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SUB-COMMISSION ON STATISTICAL SAMPLING

Addendum to Interim Report on Sample Surveys Carried Out  
in Different Countries

(Document E/CN.3/Sub.1/9)

Replies to the questionnaire on sample surveys have been received from Argentina, Czechoslovakia, Greece, Peru and Siam and United Kingdom, since the completion of document E/CN.3/Sub.1/9. Of these five countries, only Czechoslovakia and the United Kingdom had used sampling methods in various fields of enquiry. The descriptions of the surveys are given below.

/CZECHOSLOVAKIA

## CZECHOSLOVAKIA

The more important of the sample surveys carried out by the State Statistical Office of Czechoslovakia are described below:

(a) Statistics regarding agriculture, dairy, etc.

1. Milk Production: The survey of milk production which started in 1936 is done monthly on a sample basis. In each area 30 per cent of localities are selected at random and special reporters on milk production are appointed. There are about 2,500 such reporters in Bohemia and Moravo-Silesia. Each reporter, within his reporting district, selects at random 15 keepers of milch cows after classifying them into 3 groups according to size of their agricultural holdings namely, area under 5 ha., 5 to 20 ha., and over 20 ha., so that each of these types of holdings are represented in the sample. At the end of each month the reporters calculate the average yield of milk per cow on the basis of their figures and send the information by the fifth of the next month to the Statistical Office. The Statistical Office, on basis of the figures of farm animals maintained by them, estimates the total milk production by districts and provinces.

The estimates for quantities of goat milk are made on a similar basis except that only 10 per cent of the goat keepers of selected localities are included in the sample.

2. Egg Production: The surveys are organized on lines similar to those of the surveys of milk production. 30 per cent of the localities are selected at random. There are about 3,000 reporters. The reporters are requested to select from the farm animals census sheets of their districts, 15 per cent of the hen-breeders in such a way as to cover all the main types of breeders. The number of hens kept by the breeders and the average number of eggs laid, are reported every month, and on the assumption that the number of eggs laid daily is constant, the estimates for the various administrative areas and provinces are built up.

3. Production and stocks of cereals and potatoes: About 4,000 farmer respondents, scattered over Bohemia and Moravo-Silesia, send in their reports to the Statistical Office by the twenty-eighth of every month. Their reports refer to their own farms only. On basis of these figures, the estimates for the whole area

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(including about 1,000,000 farms) are calculated.

(b) Statistics regarding consumption and prices

1. Family living study: From the early months of 1947 a number of sample households have been selected to keep day-to-day accounts of their incomes and expenditures for a period of one year. By the end of June 1948, the number of households keeping such accounts amounted to only 642 although the planned quota was a thousand. The households were not selected at random because these respondents were volunteers, but amongst the volunteers the households were selected in such a way as to cover all territorial variations and, within these regions, both urban and rural districts, in due proportion. The enquiry has been limited to a number of non-agricultural occupational groups such as, industrial workers, traders and tradesmen, and pensioners.

2. Wholesale and retail prices: Eighty selected companies report the prices of selected articles, on the basis of which the index numbers of wholesale prices are calculated. For the calculation of cost of living index numbers, retail prices of foodstuffs, heating, lighting and other necessities, are collected from 403 selected localities. Prices of building materials and wages in building industry are also collected on a sample basis to calculate the building cost index numbers.

(c) Statistics regarding crafts and trades

An exhaustive enumeration of crafts and trades was made in August 1940 and sample investigations of the economic condition of the crafts and trades started in 1941 and continued until 1944. A network of selected respondents furnished information regularly.

A revised quarterly sample survey of the crafts and trades to collect information on sales, overhead charges, wages and salaries is expected to start from 1 January 1949. The sampling fraction will be about 10 per cent. The data will be collected by the district statistical staff who will be assisted by professional groupings of the trades. The samples will be selected after classifying the establishments into different size groups and into different administrative areas.

(d) Statistics regarding wages

Since 1941, quarterly surveys of wages have been carried out on a sample basis. The data collected refer to the number of working and clerical personnel by categories, hours worked, wages and salaries,

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during the week of investigation. All the enterprises have been classified by industries and within industries by wages regions. These have further been sub-divided into three groups namely, small, medium and large enterprises. Information is collected from selected enterprises within these groups by means of mailed questionnaires. A higher proportion of larger enterprises and comparatively, a lower proportion of smaller enterprises, are included in the sample.

(e) Statistics regarding population

No use has so far been made of sampling methods in relation to population statistics. Two examples where sampling will be used in the near future may be cited below.

1. Processing past records of vital statistics: The chronological series of vital statistics starting from 1875 down to the present was interrupted during the First World War. The unprocessed material on marriages, births and deaths for the years between 1914 and 1919 are however available. Due to lack of funds for analyzing all these data, a sample of the material will be taken for analysis.
2. Preliminary analysis in 1950 census: In order to satisfy as quickly as possible the demand for the results of 1950 census of population, a sample of questionnaires will be analyzed first and the results will be stepped up to indicate the position of the whole population. Results of exhaustive compilation will be published at a later stage. Experiments will be made with the results of the abridged 1947 population enumeration to decide on the method of sample selection.

Surveys by other agencies

1. Sample surveys by Ministry of Food: The Ministry of Food carries out investigations on a sample basis to collect information on the various aspects of food and nutrition. The following three investigations are examples of recent surveys:
  - (i) An enquiry into the consumption of vegetable and potatoes in 100 families in Prague - September 1947.
  - (ii) An enquiry into the consumption of meat, milk, eggs and cheese in 400 families in Prague in October, November and December 1947.
  - (iii) An enquiry into the sustenance of 200 juveniles in Prague in April 1948.

The investigations were carried out by trained female

investigators

investigators. The details of the method of sample selection are not available.

2. Surveys by the Czechoslovak Institute for Investigating Public Opinion: Czech speaking population having completed eighteen years of age is considered the universe for enquiry. The size of sample usually varies between 1,000 to 1,300. In selecting samples at random, consideration is paid to such aspects as regional characteristics, size of population of the localities, sex, age, occupations etc. Voluntary assistants, who receive training by correspondence courses and who receive quarterly premiums, act as reporters. The reporters select sample persons for an enquiry.

3. Surveys by the Institute of Agricultural Accountancy and Management: The Institute collects data on a sample basis, on agricultural problems mostly of economic character. The most important of these is an investigation, by day-to-day account keeping method, into the incomes and expenditures of farmers' and farm workers' households. Other kinds of investigations are concerned with the costing of agricultural produce, and the capacity and utilization of agricultural machinery. All the enquiries are done by special reporters who send their statements to the Institute.

## UNITED KINGDOM

The surveys described do not cover all the sample surveys undertaken by the Government Departments but should be regarded as illustrative of the work being done in the different fields of enquiry. The details of the surveys carried out by research institutes, either privately or under government grants, and by commercial and industrial concerns, are not included here.

### 1. Population

In past Censuses of Population, the last of which was taken in 1931, no use of sample techniques was made. The use of such techniques in connection with the next Census to be held in 1950 or 1951 is under consideration.

### 2. Vital Statistics

An example of sampling work in this field is the Survey of Sickness which has been carried out monthly since 1944. This enquiry is undertaken by the Social Survey, which is a Government organization set up during the recent war in order to undertake enquiries on social and allied subjects on behalf of other Government Departments.

#### Details of the Survey of Sickness

Samples of persons of age 16 or over are interviewed every month at the homes of the persons selected, and details are obtained concerning:

Incidence of illness, injuries and incapacity, including nature of illness, duration, number of medical consultations.

An analysis of these factors according to sex, age, occupation, etc. is made. Participation in the survey is entirely voluntary but refusals are so exceptional as to have no appreciable effect on the validity of the data.

Sample design: The administrative areas into which England and Wales is divided are stratified by region; and within region into rural areas and different sizes of urban areas. A sample of about 70 administrative areas is selected from the strata so formed; from each area so selected a sub-sample of individuals is chosen by withdrawing cards at equal intervals from the register of the local National Registration Office. The numbers of persons in the sub-samples are so chosen that each region - and within each region the rural areas and the different sizes of urban areas - is represented in the correct proportion in the final sample of individuals.

Sample size: A sample of 3,000 is selected; this is a sampling fraction of 1 in 10,000. A fresh sample is chosen each month.



2. Employment and unemployment

There are a number of examples of sampling work in this field; the first two cited below relate to the unemployment insurance scheme.

(a) Age-and-sex analysis of persons insured against unemployment in Great Britain

This example, whilst not of great intrinsic interest, is worth mentioning as an early application of sample techniques. The analysis has been carried out annually since 1924.

Prior to 5 July 1948, the insurance cards to which unemployment insurance contribution stamps were attached were forwarded each year at the beginning of July by the insured persons to the local office of the Ministry of Labour; blank contribution cards covering the succeeding 12-month period were issued by the Ministry of Labour office in exchange.

The stamped cards at local offices were bundled in hundreds and forwarded to a central office. Here two cards were selected from each bundle, one about one-third and the other about two-thirds the way through the bundle. From this 2 per cent sample of cards (covering about 300,000 persons) an age-and-sex analysis of persons insured against unemployment was obtained.

(b) Analysis of insured employed persons by industry (Great Britain)

In the past, the unemployment insurance cards exchanged annually at the beginning of July have been classified according to the industry in which the insured person has been employed. This analysis (which covered 100 per cent of the cards exchanged) formed the basis of the statistics of employment in the different industries.

Under the new National Insurance scheme, which came into effect on 5 July 1948, the annual exchange of old stamped contribution cards for new blank cards will not take place at one particular date in the year. In order to spread the load of work more evenly throughout the year, one-quarter of insured persons (i.e. about 6 million persons) will exchange their cards annually in July, one-quarter will do the same annually in October, one-quarter in January, and the remaining quarter in April - a "staggered" exchange of cards. As a result the industrial analysis of insured persons at each of the four exchange dates in each year will be based on a 25 per cent sample of the insured persons' cards.

Method of allocating cards to the four exchange dates

At the last exchange under the old system, the cards of insured persons which were handed in were allocated to the four exchange dates (July, October, January and April) in a systematic manner; thus the 1st, 5th, 9th.... cards in the stack were allocated to the July

### Sampling errors

The error in the estimate of employment in a particular industry at any exchange date will depend on the size of the industry in question. For an industry employing 50,000 persons the standard error will be of the order of  $3/4$  per cent.

By averaging the estimates of employment at the four exchange dates an estimate is derived of average employment at the four dates, and the errors attaching to such an estimate will be substantially smaller than mentioned above. The errors in this case are dependent on the size of industry under consideration and on the mobility of labour from one industry to another; if in fact mobility is zero, the errors are zero for all industries.

#### (c) Employment in the building and civil engineering industries in Great Britain

The building and civil engineering industries are organized in a large number of small units. The total number of male operatives aged 16 and over employed at the end of each month is determined from a sample of firms, the first sample being taken in September 1945. (In addition there is a quarterly census of all firms at which information on other matters besides employment is requested). The census and sample returns are made by postal schedule.

Sample design: The universe of firms is stratified according to the number of male operatives employed at the date to which the most recent census refers. Optimum sampling fractions are employed, varying from  $1/1$  (100 per cent sample) for large firms to  $1/100$  for the small firms. About 6,000 firms out of 120,000 are approached, of which about 90 per cent respond.

Sample error: The standard error of the estimate of total employment is of the order of  $1/2$  per cent.

#### 4. Industrial production

An example of a sample survey in this field is the monthly enquiry amongst firms in the clothing industry in Great Britain, undertaken since 1946 by the Board of Trade. Here again the industry is organized into a large number of firms (about 14,000), of which about two-thirds employ 10 or less workers. The data returned on the postal questionnaires relate to (a) consumption of different materials during the preceding month, (b) stocks of these materials at the end the month, and (c) sales of different types of garments.

The universe of firms is stratified by (a) the firms' principal product (nine strata), and (b) the number of workers employed at a base date. Sampling fractions varying from  $1/1$  for the large firms to  $1/50$



From the data supplied by a sample of 300 firms, indices of usage and stocks of the different materials, and indices of sales of different types of garments are calculated. The size and design of the sample are at present under review with the object of reducing the sampling errors to which the indices are currently subject.

#### 5. Agriculture

In the example to be quoted - the National Farm Survey of England and Wales of 1941-43 - information was obtained from every member of the population (i.e. from every farm or agricultural holding), and sampling was used merely for the evaluation of national and county aggregates and averages etc. The primary aim of the survey was to assist the administration of the local committees set up to direct the war-time food production campaign; the analysis of the returns to give national and county totals was not the primary aim.

Information collected: From each of 300,000 holdings (of 5 acres or above) information was collected on the following subjects (inter alia):

- A. Nature of tenure (tenant or owner); length of occupation.
- B. Rent of holding or, in the case of an owner-occupier, the estimated rental value.
- C. Nature of soil.
- D. Conditions of farmhouse, buildings, roads, fences, etc.
- E. Infestation by animal and insect pests and weeds.
- F. Type of water supply, and of electricity supply (if any).

For some of this data the field worker had to use his judgment on matters not susceptible of easy quantitative measurement.

The information from the Survey proper was combined with that derived from the agricultural census return of 4 June 1941; this gave details of the numbers of livestock and acreage of different crops on each holding.

Sample design: The universe of survey returns was stratified by counties and within counties by acreage of holding. The sampling fractions were dependent on the size of holding only, varying from 1/1 for holdings of 700 acres and above to 1/20 for holdings of 5 to 25 acres. The sample contained 40,000 holdings, or 14 per cent of the population.

Information deduced from the statistical analysis

Much of the analysis was done separately for each county and gave information on such matters as:

distribution of holdings by acreage;

/proportions

proportions of holdings occupied by tenants and by owners;  
average rent per acre for different sizes of holding;  
distribution of holdings by number of farm cottages;  
proportion of holdings with electricity.

The sampling errors vary for the different items of information derived, but were not considered to be sufficiently large to render invalid comparison between different counties.

Note: Fuller details of the Survey are given in "National Farm Survey of England and Wales 1941-43, A Summary Report". Published by H.M. Stationery Office, 1946.

#### 6. Capital expenditure by industry in Great Britain

Hitherto little or no information on capital expenditure by industry has been available, though questions on this topic are to be incorporated in future Censuses of Production. In the meantime the Government Departments concerned are proposing to undertake a sample survey in certain fields of industry (notably in manufacturing industry) to ascertain past capital expenditure; the first survey, which will be carried out by means of a postal questionnaire, will ask for expenditure in the year 1947 analyzed between (a) building and civil engineering work; (b) plant and machinery, and (c) vehicles.

Sample design: The universe of establishments will be stratified (a) by the number of workers employed at each establishment, and (b) by broad industry groups. Sampling fractions will vary according to (a).

Size of sample and sample error: It is proposed to include about 3,000 establishments in the first survey, representing perhaps 4 per cent of the field to be covered in the first enquiry. It is thought that the final estimate of capital expenditure may be subject to a standard error of the order of 3 per cent.

#### 7. Wages and earnings

The Ministry of Agriculture's Wage Inspectors annually collect by interview data on hours of work and earnings of different classes of agricultural labour in England and Wales; the first survey covered earnings etc. in the year 1946. A similar survey for Scotland is undertaken by the Department of Agriculture for Scotland.

Sample design: The universe of agricultural holdings is stratified (a) by county and (b) by the number of regular adult male workers on the respective holdings at a base date. Sampling fractions which vary according to the number of such workers are used.

Size of sample and sampling error: The sample consists of 2 per cent of all holdings (or 3 1/2 per cent of the agricultural labour force); i.e. about 5,000 holdings are included in the survey. The standard errors of the estimates of average earnings for the main classes of labour are about 1/2 per cent.

3. Family budget expenditure

An important survey on the expenditure of working-class households was undertaken by the Ministry of Labour in 1937-38 in connection with the Cost of Living Index; the results of this Survey have been incorporated in the new "Interim Index of Retail Prices" - a monthly index which, since June 1947 has replaced the old Cost of Living Index.

A description of the 1937-38 enquiry is given in the "Ministry of Labour Gazette" of December 1940. About 22,000 heads of households were approached and invited to complete schedules of their households' expenditure in each of four weeks in the year beginning October 1937; about half this number completed the schedules satisfactorily. The heads of households were selected for the most part from the register of persons insured against unemployment; where a person selected at random from this register was found not to be the head of a household, his name was rejected from the sample list.

A new use to which family budget data may be put is the improvement of national income and expenditure statistics. To this end sample surveys of the whole population of the United Kingdom have just begun in order to estimate the nation's expenditure on items on which present data are inadequate, such as domestic service, medical expenses, and repair and maintenance of house property.

To maintain up-to-date information the enquiries will need to be repeated regularly, and where the expenditure is seasonal enquiries will have to be undertaken several times a year. Different samples will be invited to give details of different items of expenditure, and it is hoped ultimately to obtain data on all consumer expenditure.

Sampling unit: For some items of expenditure the sampling unit will be the individual; for other items of expenditure it will be the household.

Method of enquiry: The alternative methods of (a) interview alone, and (b) completion by the informant of a schedule (in addition to interviews) will be tried out. Informants will be asked to state their expenditure on specified items during a specified time period; the length of this time period will vary with the item of expenditure according to the frequency with which disbursements are made.

Selection of the sample: This will be on the same general lines as for the Survey of Sickness (see above).

Sampling fraction: This will vary with the item of expenditure. For items of expenditure common to all classes of the community, samples of about 2,000 or 3,000 individuals (or households) are being considered. (This is a sampling fraction of 1 in 15,000 in the case of individuals).

Sampling errors: A standard error of the order of 2 1/2 per cent on individual items of expenditure is being aimed at.

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