

THE NATIONAL SAMPLE SURVEY, AGRICULTURAL STATISTICS AND PLANNING IN INDIA*

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“THE establishment of an all-purposes National Sample Survey foreshadows another dangerous possibility. This is that an authority may be created which through the nature of its being will tend to exterminate all parallel agencies in the field. Being an all-purposes survey it has no specific work and being created on a large scale it will have to keep on doing a lot to justify its existence. This will necessarily lead it to encroach on sphere after sphere in an extensive imperialistic drive. Already it is reported that some of the most important expert agencies built up after years of careful work have been abolished in order to extend the field of this somewhat non-descript authority.”¹

These prophetic remarks of Prof. Gadgil have been amply borne out by the developments, or rather their lack, in the field of agricultural statistics during the past ten years, which, in our view, had serious repercussions on agricultural planning in India. We propose to discuss them briefly in the present article.

The absence of adequate agricultural statistics had been brought home forcefully and tragically during the Second World War when a serious food crisis developed in the country by the stoppage of imports from Burma and the Bengal Famine. As a result of the steps initiated then, considerable progress was made in the years that followed towards improvement of agricultural statistics. In 1943, the Indian Council of Agricultural Research was entrusted with the task of evolving a scientific method for estimating the outturn of crops. Taking advantage

* This paper reviews the present position of agricultural statistics in India. After pointing out the various drawbacks in the system of collection of agricultural statistics the author suggests measures to improve it. In view of the importance of reliable agricultural statistics in relation to agricultural planning, the paper is reproduced in this journal 'from *Changing India*', edited by V. M. Dandekar and N. V. Sovani, Asia Publishing House, Bombay, 1961, for the benefit of its readers.—*Editor*.

¹ Concluding paragraph of Prof. D. R. Gadgil's foreword to the *Report on the Poona Schedules of the National Sample Survey*, Publication No. 26, Gokhale Institute of Politics and Economics, 1953, p. viii.

of the successful experimental sample surveys that had been carried out for this purpose by the author and his associates during the previous two years on the cotton crop in Berar on behalf of the Indian Central Cotton Committee, the Indian Council of Agricultural Research was able to extend the application of this method to wheat and rice and subsequently to jowar and other food-grains under the vigorous leadership of the Council's Statistical Adviser, Dr. P. V. Sukhatme. In the course of the next seven or eight years, the method of crop cutting surveys covered almost the entire area under wheat and rice (with the notable exception of Orissa) and the major portion of the area under other food-grains. The rapid adoption of the method by the States was due to the training and use of administrative agencies connected with agriculture, revenue, land records, and extension for the field-work of the crop surveys which made it more efficient because of the agricultural knowledge and familiarity with local conditions of these agencies and far less expensive than if an *ad hoc* field staff had to be employed for this purpose. It will not be out of place to record here that the scheme for the experimental survey on cotton which was the precursor of these extensive developments was itself sanctioned by the Indian Central Cotton Committee at the instance of its then President the late Sir Pheroze Kharegat, an administrator of rare insight into scientific method, in spite of a strenuous opposition to the launching of this experiment.

The principle of utilizing local administrative agencies demonstrated its soundness in extending the sample survey technique to other fields of agricultural statistics such as estimation of live-stock numbers and marine fish catches, and extensive sample surveys were carried out successfully by the Indian Council of Agricultural Research in these fields. To improve the quality of land utilization and crop acreage statistics provided by the *patwari* agency, the Council recommended a scheme of rationalized supervision over this work of the *patwari*, which consisted in organizing the scheduled supervision of this work on a sample pattern with the twin objective of introducing an element of surprise in the normal supervision to make the field staff more alert and of providing a scientific basis for adjusting the *patwari* data in case of need. Another recommendation of the Council in this field was for improvement of the quality of pre-harvest forecasts of crop acreages, by spreading out the crop inspection work of the *patwari* in such a manner that a part of it is done on a sampling plan before a prescribed date, to provide material for estimating the crop acreages for the forecast in place of the current method of indicating crop acreages for this purpose by qualitative observations. After the transfer of sample

survey work in agricultural statistics to the National Sample Survey towards the end of 1952, this last item was reported to have been given a trial by the National Sample Survey staff by asking the *patwari* to report crop acreages in a 10 per cent. systematic sample of survey numbers in each village under his jurisdiction. This approach which unnecessarily duplicates the *patwari's* work, since he must carry out the inspection in each village twice, once on the 10 per cent. sample and again on the remaining survey numbers to complete his work, is not likely to succeed as not fitting into the administrative routine. The Council's recommendation was that the *patwari* may be asked to carry out the sample inspection on a whole village or a portion of a village, if the latter was large, for providing a pre-harvest forecast and he could then continue his work of crop inspection in the remaining area under his jurisdiction, without having to go back to those villages which he had completed earlier. The results of the National Sample Survey attempt are not known. They could not have possibly come out in time for any pre-harvest forecast.

With the transfer of the sample survey work in agricultural statistics to the National Sample Survey, the Council discontinued further efforts for improvement of agricultural statistics. The loss was not so much to the Council which diverted its statistical work to agricultural and animal husbandry research where it was urgently needed, but the cause of agricultural statistics certainly received a set-back. After the transfer of the work to National Sample Survey it seems to have continued in a more or less routine manner without any vigorous effort, to extend it to other crops or make the coverage complete. Orissa still continues without any reliable statistics of either crop acreages or yield. Extension of crop cutting surveys to commercial crops like cotton, oilseeds, sugarcane, etc., have made no perceptible headway though the All-India Committees concerned with these commodities are reported to be pressing for this extension. It is an irony that the cotton crop of the country where the need of reliable production statistics was felt earliest and in which a beginning was made by the demonstration of the applicability of modern sampling theory to the problem, still suffers from lack of reliable production data for the greater portion of the crop. We are still as far today as we were before, from the stage of securing any worthwhile production statistics for agricultural commodities minor in acreage but important nutritionally or commercially, such as fruits, tobacco, etc., or of live stock products. Work on statistics of fish catches also seems to have come to a standstill where the Indian Council of Agricultural Research left it. It is

a matter of some consolation to those who have been connected with the pioneering efforts that were made through the Council for developing and promoting scientific methods of estimation of agricultural and live stock products that although this work has apparently stagnated in India for the time being, the Food and Agriculture Organisation of the United Nations has been taking considerable advantage of this experience built in India for introduction of scientific methods of estimation of crops, live-stock and fisheries in other countries. The most recent example is that of Egypt where crop cutting surveys for estimating the production of the principal crops of the country, cotton and wheat, are now an annually established practice. In Egypt, the application of the sampling methods also for estimating fish catches developed in India has been demonstrated successfully on marine, lake and river fisheries of the country.

In 1944 a section of Economics and Statistics was established in the Ministry of Food and Agriculture for bringing about other improvements in agricultural statistics through administrative action. This section which later developed into the Directorate of Economics and Statistics did considerable work in persuading the States to extend the coverage of land utilisation and crop acreage statistics to previously non-reporting areas to bring more crops under annual forecasts and to start new statistical series such as those of prices of agricultural commodities like millets and live-stock and live-stock products. It brought about a considerable measure of uniformity and comparability among the statistics compiled by the States through proper co-ordination. As a result of the activities of this Directorate, the coverage of the area reporting agricultural statistics has increased from 570 million acres in the pre-independence days to 720 million acres and the number of crops for which forecasts are issued increased from 10 to 26.

In 1947 India was invited by the Food and Agriculture Organisation to participate in the decennial world census of agriculture in 1950. The proposal was considered by the Conference of Provincial and State Ministers of Agriculture in September 1948 and with the awareness of the urgent need of comprehensive, detailed and reliable agricultural statistics as a foundation for planning which was receiving serious consideration at that time, the Conference recommended that India should co-operate with F.A.O. in organising the agricultural census and that the occasion of this census should be made use of for collecting all the basic data in agriculture without restricting the scope of the inquiry to the minimum list of items prescribed by the F.A.O. The objective should be to place the agricultural statistics of the country

on a sound basis as a permanent measure and the various inquiries should be so planned as to provide in a comprehensive manner all the data required for formulating measures of agricultural development. A technical committee consisting of representatives of central, provincial and State governments was set up to work out the details. This committee reviewed initially the whole field of agricultural statistics and made recommendations of far-reaching importance to make their coverage complete and to improve their quality. The committee recognised that the central problem in the improvement of agricultural statistics in India was one of strengthening the primary reporting machinery with the *patwari* at its base by reducing its burden, rationalizing its procedures and setting it up where it did not exist. In the view of the committee the general pattern of this machinery, which had stood the test of time, was sound and needed no radical alteration. The committee made detailed recommendations for strengthening this machinery in numbers, training, supervision, etc., and for interim measures for improvement of agricultural statistics. The committee recommended cadastral surveys of the areas not yet surveyed, priority being given to unsurveyed pockets within large cadastrally surveyed cultivated areas. The committee standardized the classification of area and the various village forms prescribed for recording annual and other periodical agricultural statistics, thereby placing the statistics from different States on a strictly uniform and comparable basis. The committee laid down practicable procedures for recording area under mixed crops. It also made recommendations on scientific procedures for estimation of crop yields and preparation of crop forecasts, for compilation of statistics of holdings, harvest prices, agricultural wages, production of milk and eggs and other miscellaneous statistics. In regard to the F.A.O. census of agriculture the committee recommended that all items included in the start list proposed by F.A.O. should be collected by the method of complete enumeration and data on items in the expanded list such as additional particulars of holdings may be collected through random sample surveys once in five years with respect to only such items as are of relevance in the Indian context. The committee's report, *Co-ordination of Agricultural Statistics in India*, was published in September 1949.

With the First Five-Year Plan imminent and considering the needs of the plan for comprehensive, detailed and reliable statistics the committee had given a timely lead and the Indian Council of Agricultural Research prepared a five-year programme for systematic implementation of technical improvements in the field of crop

acres and yields, live stock numbers and their products and fish catches on the basis of the work that the Council had done so far and the Directorate of Economics and Statistics prepared several schemes for improvement of agricultural statistics under the First Five-Year Plan. With the initiation of the National Sample Survey in 1949 all these plans and programmes were swept overboard and in spite of the recommendations of the Agricultural Ministers' Conference and the detailed study of the Technical Committee, the 1950 F.A.O. census was actually conducted by the National Sample Survey as one of its sampling rounds in 1954-55 and the results which consisted of national totals and totals for groups of States were reported to F.A.O. in 1958. The termination of the work of the Indian Council of Agricultural Research in the field of improvement of agricultural statistics by transfer of the work to the National Sample Survey in 1952 has been mentioned already. The Directorate of Economics and Statistics also does not seem to have been able to get its schemes for improvement of statistics in the First Five-Year Plan implemented and many of its schemes in this field could not find a place in the Second Five-Year Plan. Even today about 86 million acres of area do not report any agricultural statistics and among those that are brought into the reporting category, statistics for 90 million acres are crude estimates. That no significant advance has been made in the improvement of agricultural statistics during the last decade would be a correct statement of the position. The recommendations made by the Technical Committee on Co-ordination of Agricultural Statistics remain as true even today for the simple reason that they have remained confined to the pages of its reports.

It is difficult to put down what the precise objectives of the National Sample Survey are. It was generally stated that the major objective of the organization was the quick collection and tabulation of reliable data needed by the Central Government at the national level for policy formation. Leaving aside the question of reliability for the moment, experience for ten years since the beginning of the Survey, during which its annual expenditure has reached nearly one crore of rupees from the initial figure of 25 lacs of rupees, shows that there is a lag of at least three years between whatever reports have been issued and the surveys to which they refer. It is probable that the major portion of the data collected so far has not seen the light of the day. It has also been stated that the National Sample Survey was organised at the request of the National Income Committee set up by the Government of India with a view to collecting the data for obtaining more reliable national income estimates. With regard to this objective, the National Income

Committee which consisted of Prof. P. C. Mahalanobis as Chairman and Prof. D. R. Gadgil and Dr. V. K. R. V. Rao as members observed in its final report in 1954: "So far it has not been possible to make significant use of the material thrown up by the survey for the national income estimation purposes. While our income estimates are computed partly by evaluation of production and partly by estimation of income, the N.S.S. data on these broad fields collected during the first round are neither adequate nor are considered sufficiently reliable; data collected in subsequent rounds have not yet been fully processed" and further, "It should be pointed out that in future also a large part of the requirements of national income estimation will have to be met through the data normally collected by various organs of the Government at the State and local authority levels. The N.S.S. by its very nature cannot replace this process." It would be useful to ascertain what other committees, commissions or government departments have found N.S.S. data satisfactory and adequate for their purpose.

Whatever its genesis, the National Sample Survey claiming to collect, through its own independent mobile agency, more reliable data than the *patwari* agency in the field of agriculture has created an atmosphere of lack of confidence in the *patwari* statistics in the minds of administrators and government authorities and has, thus, been responsible for bringing to a standstill, owing to a lack of support from these, all measures formulated earlier for improvement of agricultural statistics through a strengthening of this field agency. The notion has been propagated that sample data at national level are sufficient for policy-making at the Centre, that the National Sample Survey will provide these reliably and expeditiously and that the States should be left to collect their own statistics as best as they can, the latter being no business of the Centre. The main weakness in this approach, apart from its wastefulness, is the difficulty of reconciling the Central and the State statistics as the latter must total up to give the former. No explanation has been forthcoming to answer this difficulty. Since agricultural statistics account for over 80 per cent. of national statistics, it must be considered unfortunate that the National Sample Survey was conceived in a spirit of basic distrust of the *patwari* statistics. This must be ascribed to the Survey having originated at the Indian Statistical Institute which, by a geographical accident, is located at a point far from centres of established *patwari* organizations in India and the founders of the Survey did not have the benefit of being exposed to a close contact with the operational techniques of the *patwari*. With his multifarious duties everything that the *patwari* does cannot be

defended as being correct and it is, therefore, easy enough for laymen to generalize and condemn roundly everything that he does. That such criticism is born of ignorance and is not applicable to several types of agricultural statistics which the *patwari* produces such as those of land utilization, crop acreages or live-stock numbers, but not others like crop yields, has been verified through several carefully conducted checks.

It was natural that the National Sample Survey in launching upon its tasks should have begun with an attack on the *patwari* statistics of crop acreages with a spot check of the *patwari* records for the year 1949-50 in several States. The object was to put the *patwari* in the wrong, if possible by assuming his records to be 100 per cent. correct, and "obviously the best plan in the situation was to check those villages or plots which were difficult of access and were thus likely to show the worst results", and consequently, "in choosing villages care was taken to select if possible one which was out of the way and remote from the residential village of the *patwari*". The investigation came out with the astounding result that cash crops like sugarcane, linseed, etc., were underestimated by the *patwari* by more than 50 per cent. and wheat was overestimated by 15 per cent. These impressive results fitted well with the criticism of the Grow More Food Campaign which was current then that the increase in area under food-grains was fictitious and brought about by the *patwari* by under-recording cash crops and over-recording the area under food-grains. Critical examination of the report of the spot check by statisticians familiar with the land records system in the different States showed clearly that apart from a deliberately chosen biased sample, the inaccuracies in the results were mostly due to the ignorance of Land Records Rules on the part of the investigators and the real error in the *patwari* records was small. For example, sugarcane is prescribed as a *kharif* crop in the *Land Records Manual* and although it is planted in the months of January-March, it is entered in the *patwari's* crop register only at the time of *kharif* crop inspection in September-October. The investigator noticing the crop in the field in April and finding no entry to the effect in the *patwari's* register bagged it as his mistake. Again linseed is largely grown as a minor mixture with crops like wheat and Land Records Rules in Uttar Pradesh lay down that areas under such mixtures should be recorded only under the major constituent and an allowance subsequently made for the minor component when computing acreage figures for different crops. If while initiating the spot check the authors were not aware of these provisions in the land

records procedures, at least the staggering magnitude of error, frequently to the extent of 90 or 100 per cent., reported by the investigators, might have persuaded them to probe further into such discrepancies. We may add in passing that in respect of the same year, 1949-50, the report of the first regular round of the National Sample Survey concluded that the all-India official estimate of area under wheat was underestimated by 14 per cent. The National Sample Survey has not ceased its excursions into the *patwari* statistics even now. It is learnt that the results of its latest efforts, no doubt unexpectedly for the Survey, fully vindicate the high reliability of the *patwari* statistics, as the National Sample Survey estimates for all-India area under food-grains are reported to be within 5 per cent. and 3 per cent. of the official statistics which are largely based on the *patwari* data, for two successive years.

This is not surprising. The Indian Council of Agricultural Research had verified through carefully conducted sample checks in several areas that the land utilization and crop acreage statistics compiled by the *patwari* were remarkably accurate considering the scale of operations. As an example, one of the criticisms of the Growth of Food Crops Act promulgated in Bombay State in 1944-45, under which cultivation of cotton was restricted, was that the *patwari* deliberately showed area under cotton as being under food-grains. A sample check was carried out over one district each in Gujarat, Deccan and Karnatak regions of the State in respect of the 1948-49 acreages, soon after the crop inspection data had been entered by the *patwaris* in the village registers. In none of the districts, did the recorded area under cotton differ from actual area as inspected and measured during the survey by more than 0.6 per cent. The reason why the *patwari* statistics have been satisfying these rigorous tests is that the system is practically fool-proof.

It is alleged that the *patwari* neglects to visit fields for crop inspection and compiles his statistics at home. Even if this is true sometimes, the crop acreage statistics are not necessarily vitiated, because for each survey number the precise area measured by cadastral survey is entered in the village register and the *patwari* has only to fill in the name of the crop grown in each survey number in a particular season. With his status, his local knowledge of agriculture and personal contact with the cultivators, the *patwari* can secure this information easily from the cultivator concerned or his neighbours, even if he does not see the crop for himself occasionally. For this reason also, the *patwari* can be a far more reliable source for collecting a variety of socio-economic statistics for the villages in his charge than a casually visiting investigator belonging to the mobile field staff of a sample survey. Being a highly

decentralized and locally established machinery subject to a hierarchical departmental control, the chances of slipshod field-work or deliberate manipulation are very much reduced as compared to the peripatetic agents of a highly centralized sampling organization, as Prof. Gadgil remarks in his foreword to the *Report on the Poona Schedules of the National Sample Survey*. A recent analysis of the role of the *patwari* in the village life, of the great variety of data found in the *patwari* records, the complexity of the record system and the strong and weak points of the data, are due to an American investigator, Oscar Lewis. One of his major findings is: "The records are on the whole reliable and of great value for getting background information of the agricultural economy as well as on some elementary aspects of village social organization. Much time can be saved by an investigator who has some previous knowledge of the content and organization of the *patwari* records. It is hoped that with the aid of this guide a field-worker can get the necessary data in two or three days of work instead of two or three weeks."²

We are constrained to remark that with the ever-increasing pressure of work for all government departments, the *patwari* machinery is showing evidence of obvious strain in its statistical work in places. The Technical Committee on Co-ordination of Agricultural Statistics had recommended, more than ten years back, steps for strengthening this agency and with the increased tempo of planning this need should be correspondingly more urgent. With continued apathy and neglect through our preoccupation with experiments like the National Sample Survey, we may find this unique apparatus which has served India's agriculture well through centuries becoming useless as a source of data of our rural economy, at a time when with sufficient reinforcement it could serve the needs of planning in agriculture as no other agency could, and future generations can blame us rightly for allowing this valuable legacy of the past to decay.

The merits of sample survey as a source of collecting reliable data are recognised universally; but it is important for exploiting this modern tool efficiently to define the objectives of the survey clearly and to set down explicitly the items on which quantitative information is sought to meet these objectives and the margin of error permissible in the numerical estimates for the different items derived from the survey in relation to the use to which these estimates are to be put; for unlike a complete census, a certain amount of error is unavoidable in the results of a sample survey. It is then possible to look for an appropriate frame

² Oscar Lewis, *Village Life in Northern India*, University of Illinois Press, Urbana, 1958.

and design the sample with the aim of keeping the error of the results within specified limits. A multi-purpose sample survey suffers from the very multiplicity of its purposes in this respect. A single rigid sample cannot provide results on all the large number of items, occurring with widely varying frequencies in the population sampled, on which data are sought to be collected with the desired level of precision. However large the sample, items which occur with low frequencies or are distributed heterogeneously in the population cannot be estimated within the requisite margin of error and estimates of such items are of little use for further study. At the other extreme items which are common and are evenly distributed will be determined with an excessive degree of precision which also represents a waste of resources. Again, with the multiplicity of purposes, it is impossible to collect sufficiently detailed information for individual purposes and research workers and others who look for data for a specific item or a group of items in which they are interested find the results of the multi-purpose survey sketchy and disappointing. The National Sample Survey is the most ambitious multi-purpose survey imaginable. In the rural sector, it visualizes an integrated operation for collecting information relating to agriculture, population, cottage industries, retail trading and other sectors of national income. Further, since it is an all-India survey, it is considered desirable to collect important sociological and demographic information in addition to the purely economic, as such information is of great value for national planning. In keeping with these general objectives, the main inquiry included questions on hundreds of items of all kinds concerning the family, its composition, occupation, employment, earnings, productive expenses, loans, land, land utilization, cost of production for different enterprises (agriculture, live-stock, crafts and industries), financial intermediaries and distributive trades, family gudget covering details of consumption, expenditure and housing and economic condition of the village as a whole. The family schedule alone seeks data in respect of over 300 items divided into some 50 groups.

The wide range of precision of the results obtained under these conditions is illustrated by the standard errors tabulated for some 117 selected items in the *Second Report on the Poona Schedules of the National Sample Survey*. The frequency distribution of the percentage standard errors of the means for these items at the all-India level on a sample of approximately 600 villages is as follows:

Per cent. standard error up to	5	—10	—20	—30	—40	—50	>
No. of items	22	37	35	14	6	2	1

The margin of error of the estimate which is three times the standard error was more than 50 per cent. of the average for 31 items and out of these it was higher than 100 per cent. for 7 items. Only 40 items had error margins of less than 25 per cent. On the general utility of the results of survey the report concludes, "The state estimates are liable to sampling errors several times larger. It might be thought, therefore, that the utility of these estimates was extremely limited for a study of any specific regions or for inter-regional comparisons. They are also designed to throw little light on the activities of specific economic groups. On the other hand, the margins of errors of most of the estimates, even on an all-India basis, are many times larger than the annual changes one might expect in them. They would therefore prove of little value in assessing annual change". Even if the total sample of villages is three times the number canvassed by the Poona schedules, the margin of error will be reduced $1/\sqrt{3}$ and the broad conclusions regarding the utility of the results will not alter.

More than sampling errors, it is the measurement and observational biases, the so-called non-sampling errors, that distort and frequently vitiate the statistics collected for a large unorganized population such as the rural sector of economy in India. Here the sample survey is at an advantage over complete enumeration in many cases, because of the possibility of ensuring more accurate measurement and observation by selection of enumerators with an appropriate background and familiarity with the subject-matter, field and local knowledge and by giving them intensive training in field-work. They can also be supervised carefully by a small number of highly qualified supervisors. This is true when the sample survey is confined to a particular field and has well specified objectives requiring the collection of data on a limited number of inter-connected items. This advantage is, however, lost when the survey is multi-purpose and covers wide fields of economy, sociology and demography, requiring the investigator to record data on hundreds of items extending over a diverse range of topics. It is unthinkable that persons with any acquaintance with the whole range of the inquiry can be found to work as investigators or supervisors or can be trained to gain a reasonable insight into the technological, economic and other background of fields in which they are to collect data. Instead of recognizing this serious weakness of a multi-purpose survey, there is a growing tendency to insist that a multi-purpose investigator and statistician are capable of collecting and handling data in any field by virtue of their knowledge of 'Statistics', whether these data concern area and yield statistics of crops, village industries, social institutions,

financial questions, intricacies of marketing or costs of production, employment, health, education or any other human activity. Such an attitude is bound to make statistical work superficial and to have disastrous consequences on the quality of data collected. We have already referred to the results of spot check of the *patwari* records organised by the National Sample Survey which is an example of what happens when field investigators and directors of a survey do not know the rules of the game. Investigators, unfamiliar with live-stock, are reported to have recorded a substantial proportion of milk yielding cows and breeding bulls under one year of age. Again in a multi-purpose survey covering a wide range of topics and involving hundreds of items, interview is the only feasible method of collection of data which are susceptible to large biases arising from this method. The respondent, partly out of ingrained suspicion of any inquiry especially by a casual visitor and partly out of lack of a quantitative appreciation of his activities or lack of memory when the period covered by the inquiry is long, gives replies which appear plausible but deviate systematically from truth, and the investigator in his ignorance of probable dimensions of real quantities records them without any scrutiny. Appropriate methods of ascertainment of data suited to different items, including physical measurement where necessary, are as important as the proper selection of the sample in obtaining accurate results from surveys; but a multi-purpose survey leaves no choice in the matter of methods. A glaring example of serious biases introduced by the interview method is given by estimates of production of food-grains for the year 1949-50 included in the report of the first round of the National Sample Survey. This estimate was arrived at in two ways, by asking the cultivator households how much of different food-grains they produced during the year, and by calculating the consumption requirements of the population by asking sample households how much of different food grains they consumed during the year and making allowance for imports. The first method gave a figure of 38 million tons leaving small quantities of lesser millets, which was dismissed in the report as being quite absurdly low, while the second method gave a figure of 60 million tons which the report has taken great pains to justify and to criticize on that basis the official estimate of production of 49 million tons as being an underestimate. Actually the degree of underestimation should be still greater if it is recognized, which the report fails to do, that the official estimate is of gross production while the National Sample Survey estimate of 60 million is of net availability for human consumption after deduction of losses, seed requirements, animal feed, etc. If allowance is made for these, the latter estimate would be nearly 69 million tons. It has

to be noted that the official estimate was largely based on crop cutting surveys. This, added to the fact that imports of the order of 3 million tons from abroad were absorbed annually in the Government's efforts to meet rationing commitments and had served a real need, leads us to the conclusion that the real production was closer to the official figure than to the National Sample Survey estimate of 69 million tons.

An amusing piece of evidence adduced in the report to justify the estimate of consumption of food grains is that the consumption estimate for salt of 2.43 million tons in 1949-50 arrived at from the survey was in a strikingly close agreement with the supply figure of 2.46 million tons. Even if the National Sample Survey estimate of salt consumption is correct, it does not necessarily follow that its estimate of food consumption is also correct. Unlike food-grains, salt is not produced by the villagers, but is purchased by them. Secondly consumption of salt is limited to certain quantities and is not liable to fluctuation to which food consumption is. In fact, however, it can be shown that the National Sample Survey estimate of salt consumption was itself an overestimate and that the human consumption of this commodity was within 2.1 million tons in the year 1949-50. Another evidence, which was more worthwhile, was comparison between the West Bengal estimate of production of 3.7 million tons of food-grains based on crop-cutting surveys and sample estimate of 4.03 million tons based on the National Sample Survey taking into account a net rationing off-take of 0.4 million tons from Government stocks. A close agreement was shown between the two. Here again the important point that the crop survey estimate is a gross estimate while the consumption estimate is a net figure has been lost sight of. When this is taken into account, the National Sample Survey estimate can again be shown to be an overestimate. It is not really surprising that the interview method should result in statistics of production of food-grains which are underestimates and statistics of consumption of food-grains which are overestimates. Apart from the universal tendency of the respondent to give lower figures of production, income, returns from enterprises, etc., and inflated figures of consumption requirements, costs and investments, Government procurement and control of prices of food-grains which was in operation then would provide a special incentive for understatement of production and overstatement of consumption needs of the household. The psychological ground is the same in both cases.

It is reported that the National Sample Survey is now switching over to objective methods of estimating crop production involving crop-cutting surveys. Experience has, however, shown that the N.S.S.

type of organization with an *ad hoc* moving field staff is inherently incapable of employing this technique successfully. The experience of the Indian Statistical Institute in crop surveys in Bengal and Bihar of which the projected efforts are presumably extensions itself leads to this conclusion. The organization and results of the Bengal and Bihar crop surveys have been discussed at length in two articles entitled "Crop Surveys in India" published in the *Journal of the Indian Society of Agricultural Statistics* by Sukhatme and Panse (1948 and 1951) and the basic weakness of the approach involving *ad hoc* moving field staff has been clearly brought out as the main factor for their failure. Prof. Mahalanobis had recognized this weakness when, in explaining the difficulty of crop-cutting work with such staff in Bihar, he stated, "After struggling with this problem for many years, it is becoming clear that crop-cutting work to be done properly must be carried out by a comparatively larger number of investigators, who could watch the crop as it grows and collect sample cuts at the right time from the fields situated in the neighbourhood of their normal places of residence".³ He made similar observations in his report on the Bengal crop survey. It is, therefore, difficult to understand why the National Sample Survey should want to try this admittedly unsuitable approach on a large scale. The use of small plots which alone is possible for a rapidly moving field staff and the loss of an appreciable proportion of originally planned sample cuts due to the investigator having arrived at the spot either too early or too late for harvest, generally lead to large biases in the results. The solution of the problem of estimation of agricultural production lies in extending to the whole country and to all important crops the approach developed and demonstrated successfully by the Indian Council of Agricultural Research over several years and in strengthening the primary field agency for this purpose.

As stated earlier the collection of data on cost of production of different enterprises in agriculture, animal husbandry, rural industries, etc., is an important part of the National Sample Survey and the respondent biases that vitiate estimates of agricultural production secured through the interview method, will affect the information on costs of production much more seriously. The respondent will suffer more from lack of memory and will tend to inflate items of input and deflate those of outputs so that the results will be of little value for national income estimation or any serious use. This is not speculation. Just such biases were revealed in a comprehensive investigation carried

³ *Sankhya*, The Indian Journal of Statistics, 1946.

out in different regions of India for three years under the auspices of the Research Programmes Committee of the Planning Commission to compare two methods of collecting data for estimating cost of production of crops. One method consisted in locating an investigator in a selected village on a whole-time basis to record on sample farms field operations and other items by daily physical observation. In the other method the investigator paid periodical visits—3 or 4 times a year—to selected villages and interviewed farmers of selected holdings to obtain data for cultivation and other operations since his previous visit. It should be noted that the investigators who did the field-work in this investigation were trained men with an agricultural background. The investigators employed for the interview method had an additional qualification in agricultural economics. The interview method gave appreciably higher estimates of total inputs and of individual components like human and bullock labour. The quality of cost of production data that would be collected among other several items by the general investigator of the National Sample Survey can well be imagined. Here also the misleading nature of the comparison between two half-samples, which is a favourite device of the National Sample Survey, will be well brought out, for even if a close agreement is shown between the two half samples, which is frequently the case with large samples, this cannot be interpreted as a demonstration of the reliability of the data, for, both samples will be equally susceptible to large respondent biases.

The National Sample Survey could have discovered the various inherent difficulties in the efficient prosecution of a large scale multi-purpose survey, which have been briefly referred to above, by pilot investigations of limited size in different regions which is the normal scientific approach to problems of this kind. This would have saved large funds for permanent improvements in the statistical system and as far as agricultural statistics is concerned, would not have held up directly or indirectly these improvements over the last decade.

The National Sample Survey has been applauded periodically by statisticians in England and the United States as being unique in its conception, organization and scale of operations, which it certainly is. It is interesting to note that these advanced countries have not thought it worthwhile to establish a single multi-purpose sample survey as a source of all their national statistics. The nearest that United States came to it was in developing a master sample of area, which, it was hoped, would provide a ready-made base for all kinds of surveys; but as far as one can judge this master sample is languishing in its files without any use. The recognized principle is that each administrative

department organizes surveys with specific objectives in its particular field according to its needs and these are carried out by personnel specially trained in this field. An excellent example is that of the current United States national health survey projected by the U.S. Department of Health, Education and Welfare. Although this country-wide project is limited to the subject of health, it is important to note that "the survey is not a single survey with a single method and a fixed set of objectives. Rather it is a programme of surveys, using different approaches and having changing end objectives as both the techniques and the needs for data evolve". It is also interesting to observe that as a check on interviewer variation and bias, no interpenetrating half-samples are employed, but for one-sixth of the sample households reinterviews are conducted by highly trained regional field supervisors, a method akin to rationalized supervision which we have recommended for agricultural statistics. In England, the Social Survey is a government organization for sociological research as a part of the Central Office of Information and is engaged in carrying out sample surveys with well-defined limited objectives, on social and economic topics. It does not select its own fields of work but every separate survey which it undertakes for government committees, departments, etc., has to go to the Treasury for authorization. Examples of surveys this organization has done, are studies of consumer shortages owing to war-time and post-war rationing, occupational mobility, the depopulation of rural areas in Scotland, family expenditure in particular sections such as clothing, domestic capital goods, etc. This is a very different situation from the omnibus National Sample Survey in India.

Looking back on the decade completing itself this year, it must be regarded as an unfortunate coincidence, at least as far as agriculture is concerned that the National Sample Survey emerged about the same time as planning commenced in India at the beginning of this decade. It is reasonable to assume that planning in agriculture, *i.e.*, careful preparation of the inventory of our agricultural resources, setting up targets of production and deployment of these resources among millions of producers in such a manner that they may be used in an optimum measure for the achievement of targets in a vast country like India, would require far more detailed and comprehensive agricultural statistics than we have at present. The Technical Committee on Co-ordination of Agricultural Statistics had foreseen this need. Its recommendations including a quinquennial census of agricultural holdings were geared to the purposes of planning. But so great has been the influence on our thinking of sample statistics which the National Sample Survey

promises to provide at the national, not even State, level, that the need of detailed statistics, penetrating to small areas for the sake of planning is seriously questioned. Some concede that such detailed statistics, including a census of agricultural holdings, may be useful, but consider them too laborious and expensive to collect. Such attitudes reveal a complete lack of appreciation of the real dimensions of effort required for effective planning in agriculture under our conditions, compared to which the effort required for collecting basic data required for such planning is almost insignificant.

Planning in agriculture during the first two Five-Year Plans has been confined to the national level. The agricultural plans have consisted of a set of development schemes formulated by consultation between the Centre and the States. A lead is given to the States by indicating overall resources and targets and State schemes are then fitted within this framework. Such planning from top, without taking account of the resources, needs and limitations of individual areas, let alone of the ultimate individual units of agriculture, the cultivators can, at best, have only a limited influence on agricultural development and cannot in any case lead to an optimum utilization of available resources. Although no critical appraisal of the results of the First Plan or of the progress of the Second are available, there are sufficient indications to show that planned achievement is limited. Of the increase of 7.6 million tons in food-grains anticipated in the First Five-Year Plan, rice and wheat were expected to account for the bulk. This expectation was natural since the plan schemes on irrigation, improved seeds, fertilizers, etc., were mostly concentrated on these two cereals. Actually, however, the largest increase occurred in millets and other minor cereals. This was obviously a non-planned increase and has to be ascribed to weather and other factors. The target for rice was not fulfilled and we may add that in several important States, U.P., Bihar, Madhya Pradesh and Bombay, there was no perceptible increase in the yield of rice per acre over the plan period. Although targets for wheat are stated to have been fulfilled, there was no significant increase in Bihar and the increases in Madhya Pradesh and Bombay are largely due to natural factors, as there were serious rust epidemics in these States during the pre-Plan quinquennium which had pushed their yield to an abnormally low level.⁴ The Agricultural Administration Committee put the matter differently when it recorded, "At present we have a spectacle of financial targets being fulfilled without the proportionate additional production

⁴ V. G. Panse, "Recent trends in the yield of rice and wheat in India," *Indian Journal of Agricultural Economics*, Vol. 14, 1959.

being realized." The laxity in the present method of planning is also brought out by the report that the increase of 15 per cent. in food production which had been worked out and finalized for the Second Five-Year Plan was suddenly raised to 24 per cent. without any corresponding change in the resources and the States were asked to recast their plans accordingly.

A continuation of this situation through ten years of planning is strange when the country has been gradually divided into community development blocks which are recognized as the area units for planning and execution of planned development and this process of setting up development blocks is to be completed by 1963 over the entire country. No doubt the need for planning from below was accepted when writing the Second Five-Year Plan which stated, "Despite the uncertainties to which agriculture is necessarily subject, it is important that a more studied effort to introduce a planned approach to agricultural development should be made," and again, "Each district and, in particular, each national extension and community development project area should have a carefully worked-out agricultural plan. This should indicate for villages the targets to be aimed at, the broad distribution of land between different uses and the programme of development". The same sentiment is expanded in the *Draft Outline of the Third Five-Year Plan*. A section is devoted to 'block as a unit of planning and development' and it is stated that the question of treating blocks in this manner has been under consideration for some time and that the State plans in agriculture are proposed to be formulated on the basis of block and district plans. In fact, while tentative agricultural targets are given in the draft of the Third Plan, it is added that the final targets will emerge when detailed agricultural plans for villages and blocks are formulated. Actually nothing like this detailed planning was done for the Second Five-Year Plan which followed the pattern of the First Plan and in spite of the more definite proposals in this direction for the Third Five-Year Plan, it is extremely doubtful whether this plan will differ from the previous two in its structure, namely as a set of schemes prepared at the national and State levels, without being significantly influenced by block plans based on the needs and potentialities of local areas.

We are not interested here in comparing the two approaches to planning and how they should be dovetailed into each other. The subject has been dealt with in a most illuminating address delivered by Prof. Gadgil at the 13th Annual Meeting of the Indian Society of Agricultural Statistics in January 1960. It is now recognised that for formulation of realistic targets and for optimum utilization of resources

for the achievement of these targets, formulation of detailed plans for local areas, viz., blocks, reaching down to individual villages on the basis of their particular environment, is an essential step. A prerequisite, among others, for giving effect to this aim is availability of detailed agricultural statistics for blocks and individual villages constituting the blocks, which alone can provide a firm base for village and block plans. These statistics include land utilization, crop acreages, live stock, extent and sources of irrigation, irrigated crop areas, extent of drainage, agricultural population and agricultural labour force and crop yields at the block level. Important among the statistics required is information on the ultimate units of cultivation, the cultivators' holdings. Their number, fragmentation, size, tenure, cropping pattern, irrigation, availability of human and animal power and machinery are items of this information which are necessary for formulation and implementation of block and village plans. It is surprising that even the Third Five-Year Plan which underlines the need for such plans is silent about these requirements which is the reason for our fear that the Third Plan will also go the same way as the two earlier went.

A few examples will show why planning from below is essential for optimum utilization of national resources and why detailed statistics are a prerequisite for such planning. Take reclamation of fallow land for cultivation. Mere national or State totals of fallow land cannot help in formulating an effective programme of reclamation. A certain ratio, determined by a complex of environmental factors, of fallow to cultivated area, is a vital necessity for each village community for grazing its live-stock and for other purposes. It is only the surplus fallow land above this ratio that can be considered for reclamation and its extent can be determined only by careful inquiry for individual villages and their needs. In the absence of this basis, a general target set up for reclamation of fallow land from national and State totals and an indiscriminate drive for its achievement may even have adverse effects on agricultural production by increasing the already pressing cattle menace on crops. Data on crop acreages, and the extent to which they are irrigated, are necessary to formulate requirements of improved seeds, fertilizers, pesticides, etc., of each village and of the whole block. For an optimum disposal of these supplies among farmers, classification of cultivators' holdings according to their size, cropping pattern, irrigation facilities and so on is necessary so that different classes of holdings get the aids according to their needs and their capacities to utilize them. It is likely that the small subsistence farmer can utilize improved seeds more easily while fertilizers in their present short supply may be concen-

trated more effectively on larger holdings. Credit is, perhaps, the most basic need of our agriculturists and any reasonably accurate estimation of this requirement and its distribution, where it is needed most, is entirely dependent on the knowledge of number and classification by relevant characteristics including the kind of tenure, of the cultivators' holdings in an area. The pattern of co-operative activity and its extent for any area is also determined by the structure of agriculture in that area as indicated by the characteristics of the holdings. In short, an effective plan for agricultural development for an area should be geared to the needs and potentialities of the area as revealed by agricultural statistics of that area. An important aspect of these statistics is the enumeration of holdings by their chief features which will enable the local plan-makers and extension workers to classify them into broad types for defining the correct approach to them at the stage of planning and implementation.

Such data cannot be secured by sampling. As the F.A.O. programme for the World Agricultural Census, 1960, puts it, "If data are needed for very small administrative units as a basis for regional planning or in order to provide bench-mark information for current agricultural statistics, sampling methods may be uneconomical and complete enumeration unavoidable except for items which do not lend themselves to complete enumeration". It is because the smaller are areas for which and the greater the detail with which statistics are required, the more disproportionately large is the sample size necessary for accuracy. Fortunately we have in the *patwari* agency a unique apparatus for the collection of these data by complete enumeration, over a greater part of the country. Much of the data are already available in the village records and these have to be compiled at the block level village by village. Other data which are on a field-to-field basis have to be reorganized by operational holdings. This last item would need a special effort including a certain amount of spot verification under careful field supervision. This work also can be done best through the *patwari* and the field staff of Revenue and Land Records Department. A census of holdings should be carried out for this purpose at the beginning of each Five-Year Plan period which was the recommendation of the Technical Committee on Co-ordination of Agricultural Statistics. We shall, thus, have certain statistics like land utilization, crop acreages, irrigation, yield, etc., annually for each village and block and a quinquennial census of holdings. Apart from their chief function of providing the foundation for realistic planning, these data will also serve as the bench-mark against which the progress of the Plan can be measured. This assessment

which is a vital aspect of planning is today confined to the progress of expenditure. In addition to the regular collection of agricultural statistics annually or at longer interval, some *ad hoc* surveys and investigations would be required in relation to the various aspects of planning. Questions of demand and supply of credit, extension of co-operative activities, consolidation and other land reforms, acceptance of improved practices by farmers, etc., will need to be examined. For this purpose also the *patwari* and other locally-stationed rural agencies like those of community development from the most useful fieldstaff by virtue of their local knowledge and personal contact with the villagers, rather than a centralized moving agency like that of the National Sample Survey.

We have explained in the preceding pages the crucial role that the *patwari* can play in providing the detailed agricultural statistics which are an essential requirement for raising our agricultural planning to a new and more effective level from the present status of a set of schemes. No centralized sample survey organization can meet the need. Any expenditure incurred for enabling the *patwari* to play this role is small compared to the issues at stake. It should also be remembered that, unlike a purely statistical agency, the *patwari* can provide the statistics that we need at marginal cost, for he is concerned primarily with land records and in all matters of land reforms. The strengthening of this agency by setting it up where it does not exist, by reducing its jurisdiction where it is heavy and by rationalizing its work, was recommended as early as 1949 by the Technical Committee. All that has happened since then is that the *patwari* has been taxed more and more by various departments and at the same time condemned for being unreliable, while little thought has been given to the strengthening of his resources. A fresh assessment of the needs in view of the increase in the burden on his shoulders from various sources that has taken place during the past ten years should be made quickly and the necessary steps taken to reactivate the *patwari* agency to fulfil its tasks of land reforms and improvement of agricultural statistics. It is not yet too late to infuse new life into this age-old organization; but the longer we postpone it the more difficult and more expensive will be the process of regeneration and without the statistics which this agency can supply effective agricultural planning will remain a far-off goal. Any local planning done by *panchayats* and block development officials is liable to be lopsided without the aid of detailed and accurate data. We should, therefore, urge on immediate implementation of the two-fold programme of collecting agricultural statistics by blocks, villages and holdings with

such resources as can be marshalled and of strengthening of the *patwari* agency to enable it to discharge its responsibilities efficiently.

A period of ten years is sufficient even for an experiment of the size of the National Sample Survey to form a reasonable judgement of its potentialities. The conclusion, if it needed any experimental verification, is clear that no *ad hoc* central agency can be a substitute for departmental agencies and regional authorities with administrative responsibilities and consequent background of specialized knowledge of the subject-matter field, in building up a sound and permanent system of comprehensive agricultural statistics from the base, which is the cultivator, to the national level. The claim of such *ad hoc* agencies to independence is illusory as no agencies, particularly those depending on the Government for their existence, can be independent. Only the biases differ. The integrity of our statistics will, like all our activities, develop with our national character. Whatever the agency, the population to be enumerated and measured is common, only the agents making the enumeration and taking the measurements will differ. It is useless to suggest that agents belonging to one agency will be inherently more scrupulous or honest; but the balance of advantage lies with departmental and regional agencies because of the purposiveness of their activities, their administrative responsibilities and well-tested elaborate systems of field procedures subject to comprehensive supervision and counter-checks at various levels. It is time that processes of centralization started a decade ago, which have been gaining increasing speed and are weakening departments and authorities concerned with responsibilities for agricultural statistics, both in the Centre and States, are reversed to prepare the ground for agricultural planning on a new level. Prof. Gadgil came to this conclusion after a close and active association with the National Sample Survey and his views on the subject embodied in his foreword to the *Report on the Poona Schedules* and in his address to the Indian Society of Agricultural Statistics in 1960 merit careful consideration on the part of all those who are concerned with the future of agricultural statistics and of agricultural planning in this country.