in reduction of non-sampling error. Information collected in a survey is to be tabulated to get desired estimates. Normally a tabulation plan is prepared for a survey. Experience of a survey may be used to conduct a similar survey in future in terms of determination of sample size, designing of schedule of enquiry, controlling of non-sampling error.

B. sampling techniques used in large scale sample surveys in India

1. An effective system for collection, processing and dissemination of socio-economic indicators is a prerequisite for development planning and formulation of social policy for a country.
2. India is a vast country with an area of 3.2 million square kilometers. It has a population of more than 1000 million people. It is multi-ethnic, multi-religious, multi-cultural and multi-lingual country with plenty of physical, climatic, economic and social diversities.
3. Social pattern of life varies widely over different States/UTs. Even there is considerable variation from district to district of the same State/UT. Among the hilly areas, there are areas ranging from high altitude to low altitude with a significant difference in life styles. Similarly, if one considers the plain areas only, there are so many forest areas, deserts, plateaus, dry lands and fertile lands spread across the country. These diversities give rise to varied pattern of habitat, social and economic behaviours, consumption habits etc.
4. Economically, India is developing country. Majority of the people are engaged in agricultural activities. In recent years tertiary sector is growing rapidly while the contribution of primary is going down. As is the case with developing countries, there is a large unorganized sector in the economy. Almost 90% of the enterprises are in the unorganized sector.
5. Given the realities described above, sample surveys are, therefore, one of the most important means for obtaining information about the social and economic health of the nation. National Sample Survey Organisation (NSSO), conducts most of the sample surveys in India concerning socio-economic characteristics.
9. Some of the surveys of socio-economic character undertaken by NSSO are:
 1. Household consumer expenditure survey
 2. Labour force survey
 3. Enterprise surveys in the Unorganised sector – manufacturing, trade, services etc.
 4. Annual Survey of Industries (ASI)
 5. Debt and investment survey
 6. Land holding survey
 7. Health, family welfare and morbidity surveys
 8. Survey of disabled persons
 9. Survey of housing condition
 10. Survey on migration
 11. Survey on literacy and educational facilities
 12. Survey on village facilities
 13. Survey on condition of farmers

Sample surveys conducted by NSSO (National Sample Survey Organisation) – India experience

Overview

1. Sample surveys are conducted every year on certain indicators. Usually, the surveys are of one-year duration from July to June, which is considered as agricultural year in India. But some surveys are of six months duration depending upon the nature of the subjects of survey. Sometimes the period of survey is also taken as Jan to Dec to suit the purpose of the survey. Each such survey is termed as 'NSS Round' of survey. 66 such rounds of surveys have been conducted so far by NSSO. At the moment, 66th round of survey is in progress and it is a survey on 'Household consumer expenditure and employment-unemployment'.
2. The survey period is divided into sub-periods of three-month duration and is termed as 'Sub-round'. Thus a full-year survey will have four sub-rounds/quarters while a half-year survey will have two sub-rounds/ quarters. This procedure is adopted to distribute the samples uniformly over different quarters of the year so that the seasonal effects can be smoothened out. Also, periodic progressive estimates can be built up.
3. Samples are drawn in the form of independent sub-samples of equal sample sizes. This facilitates an easy method of obtaining an estimate of sampling error even when the sample design is a complex one.
4. Estimates are required for all-India as well as for each of the States/UTs. Hence, the sample design needs to take care of this requirement. Further the estimates are generated separately for each of rural and urban sectors.
5. The surveys are nation-wide, large-scale, continuing, integrated multi-subject surveys. In each round of survey, some of the topics listed in para- 9 of the Introduction are taken up together. For example, 'Household consumer expenditure' and 'Employment-unemployment' surveys have been taken up in 66th (July 2009- June 2010) and 61st round (July 2004 – June 2005). In the previous round (i.e. 65th round conducted during July 2008 – June, 2009), Domestic Tourism, Housing Condition and Conditions of slums surveys were taken up for collection of information simultaneously. Enquiries on different subjects are conducted in the same round due to the importance of the indicators and the need to monitor them continuously. Sample design adopted for all the enquiries for the round is more or less same. Separate designs for different enquiries are not adopted since time and resources are limited for the round.

Sample Design

General

The sample designs vary over the rounds to some extent depending on the subjects of enquiry. But the broad structure is essentially the same over the rounds. There are broadly two types of surveys viz. Household surveys and Enterprise surveys. In the Household surveys, ultimate stage units are the households while it is the enterprises for Enterprise surveys.

The sample design followed in socio-economic surveys is a multi-stage design. The first stage units (FSU) are *area units* viz. *villages* in rural sector and *blocks* in the urban sector. The second stage units (SSU) are the households or enterprises.

Sampling Frame for FSUs: Use of Decennial Population Census Frame:

In rural areas of India, the census villages are the most common and convenient first-stage sampling units for any large-scale household enquiries. The census provides a complete list of villages for each State/UT and districts along with their identification particulars as well as supplementary information on several items for each village e.g., area, population, number of houses and households, number of literates, number of workers in different activities such as cultivation, agricultural labour, manufacturing, trade, transport, services, etc.

This list of census villages is perhaps the only sampling frame for the whole of rural India mainly because no other complete list of villages (or similar area units) is available at one place or in published form. But apart from this compelling reason, the census frame is satisfactory in other respects also. Firstly, the major part of the census frame relates to a fixed point of time viz. 1st march of the census year. Secondly, the concepts, definitions and procedures adopted in census are fairly uniform throughout the country and hence the census frame represents a uniform and consistent set of data. Lastly, the census gives a host of supplementary information that can help in evolving an efficient sample design.

However, one should not get the impression that the census frame leaves nothing to be desired. Some drawbacks of the census frame of villages and in what ways they have been tackled in NSS are briefly discussed below:

- (i) The village list becomes backdated a few years after the census has been conducted. Between two successive censuses, some villages are declared as urban areas, some villages go out of existence due to natural causes such as floods or due to new constructions of roads and projects, while some new villages come up from forests and vacant lands or due to splitting of large villages.

Fortunately, the extent of such changes in the population is quite small and does not affect the survey results much. Moreover, this is taken care of by making suitable adjustments to the extent feasible at the time of estimation.

- (ii) Some of the villages are very big in area and population and hence are difficult to survey within a reasonable time limit. A practical solution to this problem lies in sub-dividing a large village into several compact and identifiable sub-divisions of nearly equal population content and conducting the survey in one or more of the sub-divisions selected at random. These sub-divisions, usually formed by grouping contiguous hamlets, are called 'hamlet-groups' and the technique stated above is known as 'hamlet-group selection'.
- (iii) The census frame does not generally give information on number of manufacturing, trading and service enterprises in the village. With this data, the census frame would have been more suitable for enquiries on household and non-household enterprises.

Economic census frame

A census of enterprises and establishments, known as Economic census, is conducted periodically every five/six years throughout the country (the last one was conducted in 2005). This census lists all the enterprises and establishments in organized and unorganized sectors along with the information on total number of workers, hired workers, type of enterprises, industries in which engaged, etc. The data is collected from each village and urban blocks. Thus, this also provides a list of villages and blocks with supplementary information on

number of enterprises and number of workers by different industrial classification. Hence this is preferred as sampling frame for first-stage units in case of enterprise surveys.

As in the case of population census frame, Economic census frame has also certain limitations:

- (i) It becomes backdated with the passage of time. Since most of the enterprises are in the unorganized sector, births, deaths and growth are unpredictable and hence supplementary information are not reliable after some time.
- (ii) The lists of villages used by Economic census are borrowed from the population census. Therefore, the limitations mentioned in sub-para (i) and (ii) in case of population census exist here also.
- (iii) Data collection in case of Economic census requires more technical knowledge compared to population census in respect of clarity of concepts, definitions, etc. But it is hardly possible to engage so many temporary personnel with adequate technical knowledge for this one-time large-scale work. Hence, the quality of data is not at par with that of population census.

Urban Frame Survey

In the decennial population census, '*enumeration blocks*' are formed for carrying out census work efficiently. These blocks, which are small sub-divisions of towns, are smallest units with an average population of about 800 for which the census data (same as that for villages) are published for the urban sector. In the initial rounds of NSS, this list of census *enumeration blocks* were used as sampling frame for urban areas. But the census *enumeration blocks* proved to be unsatisfactory due to the following reasons: (i) census *enumeration blocks* are not well-demarcated area units with clear boundaries in many cases; (ii) they are usually described in terms of census house numbers which often get defaced or erased over a period of time. As a result, the census *enumeration blocks* become less and less identifiable with the passage of time and the risk of wrong coverage and under coverage increases. The need for a better frame for urban sector led to the initiation of Urban frame Survey.

UFS Blocks

The object of Urban Frame Survey (UFS) is to demarcate the area of a city/town into urban *blocks* that would remain identifiable over a long period of time and that would minimize the risk of wrong and under coverage mentioned earlier. To achieve these objectives, it is ensured that the newly formed blocks (i) cover the whole area of a city/town including vacant plots, (ii) are compact area units, (iii) are bounded on all sides by stable, well demarcated and easily identifiable boundaries like streets, lanes, canals, big buildings, etc. and (iv) contain 150 to 200 households. After demarcating the blocks (called *UFS blocks* or simply *blocks*) on field, a set of maps and schedules are prepared, the maps showing the locations and boundaries of the *blocks* and the schedules giving detailed descriptions of the boundaries and also estimated number of households, population and locality type codes like Industrial Area, Market Area, Hospital Area, Residential Area, etc for each *block*.

UFS is a continuing job for updating the list of blocks and supplementary information. List of blocks is updated for 20% of the blocks in some cities/towns through UFS every year and within a span of five years, called a 'UFS phase', updation of blocks is completed for all cities/towns of the entire country. Presently, 2007-2012 phase of UFS work is going on.

This list of UFS blocks is used as sampling frame for urban sector for most of the sample surveys. In the Economic census of 2005, UFS blocks of phase 2002-07 were used as area units in the urban sector just as villages were used for rural sector.

Sampling Frame for Second-stage units

The frames of second stage units (households and enterprises) are prepared by the investigators only for the sample villages and blocks. After arriving at a sample village/block, the investigator prepares a complete and up-to-date list of households residing in it or the enterprises situated inside it. During this listing, he also collects for each household/enterprise some information, which can be utilized to increase the efficiency of household selection and estimation of parameters. The nature of information to be collected, of course, depends on the subjects of enquiry of the particular round.

General Strategy for Sample Design

The basic design is built around a stratified sampling scheme with multi-stage selection in each stratum. Each State/UT is naturally taken as a domain of study and is divided into several strata of compact areas. Within each stratum, a two-stage or three-stage scheme is adopted for sampling of households / enterprises.

In NSS, technique of sub-sampling has been used widely for study and assessment of sampling and non-sampling errors in the survey results. The method consists in drawing the total samples of FSUs in the form of two or more parallel and independent samples. Each sub-sample is drawn by the same sampling scheme and is capable of providing valid estimates of the population parameters of interest. One main advantage of independent sub-samples is that unbiased estimates of total variations of the estimates can be easily obtained even when the sample design is very complex.

Formation of strata

According to the basic principle of stratification, each stratum should be as homogeneous as possible with respect to the variable under study. Since a multi-subject survey involves a large number of variables pertaining to different subjects of enquiry, the general policy in respect of stratification is to adopt a collective approach, which aims at reducing the 'within stratum' variations of some key characteristics relevant to the parameters to be estimated. The pattern of stratification in the NSS has been so evolved as to cater to the needs of different enquiries canvassed in any particular round with emphasis, in some cases, on a few important enquiries of that round. In essence, the procedure consists in taking each State/UT as a sub-population (broad stratum) and in dividing it into several NSS state-regions / districts (primary strata) within which ultimate strata are formed.

NSS State-Region: An NSS state-region is a contiguous group of districts within a State having similar topography, agro-economic characteristics and population densities. For bigger States, the number of regions goes up to 7 while for smaller States/UTs, there is only one region. A region may comprise a single district for small States/UTs but for larger States, there may be 10-12 districts in a region. The regions have some distinctive geographical features and climatic conditions and this makes the regional estimates more meaningful and useful in some respects. The boundaries of a region generally do not cut across district boundaries or State boundaries.

Stratification of FSUs in rural areas

Districts are taken as primary strata in the rural sector. Districts are geographically compact areas within an NSS state-region. They are also compact in respect of climate, crop pattern, population densities, socio-cultural and agro-economic environments. Hence they have a lot of homogeneity in respect of socio-economic indicators. If the population of a district is large, the variations occur between different parts of the district. In that situation, the *large district is sub-divided into two or more strata* of equal population by grouping together contiguous groups of villages having more of socio-economic similarities. At present, each district having census population of more than 2.5 million is sub-divided into more strata. Boundaries of districts are taken as per the population census demarcation.

Stratification of FSUs in urban areas

Urban strata are formed within each NSS state-region by grouping towns belonging to the same population-size class. Size classes may be such as: < 50000 population; 50000-100000 population; 100000-500000 population; 500000-1 million population; each city with more than 1 million population. The size classes vary from round to round depending on the subjects, sample sizes, etc.

In recent years, importance for estimates at sub-State administrative unit such as district level has increased for efficient planning and monitoring of the development targets. Hence in the recent NSS rounds, districts are being taken as primary strata in the urban sector similar to that for the rural sector.

Sub-stratification of FSUs

Sometimes *sub-strata* are formed within the *primary strata* in order to reduce 'within stratum' variation of the characteristics. This may be done by grouping villages of the same population-size class or by grouping blocks of the similar type. For enterprise survey, sub-stratum may be formed with villages/ blocks having no enterprises or with those having big enterprises.

Allocation of sample first stage units

Allocation over the States: All-India sample sizes are allocated to different States/UTs in proportion to population of the State/UT for household surveys and in proportion to non-agricultural workers for enterprise surveys. However, no. of investigators available for canvassing is also taken into account.

Allocation between Rural and urban sector of a State/UT: State/UT sample size is allocated between rural and urban sectors of the State/UT in weighted proportion to populations of the rural/urban sectors with more weight to the urban sector. Although the share of urban population is relatively small but the variation is relatively high. Hence proportionately more samples are allocated to urban sector.

Allocation to strata and sub-strata: This is usually made in proportion to populations or number of workers in the strata. In the case of urban, sometimes number of FSUs in the strata/sub-strata is also taken as criterion for allocation.

Selection of sample villages

Three basic sampling schemes, SRS, Systematic sampling and sampling with PPS, have been used in different rounds of NSS. In the same round, SRS and PPS have been used in different strata too. In the case of PPS, size is usually village population for household surveys and number of workers in the village for enterprise surveys. SRS has been used in those cases where variations in village populations are not very high or the subject of the enquiry does not have much relation with population. Systematic has been used with both SRS and PPS. This has been done to ensure the spread the samples over the population and also to take advantage of the arrangement factor in the systematic sampling. Circular systematic scheme has been preferred over the method of linear systematic scheme in order to have fixed sample size. PPS With Replacement has also been used in selection of sample villages in the recent rounds of NSS.

Selection of sample blocks

Here the selection is made with the sampling scheme as in the case of rural sector. Since the populations of the UFS blocks do not vary much, population as size measure is not used here. Generally, SRSWOR/ Systematic sampling scheme is used frequently. For enterprise surveys, PPS with size as workers have been used.

Sampling within FSU

After identification of a selected FSU, the investigator starts listing of the houses and households/enterprises in a systematic manner so that no area or population of the village/block is left out. The identification of the households/enterprises and other auxiliary information are collected in a schedule known as 'Listing Schedule'.

It has been mentioned earlier that the NSS design is integrated up to the village/block level but households for different enquiries are usually selected separately and independently. This flexibility is utilized to obtain a good sample for each enquiry. While filling up the listing schedule, the investigator collects broad information like household size, means of livelihood, land possessed, monthly consumer expenditure, type of enterprise, number of workers, etc. and other characteristics meaningful for the concerned enquiries. This helps in preparing appropriate sampling frames for different enquiries and in increasing the efficiency of sampling at the second stage. The households of a frame are stratified or arranged by such auxiliary information with a view to ensuring proper representation of the different sections of the population/enterprise in the sample.

When an enquiry relates to a section of the population, the corresponding sampling frame is also limited to that section. For example, for an enquiry on trading enterprises, only the household enterprises engaged in trading and the non-household trading enterprises constitute the frame for second stage units. This makes the frame compact and relevant.

Usually, *stratification of the second stage units* for an enquiry is done to make the sample representative and increasing the efficiency of second stage sampling. Second stage stratification may be done with the means of livelihood (occupational groups like self-employed, regular salaried, laborers, etc.) or type of households targeted for enquiry (migrant, disabled, aged, child, manufacturers, traders, etc.).

Generally, a pre-assigned number of sample households are selected from each village/block for a particular enquiry. The sample sizes are distributed suitably over different second stage strata for the enquiry.

Sample households for an enquiry are selected from the corresponding frame either with SRSWOR or circular systematically with equal probability.

Problems of large villages

In order to reduce the investigator's workload in large sample village, the technique of *hamlet-group formation and selection* is adopted in NSS for large villages. A large village having a population of more than 1200 is divided into a certain number (D) of sub-divisions called *hamlet-groups*. The number of *hamlet-groups* to be formed (i.e. the value of D) will depend on the *approximate present population* of the sample village. Usually, each *hamlet-group* will have a population of about 600.

Each hamlet-group consists a few 'hamlets'. In a large village, there exist usually a few localities or pockets where the houses of the village tend to cluster together. These are called 'hamlets'. In case there are no such recognised hamlets in the village, the census sub-divisions of the village (e.g. enumeration blocks or groups of census house numbers or geographically distinct blocks of houses) may be treated as 'hamlets'. The hamlets are grouped into D *hamlet-groups*. The criteria to be adopted for *hamlet-groups* formation are *equality of population content and geographical contiguity*.

In case sample UFS blocks are found to be large (in most cases they are not) in terms of population, they are subjected to *sub-block* formation. Procedure for formation of *sub-blocks* is same as that for the formation of hamlet-groups in the case of large villages. Here the *sub-blocks* are to be formed artificially by dividing the block into a certain number (say, D) of divisions *by more or less equalizing the population giving priority to geographical compactness* within each *sub-block*. The number of *sub-block* to be formed (i.e. the value of D) will be determined according to the same criteria as adopted in the case of rural FSUs.

Out of the D *hamlet-groups / sub-blocks* formed in large village/block, usually two of them will be selected by the method of Simple Random Sampling Without Replacement (SRSWOR) or Circular Systematically with equal probability. However, some times one *hamlet-group / sub-block* is chosen *purposively* and the other is selected randomly. The purposive choice of a *hamlet-group / sub-block* may be necessary in order to get adequate sample representation of certain kind of units e.g. trading enterprise, etc. The efficiency of the estimate increases by such procedure.

The *listing of households/enterprises is done separately and independently in each selected hamlet group/sub-block*. The total sample size will be distributed between the two *hamlet-groups / sub-blocks*. But, sometimes the selection is done after a combined listing of households of the two *selected hamlet groups/sub-blocks* when there is not enough sample units.

Thus, NSS design is two-stage for smaller villages/blocks but it is three-stage in the case of large villages/blocks. It is a fact that any form of sub-division selection introduces another stage of sampling, thereby increasing the sampling error, the compromise here becomes necessary to reduce the unit cost of survey.

Sample Design of a recent NSS round on Household Consumption Expenditure and Employment-Unemployment

A brief account of the sample design adopted in the household survey conducted in one of the recent rounds of NSS (NSS 66th round) has been given below.

1. **Subject Coverage:** ‘Household Consumer Expenditure’ and ‘Employment and Unemployment’.

2. **Schedules of enquiry:** During this round, the following schedules of enquiry are being canvassed:

Schedule 0.0	: list of households
Schedule 1.0	: consumer expenditure
Schedule 10	: employment and unemployment

3. Sample Design

3.1 **Outline of sample design:** A stratified multi-stage design has been adopted for the survey. The first stage units (FSU) are the 2001 census villages (Panchayat wards in case of Kerala) in the rural sector and Urban Frame Survey (UFS) blocks in the urban sector. The ultimate stage units (USU) are households in both the sectors. In case of large FSUs, one intermediate stage of sampling is the selection of two hamlet-groups (hgs)/ sub-blocks (sbs) from each rural/ urban FSU.

3.2 **Sampling Frame for First Stage Units:** *For the rural sector*, the list of 2001 census villages (henceforth the term ‘village’ would mean Panchayat wards for Kerala) constitutes the sampling frame. *For the urban sector*, the list of latest available UFS blocks is considered as the sampling frame.

3.3 **Stratification:** Within each district of a State/ UT, generally speaking, two basic strata have been formed: i) rural stratum comprising of all rural areas of the district and (ii) urban stratum comprising of all the urban areas of the district. However, within the urban areas of a district, wherever there are one or more towns with population 10 lakhs or more as per population census 2001 in a district, each of them forms a separate basic stratum and the remaining urban areas of the district are considered as another basic stratum.

3.4 **Sub-stratification:** There is no sub-stratification in the urban sector. However, to net adequate number of child workers, for all rural strata, each stratum has been divided into 2 sub-strata as follows:

sub-stratum 1: all villages with proportion of child workers (p) $> 2P$ (where P is the average proportion of child workers for the state/ UT as per Census 2001)

sub-stratum 2: remaining villages

3.5 **Total sample size (FSUs):** 12784 FSUs for central sample and 15132 FSUs for state sample have been allocated at all-India level.

3.6 **Allocation of total sample to States and UTs:** The total number of sample FSUs is allocated to the States and UTs in proportion to population as per census 2001 subject to a minimum sample

allocation to each State/ UT. While doing so, the resource availability in terms of number of field investigators has been kept in view.

3.7 Allocation of State/ UT level sample to rural and urban sectors: State/ UT level sample size is allocated between two sectors in proportion to population as per *census 2001* with double weightage to urban sector subject to the restriction that urban sample size for bigger states like Maharashtra, Tamil Nadu etc. should not exceed the rural sample size. A minimum of 16 FSUs (to the extent possible) is allocated to each state/ UT separately for rural and urban areas. Further the State level allocations for both rural and urban have been adjusted marginally in a few cases to ensure that each stratum/ sub-stratum gets a minimum allocation of 4 FSUs.

3.8 Allocation to strata/ sub-strata: Within each sector of a State/ UT, the respective sample size is allocated to the different strata/ sub-strata in proportion to the population as per census 2001. Allocations at stratum/ sub-stratum level are adjusted to multiples of 4 with a minimum sample size of 4 and equal number of samples has been allocated among the four sub rounds.

3.9 Selection of FSUs: For the rural sector, from each stratum/ sub-stratum, required number of sample villages has been selected by probability proportional to size with replacement (PPSWR), size being the population of the village as per Census 2001. For urban sector, from each stratum FSUs have been selected by using Simple Random Sampling Without Replacement (SRSWOR). Both rural and urban samples have been drawn in the form of two independent sub-samples.

3.10 Formation and selection of hamlet-groups/ sub-blocks

3.10.1 Criterion for hamlet-group/ sub-block formation: Selected FSUs with approximate population 1200 or more are divided into a suitable number (say, D) of ‘hamlet-groups’ in the rural sector and ‘sub-blocks’ in the urban sector as stated below.

approximate present population of the sample FSU	no. of hgs/sbs to be formed
less than 1200 (no hamlet-groups/sub-blocks)	1
1200 to 1799	3
1800 to 2399	4
2400 to 2999	5
3000 to 3599	6
.....and so on	

In case hamlet-groups/ sub-blocks are to be formed in the sample FSU, the same is done by more or less equalizing population.

3.10.2 Selection of hamlet-groups/ sub-blocks: Two hamlet-groups (hg)/ sub-blocks (sb) are selected from a large FSU wherever hamlet-groups/ sub-blocks are formed in the following manner – one hg/ sb with maximum percentage share of population is always selected and termed as hg/ sb 1; one more hg/ sb is selected from the remaining hg’s/ sb’s by simple random sampling (SRS) and termed as hg/ sb 2. Listing and selection of the households is done independently in the two selected hamlet-groups/ sub-blocks. The FSUs without hg/ sb formation are treated as sample hg/ sb number 1.

4. **Listing of households:** Having determined the hamlet-groups/ sub-blocks, i.e. area(s) to be considered for listing, the next step is to list all the households (including those found to be temporarily locked after ascertaining the temporariness of locking of households through local enquiry). The hamlet-group/ sub-block with sample hg/ sb number 1 is considered for listing first, to be followed by the listing of households within the sample hg/ sb number 2.

5. Formation of second stage strata and allocation of households

5.1 Two cut-off points 'A' and 'B' (in Rs.) have been determined from previous round data for **each NSS region** for urban areas in such a way that top 10% of the population have MPCE more than 'B' and bottom 30% of the population have MPCE less than A.

5.2: For both Schedule 1.0 and Schedule 10, households listed in the selected FSU/ hamlet-group/ sub-block are stratified into three second stage strata (SSS). Composition of the SSS and number of households to be surveyed from different SSS are as follows:

SSS	composition of SSS	number of households to be surveyed	
		FSU without hg/sb formation	FSU with hg/sb formation (for each hg/sb)
Rural			
SSS 1:	relatively affluent households	2	1
SSS 2:	of the remaining, households having principal earning from non- agricultural activity	4	2
SSS 3:	other households	2	1
Urban			
SSS 1:	households having MPCE of top 10% of urban population (MPCE > B)	2	1
SSS 2:	households having MPCE of middle 60% of urban population ($A \leq MPCE \leq B$)	4	2
SSS 3:	households having MPCE of bottom 30% of urban population (MPCE < A)	2	1

6. **Selection of households:** From each SSS the sample households for each of the schedules are selected by SRSWOR.
