

REPORT OF SEMINAR ON ORGANISATION AND CONDUCT
OF CENSUSES OF POPULATION AND HOUSING

Addis Ababa, 17 -- 28 June 1968

VOLUME I
Seminar Report

Note: Volume II of this report, which consists of technical working documents, is not being submitted to the ninth session of the Economic Commission for Africa.

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REPORT OF SEMINAR ON ORGANISATION AND CONDUCT
OF CENSUSES OF POPULATION AND HOUSING

Volume I: Seminar Report

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REPORT OF THE SEMINAR ON ORGANIZATION AND CONDUCT
OF CENSUSES OF POPULATION AND HOUSING

INTRODUCTION

1. The Seminar on Organization and Conduct of Censuses of Population and Housing was held at ECA Headquarters, Addis Ababa, from 17 to 28 June 1968. It was attended by participants from the following Member and Associate Member States of the Economic Commission for Africa: Burundi, Cameroon, Democratic Republic of the Congo, Dahomey, Ethiopia, France, Gabon, Ghana, Ivory Coast, Kenya, Lesotho, Liberia, Libya, Madagascar, Mauritania, Mauritius, Morocco, Niger, Nigeria, Rwanda, Sierra Leone, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, UAR and Zambia.
2. Representatives of the United Nations Statistical Office and of the Specialized Agencies of the United Nations (FAO, ILO, UNESCO, UNICEF and WHO) took part in the Conference, and the Population Council sent an observer. The list of participants is given in Annex I of this report.
3. The seminar was opened by Mr. R.K.A. Gardiner, Executive Secretary of the Economic Commission for Africa, who drew attention to the importance of the 1970 world census programme in the planning of economic and social development and in research, and to the role of the United Nations in promoting censuses of population and housing. The Executive Secretary noted that the countries of the region had made considerable progress in recent years in this field of statistical activity, and he emphasized the value to the participants of the exchange of country census experience and of the discussions on methodology during the Seminar.
4. The Seminar Programme, the Guide for Discussion and the List of Documents are given in Annexes II, III and IV respectively. The working documents prepared for the seminar are reproduced in Volume II of this report.

GENERAL CENSUS PLANNING

5. For this topic, the seminar had before it a paper entitled Planning a Population and Housing Census, E/CN.14/CPH/18, which is reproduced as Paper II in Volume II of this report. This paper had originally been prepared for, and discussed by, the Seminar on Organization and Conduct of Population and Housing Censuses for Latin America, held 20-31 May 1968, but inasmuch as the principles of planning are universal, the paper served equally well as a guide for discussion at the African Seminar.

6. Discussion of the paper was spread over two sessions with the first part encompassing roughly the pre-enumeration elements among which the following were given the status of the principal issues:

- (a) Definition, objectives and essential features of a population census and of a housing census;
- (b) Census planning and the timing of the various operations, including the choice of the census date;
- (c) Legal basis;
- (d) Simultaneity;
- (e) Budgeting and cost control.

Definition of a census

7. In connexion with the first issue set forth above, it was recalled that a census of population has been defined as the total process of collecting, compiling, evaluating, analyzing and publishing economic and social data pertaining, at a specified time, to all persons in a country or in a well-delimited part of a country.^{1/} Similarly, a census of housing has been defined as the processes listed above in regard to all living quarters and their occupants.^{2/} Therefore, a first consideration in planning for a census must be that the plan take account of activities in every one of these phases, i e., in collecting, compiling, evaluating, analyzing and publishing.

1/ Principles and Recommendations for the 1970 Census of Population (ST/STAT/SER.M/44).

2/ Principles and Recommendations for the 1970 Census of Housing (ST/STAT/SER.M.45).

Integration with other inquiries

8. It was pointed out that the objectives of censuses of population and housing as defined above were the provision of reliable demographic, economic and social data in the form required for planning economic development and social advancement of a country. Hence, these censuses can not be considered as isolated statistical activities. Rather they must be planned as part of a larger, long-range statistical programme which has been designed to produce the full array of statistics required by national planners. Thus, censuses of population and housing must be fully co-ordinated both in time and in content with other statistical inquiries. The value of the census of population and housing can be markedly increased if the results can be employed together with those of other investigations. The usefulness of the census of population is enhanced if it can furnish information needed for conducting other statistical inquiries. The purposes of a continuing programme of data collection can best be served, therefore, if the relationship between the population and housing censuses and other statistical investigations is considered carefully and established at the planning stage. It is also essential to recognize this role of the censuses as one segment of a longer-range, wider-scope statistical programme because of the necessity of balancing the staff and money resources of the statistical service against programmes in all fields. The Seminar agreed that the view of the census of population and of housing as part of an integrated system of data collection was essential to planning.

Elements of a census plan

9. Attention was next directed to the elements of a census plan as set forth in Annex I of document E/CN.14/CPH/18 (volume II of this report, Paper II).

10. It was noted that the first element mentioned was "studies of previous census records". The value of maintaining records of past census experience was agreed by the participants. It was pointed out that, all too often, the solutions found to difficulties in one census were completely lost to the next census organizers because of failure to record and file

These experiences for posterity. The result was that each new census administration had to face and solve over again many of the same problems. It was agreed, therefore, that one element of a good census plan should be the maintenance of census history and that the history should be studied as a prelude to planning successive census.

Census legislation

11. The preparation of the legal basis for the census was considered a very important basic element of a census plan. It was agreed that without such legal authority clearly defined, no steps could or should be taken because it was only by virtue of this authority that funds could legally be appropriated for the carrying out of the census and administrative responsibility fixed. It was pointed out that such enabling legislation is found in varying forms: sometimes it is part of a general statistical law; sometimes it is a law covering solely periodic population and/or housing censuses; sometimes it takes the form of an ad hoc law authorizing one specified inquiry. Irrespective of the form which the legislation might take, the group felt that its adequacy should be investigated at an early stage of planning.

Budget estimates

12. Preparation of a preliminary budget estimate was also considered to be a priority activity, to be planned and executed at an early stage. This preliminary budget would have to be re-examined and revised as the census activities progressed, but it was agreed that preparation of these cost estimates for the whole operation should be one of the first steps. The estimates should be accompanied by provision for cost control.

13. No general suggestion or draft scheme for a theoretical census budget was presented but it was noted that the items in such a budget correspond generally to the main elements of the census plan, although the amounts involved were not necessarily proportional to the time spent on the work relating to them. For example, the enumeration ideally lasts only one day or at most 4-5 weeks in exceptional cases, but its expenses, if the enumerators are paid, could amount to one-third or even one-half of the

total cost of the census. Other major costs to be budgeted are (1) space for census operations; (2) furniture and office equipment; (3) supplies of paper for questionnaires, instructions punch cards, publications, etc.; (4) data processing equipment; (5) cartographic equipment; (6) printing or other reproduction facilities and (7) transport. For the complete analysis of the census expenses proper, it is necessary to estimate all expenditures for the census operation, including those which are to be incurred by other public authorities against payment. Such indirect expenses can amount to a relatively high proportion of total costs especially if the census was organized on a decentralized basis.

14. Because a relatively large part of the census budget is spent on salaries of staff, it was considered especially important and necessary to estimate and work out a very detailed personnel plan covering enumerators, supervisors, and analysts as well as clerical and cartographic assistance. Problems of staff recruitment are explored further in a later section of the report.

Testing

15. Another important element in a census plan is provision for testing and pilot censuses. As noted in the Recommendations^{1/} the testing of various aspects of a census prior to the enumeration is a very useful practice for all countries; it is essential for countries without a long history of census-taking and for those where fundamental changes in census methods are being considered. To yield full benefits, tests should be employed for all stages of the census, including enumeration, processing and evaluation of results. They are particularly valuable to test weaknesses in questionnaire design, form of questions and instructions and enumeration procedures.

^{1/} Principles and Recommendations for the 1970 Censuses of Population, op.cit., para. 63.

16. Pilot censuses, on the other hand, are "dry runs" of the procedures tentatively chosen for the real census, directed, if possible, at a representative sample of the population, small enough to be covered in the test period. In addition to testing procedures, such pilot censuses provide practical training for enumerators and supervisors in the field and also give some indication of the time required to enumerate an average household - information required for estimating costs as described in para. 13 above. It was the consensus that tests and pilot censuses should be included in all census plans.

Cartographic work

17. Although cartography for statistical purposes is the subject of another paper before the Seminar (E/CN.14/CPH/6) the important role of maps in taking a census and the necessity that provision for their preparation be made very far in advance of the census date, justified its mention also in connexion with the census calendar.

18. As noted in the Recommendations^{1/} the determination of the national and internal boundaries of the territory and its detailed sub-division into enumeration areas, is one of the basic and most important census operations and generally takes a considerable part of the time and effort invested in the pre-enumeration stage. The prevention of omissions and duplications in the enumeration depends to a very large extent on the proper delimitation of the enumeration areas, which, in turn is dependent upon the accuracy of the detailed maps available. All available maps which are known to be accurate should be utilized and new maps prepared as required. It is necessary, therefore, to start cartographic work sufficiently early to ensure that an adequate supply of maps is available three to four months before the census is scheduled to begin.

^{1/} Principles and Recommendations for the 1970 Censuses of Population, op.cit., para. 53.

Census Calendar

19. Review of the elements contained in the illustrative census plan made it very clear that these elements must be programmed in such a way as to reveal the relationship of each element to each other element in a time sequence, as well as the minimum amount of time needed to finish that particular operation and the latest date at which it should be finished in order not to interfere with the activities of other operations. Serious delays in the work, or errors in time estimates, can be detected by comparing the calendar target dates with the actual dates of each operation. An example of such a calendar based on a 2-year preparatory period, is set forth in Paper II of Volume II of this report.

20. The census calendar was only illustrative but it served to emphasize the necessity of each country drawing up such a device for its own guidance in planning a census. It also made clear that planning for a census should be considered as a continuing procedure. The planning for the next census should start immediately after completion of the last one, or even simultaneously with some of the final phases of this census.

21. The calendar also made clear that a relatively long period is needed for the preparation of the census. Detailed planning of a modern census takes at least two or three years. Modern census techniques, especially tabulation by computer, make early, well-prepared and detailed census planning absolutely essential and, as a consequence, this phase of the work takes longer while the actual data processing takes less time than it did on conventional equipment. Planning must be undertaken far enough in advance of the desired census date to ensure that all contingencies have been considered and that all plans are viable in terms of men and resources. In this connexion, the Seminar was informed of new techniques of planning and programming operations, one of which is called "Programme Evaluation and Research Technique" (PERT) and another, "Critical Path Analysis" (CPA). Both of these are, in effect, a refinement of the census calendar, which

breaks each census operation down into its smallest components and shows for each of these, the next step on which it feeds and, as described in the conventional census plan, the minimum time needed to finish it and the latest date at which it would be completed. Such sophisticated systems might one day be applied to the census operations.

Status of Country plans

22. Following the discussion of the elements of census planning, several participants described the progress of their 1970 census plans. Of the 28 African countries participating in the seminar, four have taken censuses since 1965, and 19 have reached preliminary or final decisions on the date of their next census. Some others may participate in the 1970 census round, but because of financial problems, they have not yet decided on the exact date. A summary of the information supplied by the participants and of similar information from countries not participating is presented in Paper I of Volume II of this report.

23. On the basis of these country reports, it was clear that very detailed steps had been taken to plan efficiently and well in advance of the census date. Mention was made of plans for pilot censuses and other tests in urban and rural areas and it was noted that the success of these appears to be affected by lack of publicity. The importance of integrating the censuses of population and housing with other long-range statistical programmes was especially emphasized and the use of committees to achieve inter-ministerial co-ordination was mentioned. Cartographic work also appeared to play a leading role and sampling appears to have been adopted widely to supplement the simple enumeration on an exhaustive basis. These areas are discussed in the sections on geographic work and on the use of sampling in census work. Finally, the role played by the regional and inter-regional advisers in assisting countries to plan efficiently was stressed continually.

De facto or de jure enumeration

24. The African Recommendations for the 1970 Population Censuses

E/CN.14/CAS.6/1, approved by the Fifth Conference of African Statisticians, recommend the use of the de facto method of enumeration in the countries of the region because the greater simplicity may lead to greater accuracy in the results. The review of present practices showed that an overwhelming majority of the African countries are using the de facto method and two countries which have recently experimented with a de jure enumeration, have decided to revert to the earlier practice.

25. While no participating country declared having made an exhaustive enumeration on a pure de jure basis, some have applied a combined method, e.g. several countries in the Southern part of Africa have enumerated the people within the country on a de facto basis but have in addition recorded residents outside of the country as a separate category. Difficulties were noted in using the de facto method in cases where the enumeration is very much prolonged, and the need for special treatment of the nomads was also pointed out.

Type of design for the field enumeration

26. It was recognized that a wide choice of types of censuses is available to the census planner and the discussion brought out the considerable variety which exists in the region and even within a single country. This is by no means a handicap; on the contrary, flexible response to local conditions is preferable.

27. Three main types of general design were discussed:

- (1) single-stage enumeration using a uniform questionnaire throughout the country;
- (2) Two-stage enumeration involving a full enumeration on a reduced questionnaire, followed by a sample enquiry with additional questions;
- (3) single-stage enumeration with a built-in sample for which a more comprehensive questionnaire is used than for the general population.

The tendency in Africa seems to be towards the types (2) and (3), particularly the latter while countries with smaller populations (e.g. Botswana, Lesotho, Mauritius) have found type (1) suitable. An increasing use of sampling in connexion with exhaustive censuses is evident in the region as the sampling frames available become more reliable and more sophisticated.

28. The decision of the Fifth Conference of African Statisticians to recommend housing censuses in the region expressly on sampling basis, is relevant in this respect.

29. The attention of the seminar was drawn to the paper The Development of Demographic Surveys in the French-speaking African States (E/CN.14/CPH/17), (see Volume II, Paper III), which reviews the past and present stages in demographic data collection in these countries.

The urban-rural differential

30. The necessity to treat urban and rural areas differently was stressed by several participants. The reasons given were the sharp contrast between the urban and rural milieu in Africa, the much greater internal variety of characteristics in the towns and the more urgent need for data on the rapid development of the towns.

31. A large number of African countries therefore has applied or is planning to apply different, more detailed questionnaires in the urban areas. In some cases this detailed questionnaire is also used in a sample of rural areas.

Publicity

32. The publicity efforts made in recent African censuses have resulted in a generally very good acceptance of the censuses by the population. To maintain this good co-operation it is necessary to avoid asking questions which probe into the economic conditions of the households and to prevent the census campaign from being used for other (particularly fiscal) purposes. It was also recognized that political or other controversial aspects should be kept out of the census. There is a risk that the earlier tendency towards under-enumeration might change to over-enumeration if the benefits to be expected from the census are over-emphasized.

33. Experience with a very large variety of publicity media was discussed, such as the press, radio, public meetings, films and speeches by national leaders, administrative officers, chiefs, headmen, etc.. The use of schools,

not only for informing the public about the forthcoming census, but also for education on such problems as of the estimation of ages, was stressed by several speakers. The greatest effects can be expected from methods designed to reach the most remote localities and all levels of the traditional structure of the society.

Programme of analysis of census data

34. The meeting recognized the duty of the census office staff to comment on the accuracy of the data in the census publications and also to take part in the analysis of the census results in collaboration with demographers at universities or elsewhere.

35. A plan of priority analysis projects could be drawn up, taking account of the needs of the various branches of the administration and of the quality of the underlying data.

Recording of census experience

36. The meeting stressed very strongly the need to record the census experience in the course of the operations in order to preserve it for the planning of later censuses. Perhaps the greatest benefits could be drawn from day-to-day observations recorded by intermediate-level staff like field supervisors. After the census, field staff could be asked to reply to a specially designed questionnaire on topics like the accuracy of the replies to various census questions, lack of co-operation, shortcomings in training and on any matters that may have impaired the smooth running of the enumeration. All recorded experience should be collected, examined and arranged, and the relevant findings, both positive and negative, should be published in the administrative report of the census.

The census as a national project

37. Several participants emphasized that the chances of success of a population census are greatly enhanced if it is clearly recognized as a national task of first priority. If the government accords the census this role, it can mobilize all branches of the administration in a common

effort. The census campaign proper could suitably start with a public statement by the Head of State, designed to give the initial impetus to co-operation from all sections of the community. There may also be advantages in joint action by two or more countries in organising simultaneous censuses if there are significant movements of nomads or migrants across frontiers.

CO-ORDINATION BETWEEN HOUSING CENSUSES AND POPULATION
CENSUSES AND OF THESE CENSUSES WITH OTHER STATISTICAL
INQUIRIES AND COMPILATIONS

38. The working paper before the seminar for discussion of this topic was E/CN.14/CPH/3, entitled Co-ordination Between Housing Censuses and Population Censuses and of these Censuses with Other Statistical Inquiries and Compilations, which is reproduced as Paper IV in Volume II of this report. This document set forth the conceptual and operational relationships which should be established and maintained among these statistical inquiries to the end that statistical series covering a wide range of topics and obtained from a variety of sources could be used together for a periodic and comprehensive assessment of living conditions.

39. The seminar noted that the emerging concept which considers the censuses of population and housing as part of an integrated system of statistics, rather than as isolated statistical investigations, called for unified planning and conceptual compatibility. The statistics produced could then be used in a variety of ways to assist in formulating and evaluating progress in programmes of health, housing, education, social security etc.

40. The elements of "relationship" examined in the document were (1) timing; (2) compatibility or identity of definitions and concepts; and (3) identity of geographic divisions. The area in which relationship was established in the document was first the relationship of the population and housing censuses to each other. Subsequently, the relationship of population censuses was established in addition to the census of agriculture; to the census and register of establishments; to demographic, labour-force, housing and multi-purpose surveys; to population registers; to vital statistics systems; and to international migration statistics systems. Similarly, housing censuses, in addition to population censuses, are related in some degree to the census of buildings; to the census of agriculture; to the census of establishments; to housing, demographic and multi-purpose sample surveys; to housing registers; and to a system of current housing statistics.

41. The discussion of these potential links was directed first to the relationship between the censuses of population and housing.

Population census and housing census

42. The seminar was informed that an especially close association appeared to exist between housing and population censuses. In most countries they are taken concurrently, often with the use of a single schedule. Such an arrangement automatically achieves identity of timing, definitions, concepts and geographic divisions. It is also the most efficient in the use of resources.

43. The advantages of simultaneous investigation may be offset to some extent by the additional burden on the respondent and the enumerator because of the larger volume of information to be collected at one time. It was pointed out that if countries followed the minimum programme of topics recommended to be investigated at the 1970 population and housing censuses^{1/} the resulting list might present a problem, in which case consideration could be given to resorting to sampling for the more complex housing data. It was also noted that, in the African context, sampling would suffice in many cases, especially in the rural areas, because the pattern of dwellings was relatively constant. Several countries reported their plans to sample for housing data.

44. The seminar agreed that the concept of simultaneous enumeration of population and housing appeared to offer sufficient advantages to be acceptable. They then considered briefly the stages of census-taking where special care in preparation was particularly important. The first of these was the cartographic work and the delimitation of the boundaries of enumeration areas, as well as certain other "tabulation areas" of significance for analysis. It was pointed out that in some countries, the prevailing types of living-quarters correspond to readily identifiable areas and it might facilitate preparation of subsequent housing programmes if the boundaries of the EA's at the margin of these settlements could be drawn so as to avoid the incorporation of living quarters of widely divergent types.

^{1/} Principles and Recommendations for the 1970 Population Censuses, op cit
Principles and Recommendations for the 1970 Housing Census, op cit

45. It was noted that other aspects of census taking in which the combination of the housing and population census required special consideration were (1) preparation of control lists; (2) the type of enumeration to adopt (i.e., 100% or sampling of topics) (3) the training of enumerators, and (4) data processing. Because of the large volume of data to be processed in a combined operation, a system of priorities would have to be established so that data most urgently needed would be made available as early as possible. Decisions would also have to be made as to how, and at what stage of processing housing data collected simultaneously but in a separate questionnaire will be combined with the population data for tabulation purposes.

46. Having agreed on the advisability of combining population and housing censuses to exploit to the full the data collected in each, the seminar considered how these censuses can most effectively contribute to the design of the sample for a subsequent survey. It was pointed out that steps must be taken to ensure that the censuses provide figures for the smallest clearly defined areas of the country so that maximum data are available for drawing samples.

Population Census and Agriculture Census

47. The relationship of the population and agriculture censuses was discussed in some detail. It was noted that these do not have as close an association as that between population and housing censuses because they do not have common essential aspects. For example, they do not use a common definition of "persons engaged in agriculture" even though they both provide data on this topic. For agricultural censuses, this group consists of persons employed in farm work or in planning necessary to the operation of the holding. In the population census, information is obtained on persons principally engaged in the agricultural industry. Similarly, the "farm population" from the agriculture census, and the "agricultural population"

revealed by the population census are not fully comparable either, because the former includes all members of the farm-holder's household and all other persons living on the holding, while the latter is defined as economically active persons engaged in the agricultural industry, irrespective of where they live or work, plus their dependents.

48. The group was informed that because of these basic differences in concepts due primarily to differences in the unit of enumeration at the two censuses, the UN Statistical Commission had come to the conclusion that "efforts to take the two types of censuses together should not be recommended for linking purposes only, because of the burden this would place on the statistical services involved, the risk of lowering enumerator reliability, the timing problem, the potential delay in processing the large amount of material which would result and the inability of countries to analyze the results of such a large scale inquiry"^{1/}. This decision was supported by the FAO African Commission on Agricultural statistics^{2/} which recommended separate censuses taken close together in time.

49. Participants in the seminar stated that their experience supported the conclusions set forth above and that they were not planning to combine the agriculture census with population and housing. They did, however, point out that the population census is particularly useful for planning agricultural censuses. Maps prepared for the population census are suitable for the agriculture census and experience obtained with enumerators in the population census can be transferred to agriculture census planning. Costs of enumerating are roughly transferable as are determination of appropriate work loads. Sample designs are comparable and if the population census asks for some auxiliary information and selects its Enumeration areas (E.A.) carefully it can provide a frame for the agriculture census.

50. These points of convergence indicated the need for coordinated planning of the two inquiries in order to enhance the usefulness of each at minimum cost.

^{1/} Official Records of the ECOSOC, 42nd Session, Supplement No. 3, para. 28.

^{2/} Third Session of the African Commission on Agricultural Statistics, Kampala, December 1966.

Population Censuses and other inquiries

51. In addition to its consideration of the relationship of the population census with censuses of housing and agriculture, the Seminar proceeded to report on experience in other areas where linkage or at least co-ordination might be established. Several participants mentioned the use of the registers of establishments to check on the accuracy of the "industry" reported at the census. Experiments were reported, which were designed to determine whether the population census could be used to fill gaps in the data on establishments by obtaining information on very small enterprises not covered in the census of establishments. Finally the relationship of the population census to subsequent sample surveys was mentioned, not only in terms of definitions and concepts but also as a source of the sampling frame. The close relationship of the population census to vital statistics was noted, especially as concerns the need for co-ordination of definitions, concepts and classifications for vital rate computation and population estimation, but the lack of vital statistics in Africa presented a meaningful discussion of this relationship. In this connection, the seminar was informed of the United Nations "World Programme for the Improvement of Vital Statistics".

Housing censuses and other inquiries

52. Having generally agreed that the housing census should be combined with the population census, the participants reported on their experience with other relationships described in the working paper. Among the areas mentioned were plans to co-ordinate the 1970 census of housing with a system of current housing statistics now being developed; the successful combination of a census of housing with a census of establishments; and the collection of housing data in a rural household budget survey.

Conclusion

53. Even though experience had not been gained in all the types of relationships set forth in the working paper, participants, were in general agreement with it's thesis that "because of the amount and diversity of information which can be collected within a single country by means of the various censuses, sample surveys, and record based systems it is necessary to determine the conceptual and operational relationships which could be established and maintained among them, and to co-ordinate the various activities in accordance with these relationships within the over-all system.

STRUCTURE OF THE CENSUS ORGANIZATION AND ESTIMATION
OF THE NUMBER OF FIELD STAFF

Principles of a census organization

54. The meeting took note of the working paper Planning a Population and Housing Census (E/CN.14/CPH/18) (Volume II, Paper II in this report) which emphasizes the special organizational requirements arising from the fact that a census is an ad hoc but relatively large-scale operation. The size and structure of the organization depend on the administrative structure of the country, the size of the population to be enumerated and the type of census to be conducted; in all cases, however, it consists of three main parts: the Census Head Office, the Regional Offices and subsidiaries, and the Field Staff.

Census Head Office

55. Seven main functions of the Head Office were distinguished, and these might correspond to separate units within the Office: census planning; publicity; geographical work; field organization; finance and services; processing; analysis and publication.

56. The meeting emphasized the desirability of setting up a permanent census office, preferably as an internal part of the national statistical service, and, though this has not yet been effected in the great majority of African countries, several country representatives reported current efforts to achieve this aim. They were influenced by practical experience of the loss of valuable records, such as maps, methodological reports and EA lists and descriptions, as well as by the loss of staff who had taken part in previous censuses or survey operations.

57. In most countries of the region, the census organization is set up as a more or less independent entity within the Central Statistical Office or other government department legally empowered to take the census. Because regional statistical offices are still a rarity, it is usually

necessary for the Census Head Office to work through the local administrative authorities of the regions. Even where regional statistical offices exist, effective census planning requires that the local administration be brought into the picture, and that all activities be co-ordinated by the Head Office.

58. The internal organization of the Head Office varies from country to country, and, where personnel and other resources are scarce, the various tasks of planning and over-all supervision of the execution of the census may be shared amongst a very few people. However, the size of the Head Office staff must, by the nature of census work, change over time: an initial nucleus of high-level staff must be supported by clerical and executive grades, and by the staff required to establish liaison wherever necessary and to supervise the field preparations and the enumeration proper. After the enumeration, the great majority of the staff of the Head Office will be data-processing personnel.

Regional Census Offices

59. It was recognized by the meeting that a census office should be set up under a regional census commissioner for each main region of a country; the accounts of country experiences and plans showed that in some countries census offices were, or are to be set up at one or more lower levels of the administrative structure (districts, sub-districts) thus providing closer control over the preparatory work.

60. The function of the regional commissioners should be to direct the preparatory work and to co-ordinate the activities of the local administrative authorities. The regional census offices should undertake the final pre-enumeration work, or delegate it, as appropriate, to census offices at lower administrative levels.

Census advisory committee

61. The utility of a national census committee was emphasized by the majority of participants, who recognized the power of such a body to stimulate a national, co-ordinated effort to facilitate the census work.

These committees, by virtue of their bringing together senior representatives of the government departments and non-governmental organizations who are consumers of the census data, have it in their power to give both psychological and material support to the census organization. In particular they can provide staff, and services such as transport.

62. While the majority of participants supported the view that the functions of a census committee should be purely advisory, there were some countries in which the committee was the body ultimately responsible for the census. This situation arose if statistical services were organized on a decentralized basis and in such cases the census committee could delegate its authority to the regional statistical services to carry out the census in the regions.

63. Again, the view was put forward that a census committee may in fact create difficulties for the census organization by pressing for data which would unduly strain the available resources for collection in the field. In the absence of a census committee a cabinet directive to all branches of government might be needed to ensure co-operation.

Liaison with other government departments and with universities

64. It was noted that such liaison could be achieved through a census committee; if, however, no such committee existed, the question of obtaining co-operation from all departments of government and from other organizations, such as universities, became of the utmost importance and required tact and skill of a high order on the part of the census director and his senior assistants.

Estimating the number of field staff required

65. The meeting took note of the second paper Structure and Size of African Census Organizations and Estimation of Census Costs (E/CN.14/CPH/10) (Volume II: Paper IV) where methods of estimating the numbers of enumerators and supervisors are given. Data from previous African censuses, presented in country papers, supported the view that a first rough estimate of the number of enumerators required can be made on the assumption that, in African

conditions, one enumerator can enumerate 500 persons in one week (or 1,000 in 2 weeks if it is planned that the census last 2 weeks).

The number of supervisors can be very simply estimated by assuming that one supervisor should control 5 enumerators. The first rough estimates would of course, need refining to take account of differences in density of settlement, mobility of population, nature of the terrain, and so on.

Use of auxiliary field staff

66. A number of countries of the region have found it necessary to employ interpreters, to overcome language problems. Similarly, guides are essential in difficult terrain unless the enumerators are personally familiar with the area. The role of headmen and other leaders at the local level is crucial in most of the rural areas of the region, both in obtaining support for the census and in supplying local knowledge to the census field staff. The numbers of auxiliary staff required cannot be estimated except for particular census operations.

Recruitment of staff

67. Emphasis was given to the serious difficulty experienced in most countries of the region in recruiting staff suitably qualified for the various phases of the census operations. The difficulty exists at the senior level, and the need for training was recognized as the ultimate solution; the shortage may be and often is greater at the middle level and it is relevant to staffing of the Head Office, of the Regional Offices and of the field operations.

68. In respect of staffing the Head Office, secondment from other government departments is the normal procedure. Participants noted the problems of securing such secondments, the related problems of salary scales and the fact that secondment for a period as long as 2 or 3 years might create difficulties for individuals after secondment. Government policy should give careful consideration to equitable treatment of both permanent and seconded census staff.

69. Data-processing staff have been a repeated source of worry to census directors, and experience has shown that good management and adequate financial incentives are essential conditions for maintaining work of acceptable standard and for preventing high turnover rates.

70. Staff recruitment for regional offices presents corresponding problems, aggravated by the comparatively large numbers required. However, recruitment for field work is usually the most crucial issue, and the use of government officials, part time, of school teachers and of senior school pupils, has become the normal practice in many countries.

SYSTEM OF PAYMENTS TO FIELD STAFF AND OF COST ESTIMATES

71. One of the first tasks facing any census administration is the preparation of rough cost estimates. Few African governments would be prepared to agree to the holding of a population census until some indication of the over-all cost is given; and little can be done in the way of preparations for the census until some money has been voted. Rough initial estimates can subsequently be revised as the census planning progresses. The problem of census costs was therefore discussed in the two working papers, Planning a Population and Housing Census (E/CN.14/CPH/18), paragraphs 15-24, and Structure and Size of African Census Organization and Estimation of Census Costs (E/CN.14/CPH/10), paragraphs 16-27 (See Papers II and V in Volume II).

System of payments to field staff

72. Payments to field staff normally constitute much the largest single item in the census costs, and it was stressed that the choice of the particular system of payment should be made in the light of three factors; its effect on the over-all cost of the census; the desirability of a simple system of accounting; its effect on the efficiency of the enumeration. On the basis of these considerations, the following systems of payment were discussed; a single lump sum; a lump sum for the training period plus daily or hourly rates for the enumeration; and payment per head of the population enumerated. The possibility of making no payment at all was also examined.

73. Of these the last (which has been adopted in India) might help to reduce the over-all costs and simplify the accounting, but would not be conducive to high morale and efficient enumeration among the field staff. Payment per head of the population enumerated might lead to the invention of fictitious households by the enumerators. Payment on a daily basis was liable to cause the enumerators to prolong their work artificially in order to boost their earnings. Payment by lump sum might cause some enumerators to hurry through their work, with consequent loss of efficiency, in order to finish early, but had the advantages that it simplified the accounting, and if the enumeration had to be continued longer than anticipated, the census estimates would not be overspent; this method was therefore recommended as the most suitable for African censuses.

74. The participants were unanimous in their support of the principle of the lump sum, but several favoured the view that it should be supplemented by a bonus payment, the size of the bonus being determined by various criteria which would reflect the efficiency of the enumerators' work. It was observed, however, that the bonus scheme, while having obvious advantages, might be more suitable for a sample survey, wherein the numbers of enumerators are smaller and the field work more protracted, than in a complete census employing thousands of enumerators; it would complicate the accounting procedures and place a heavy burden on the supervisors who would be largely responsible for deciding whether or not the bonus should be paid. Other participants suggested that the size of the lump sum should vary according to whether the enumerators are otherwise unemployed or are seconded from other jobs and continue to be paid their normal salaries during the period when they are employed on the census. Varying payments were also suggested for enumerators who are held in reserve and do not actually participate in the enumeration.

75. The problem of whether government servants seconded to census duties should receive any extra payments in addition to their normal salaries was discussed, and it was generally felt that some such payment should be made, preferably again in the form of a lump sum. Payments to auxiliary field staff - guides, interpreters, chiefs, headmen, etc. - were discussed, and instances were cited when the non-payment of any remuneration to these personnel caused widespread discontent accompanied by threats of non-cooperation.

Other items of census expenditure

76. Salaries of officers in the central census office and in the District census offices are often excluded from the "direct" census costs; but if included they pose no particular problem of estimation once the numbers of these personnel are decided.

77. Costs of printing, stationery and equipment can likewise be estimated fairly easily once the dimensions and numbers of the necessary documents, etc., have been determined.

78. Mapping and transport costs, on the other hand, were often very difficult to estimate in advance and varied greatly from country to country. For example transport would constitute a relatively more important element in the costs of a sample survey, wherein comparatively small numbers of enumerators might have to be moved around the country over a prolonged period, than in the case of a complete census where large numbers of field staff are employed locally with relatively little movement. The means of transport adopted - motor vehicles, bicycles or animals - also varied from country to country and tended to be reflected in the costs.

79. Processing costs normally constitute the second largest element in total census expenditure, and could conveniently be divided into two main categories: salaries of the processing staff and costs of machining.

80. Census coding clerks and key punch operators would normally have to be recruited temporarily for the census work. The numbers required and the length of time they would take to complete the work could generally be estimated fairly accurately on the basis of past experience. In view of the temporary nature of the work, it was advocated that they should be paid on a bonus basis, otherwise they might tend to go slow in order to prolong the period of their employment. Other inducements towards speed and efficiency, such as the promise (where circumstances permit) of permanent employment to the most efficient workers, and the public display of work rates, were described by some delegates.

81. Three different approaches to the problem of machining were outlined, each of which would have different cost implications. First the government may already be in possession of some suitable processing machinery, such as a computer, which is not being fully used to capacity. In this case the cost element may consist of a loss of revenue to the government, which may be in the habit of hiring out computer time to commercial users. Secondly, suitable processing machines may have to be hired for the census processing. In theory, the length of time this machinery would be required - and hence the total cost of the rental - can be calculated, given the total number of cards to be processed and the specifications of the tabulation programme; in practice, however, the actual time taken to complete the machining rarely bears much relationship to the results of these theoretical calculations; unforeseen and protracted delays, often attributable to mechanical break-down, frequently cause the total time of the machining to be greatly extended. Thirdly, the whole task of machining may be farmed out to a commercial company specialising in data processing, to be done on a "bureau" basis. This procedure is generally expensive, and the time taken by the company is often substantially longer than they originally estimate, but it has the advantage that the delays will not cause the direct costs to rise above the sum agreed with the company. It was suggested that some governments might even try to insert a penalty clause in their contracts with the companies to the effect that the latter should

make a refund if the tabulations are not delivered by the specified dates; such penalty clauses are frequently included in other forms of commercial contracts, though whether the data processing companies would agree to it in the type of situation under discussion is problematical.

Methods of presenting census costs.

82. Census costs are of two types: the direct costs and the indirect costs. In the publication of the final accounts, most countries included only the direct costs, but there was considerable variation between countries as to what was comprised under this heading, and what was considered indirect and therefore excluded. All countries were therefore urged to publish their census accounts in as much detail as possible, so as to show what elements had been included or excluded. The greater the detail of the accounts, the greater would be their use for the planning of subsequent censuses. In this respect the example of the presentation of the Ghana census costs in Volume V of the Ghana Census Report was recommended to the meeting; some of this Ghana material had been reproduced in the working paper E/CN.14/CPH/10. It was emphasised by the seminar that all direct census expenditure should be controlled by the Census Head Office.

USE OF SAMPLING IN POPULATION AND HOUSING CENSUSES

83. The seminar considered the topic on the basis of the working papers entitled Use of Sampling in Population and Housing Censuses (E/CN.14/CPH/8), and The Development of Demographic Surveys in the French-speaking African States (E/CN.14/CPH/17), (reproduced as Papers VI and III in Volume II), and the background documents, Principles and Recommendations for the 1970 Population Censuses (United Nations publication; Sales No.67.XVII.3), Principles and Recommendations for the 1970 Housing Censuses (United Nations publication; Sales No. 67.XVII.4), African Recommendations for the 1970 Population Censuses (E/CN.14/CAS.6/1) and African Recommendations for the 1970 Housing Censuses (E/CN.14/CAS.6/2).

84. Sampling has a role in population and housing censuses both as an integral part of the planning, execution, analysis, and evaluation of the census and through the use of the census as a frame for subsequent sample enquiries. In addition it was appreciated that lacking adequate resources, a few African countries might be obliged to substitute sample surveys for censuses, either for the total population, or for specific population groups, such as nomads, or for parts of the country. The Fifth Conference of African Statisticians had also noted that under African conditions the recommendations for housing censuses should often be applied on a sampling basis.

Sampling as an integral part of the census

85. Sampling methods may be used in one or more phases of a population and housing census:—(1) Tests of census procedure; (2) Enumeration of items in addition to those for which universal coverage is required; (3) Post-enumeration field checks; (4) Quality control at the stage of data collection; (5) Quality control at the stage of data processing; (6) Tabulation of provisional results; and (7) Tabulation of additional data and data required for special studies.

Advantages and disadvantages of sampling and conditions for acceptable sample operations.

86. Advantages of sampling. Among the advantages of sampling mentioned were the following: - Reduction in total cost; shorter time-lag between actual enumeration and publication of results; lessened burden of total response; lessened demand on manpower and other census resources; higher quality of work and better appraisal of accuracy (e.g., objective tests of literacy); refinement of methods for minimizing not only the sampling errors but also the non-sampling errors; and possibility of collection of non-demographic items required for planning purposes.

87. Disadvantages of sampling. Among the disadvantages of sampling were mentioned possible danger of delay and higher cost of final results; increase of individual burden of response; limitation of coverage in regard to small geographical areas and items of rare frequency; and the question of public confidence. It was, however, noted that for certain planning purposes, interest lies mainly in the summary information for all the small units taken together or for groups of units.

88. Conditions for acceptable sample operations: These relate to the first three purposes of sampling mentioned earlier.

- (a) Cost and census resources. Judicious use has to be made of the resources in expert knowledge and equipment. The size and complexity of the sample is governed by the objectives and procedures, and the availability of lists, maps, and other basic information. Recent African experiences have shown that the alleged advantages of using high-speed computers, available in a number of African countries, may be lost without adequate planning of both sample design and computer programmes. The efficient use of sampling requires higher-level statistical and demographic personnel, and attempts are being made by the United Nations and the Economic Commission for Africa to meet adequately the need for training and research in these fields for all African countries.

- (b) Precision. A necessary feature of an acceptable sample plan is a statement of precision desired in sample estimates. A properly designed and executed probability sample undertaken with highly trained enumerators enables one to improve the accuracy of data and to measure the sampling errors. The use of interpenetrating sub-samples supplies controls at the point of collection of data and also estimates of margins of uncertainty of the sample estimates.
- (c) Sampling frame and sample units. It is necessary that a frame should be accurate, complete, free from duplication, adequate, and up-to-date. A frame consisting of numbers of persons, households, or houses soon becomes obsolescent. The use of a list of compact geographical areas with identifiable boundaries was endorsed as a suitable frame, one particular advantage being that, for a post-enumeration check, the sample units might be chosen beforehand.

89. Tests of census procedures. Under favourable conditions, pilot studies, based on a probability sample, and arranged in the form of interpenetrating sub-samples, can determine the choice among several possible procedures for the census operations (e.g., different types of schedules; different methods of enumeration; etc.) and can give valuable advance information of the population characteristics, cost, and variance for the whole or part of the population. Other uses of pilot studies are in determining the size of field staff, field organizations and control (Study of Pilot Enquiries and Post-Enumeration Checks Used in Conjunction with African Population Censuses, E/CN.14/CAS.5/17).

90. In housing censuses in particular, the general lack of previous information makes it imperative to obtain in advance estimates of the variability of the data and the quality of response by means of an intensive pilot study.

91. However, caution should be exercised in interpreting the results of a pilot study carried out under conditions not approximating to those of the census proper, e.g., concerning publicity, there appears to be a need for involving the population in the pilot studies, and in fact at all stages of the census.

92. Enumeration of additional items. The African variants of the world recommendations for the 1970 population and housing censuses recommend collection of data on a sample basis for topics which are more difficult to investigate and/or those for which tabulation by major civil divisions or for the country as a whole would be adequate. The Seminar endorsed the view that the collection of data on a sample basis concurrently with the census should take the form of complete enumeration of persons, households, and/or houses within a probability sample of areas by a specially trained corps of enumerators using a more detailed schedule.

93. Post-enumeration field checks. Considerable discussion took place on the utility and effectiveness of post-enumeration field checks. The difficulties encountered by some African countries in obtaining acceptable measures of the coverage and content errors in the census by the use of post-enumeration field checks were described. These related to the problems of reconciliation of data obtained from the census and survey, which were mainly as follows: difficulties of 1-1 matching, especially in regard to names; difficulties of using better enumerators due to limitations of language; apprehension of primary enumerators that their work is suspect; lack of transport facilities; problems arising from the mobility of population; etc. The failure of some post-enumeration field checks in Africa also arose from inadequate preparation of the sample design (including defective frames, and sub-sampling of households from selected enumeration areas, rather than complete enumeration of the sample enumeration areas), and faulty conduct of the inquiry.

94. On the other hand, it was pointed out that the only way of assessing the validity of scientific operations was that of replication, which for censuses of population and housing should take the form of post-enumeration field checks conducted as soon as possible after the date of the original census, under more favourable conditions than those of the census, and using the best available personnel. Such checks should be regarded as an integral part of the census, and in the absence of other alternative procedures of checking (e.g., with accurate records of births, deaths, and migration), constitute the only available means of checking the census data. It was noted that technical users of the data would need some idea of the accuracy of the census results before these could be used meaningfully. The use of such checks was thus the only satisfactory means of meeting professional standards, even though it was appreciated that their effective development might take some time.

95. The need for technical publications on the methods and results of post-enumeration field checks used was also stressed, and it was noted that methodological reports might be published separately for technical users, while general results were distributed more widely in simpler documents.

96. Concerning the checking of names, ages, etc., a description was given of an interesting procedure in Togo for issuing census certificates to persons enumerated in the census and following those up in subsequent sampling and census operations. This seemed promising and deserved further study. The use of female enumerators was also noted as necessary in certain situations. Other suggestions related to the use of feasibility or pilot studies for post-enumeration field checks, limiting the checks to certain localities, and recording of all alternative names of individuals in a sub-sample of the areas selected for the checks. It was also suggested that enumeration of additional topics might be organized as a separate operation from the post-enumeration field checks, which would then be devoted solely to the checking of coverage and content errors of the census.

97. For the sample, it was agreed that the check should consist of the complete enumeration of probability samples of compact geographical units. The bias in systematic samples of houses and/or households, due to different interpretations of unit definitions in the census and survey, was mentioned in this connexion.

98. The discussion highlighted the specialized nature of the work of evaluating census results including reconciliation of census and post-enumeration survey data, and also the need to give special attention to training statisticians and demographers in the application of appropriate techniques. A manual under preparation by the Statistical Office of the United Nations on the evaluation of census data was mentioned.

99. Control at the stage of data collection. More extensive use of separate interview records compiled by supervisors was urged as a means of checking the work of enumerators. Arranging supervision on a probability basis in order to obtain adjustment factors was another possibility, but this might be limited by practical difficulties in some countries.

100. Quality control of data processing. In order to apply methods of quality control successfully, it is necessary to fulfill certain pre-requisites of an organizational nature, which include the availability of well-trained and reliable clerks and machine operators, the existence of adequate work procedures, and competent office management.

101. Tabulation of provisional results. It was recognized that sample tabulations of provisional results would normally be available more quickly than the complete census tabulations, and have in fact been used in some countries to provide urgently required data for development planning.

102. Tabulation of additional data and data required for special studies.

As it is not normally possible to undertake all the possible cross-tabulations of the data of the census proper, sampling could be used to extend the scope of these tabulations and for obtaining data for special demographic and housing studies, especially those which are required for large areas and for the country as a whole. However, some housing items might require a high sampling fraction because of great variability of housing characteristics.

The Census as a basis for subsequent sample inquiries

103. It was noted that censuses provide the most important frame for sampling during the inter-censal period, and the need for a good frame was emphasised. It is necessary to give very careful consideration to the problems connected with sampling at the stages of planning the census, and executing the various phases with proper care. Of the methodological factors, the general framework and the geographical sub-divisions of the field organization require special attention in multi-stage sample designs.

104. The other important considerations are common to the role of sampling as an integral part of the census; these include, e.g., conditions of acceptable sample operations, and control of quality of data at different stages.

105. The importance of linking attempts to improve or establish civil registration systems with population censuses was stressed by the seminar, because of the need for comparable population and registration data.

Quality of data

106. The seminar noted the existence of non-sampling errors and biases in complete enumerations and underlined the need for their control. It re-iterated that it is the total error that has to be minimized in all processes of data collection, whether on a sample or a complete enumeration basis, and not merely the sampling error. The term "accuracy" relates to total error, while "precision" or "reliability" relates to sampling error.

107. Finally, the seminar urged the application of more imaginative efforts to the various problems of data collection and analysis. Under African conditions, these are complicated and require special techniques of collection and analysis. Some progress has already been achieved in this direction.

SELECTING TOPICS AND PLANNING THE TABULATION PROGRAMME

Population Censuses

108. The seminar generally endorsed the African recommendations concerning the topics to be investigated in a population census and the tabulation programmes related to these topics, as presented in the background document African Recommendations for the 1970 Population Censuses (E/CN.14/CAS.6/1). These recommendations had been formulated by the First and Second Working Groups on Censuses of Population and Housing (which met in Addis Ababa in 1965 and 1966 respectively) and were approved by the Fifth Conference of African Statisticians.

109. It was noted that the characteristic features of the African recommendations were that they were designed as a minimum programme believed to be within the resources of the great majority of the countries of the region, and to serve as a useful starting point. Where conditions permit, governments would no doubt choose to widen the scope of their censuses and tabulation programmes.

110. The topics recommended for inclusion in African population censuses were chosen primarily on the grounds of national needs and largely reflected past experiences with methods and definitions designed to produce data required for development planning and research. International comparability was maintained in respect of essential recommendations, since the latter are themselves based on a study of national practices and reflect a body of practices which have successfully met national needs. For similar reasons, the topics are believed to present no special problems in respect of the willingness of the respondents to reply to the questions asked, though there still remain the difficulties arising from lack of knowledge (e.g., of age) and from recall lapse.

111. The "Recommended" topics are those which should be regarded as basic essentials; the "other useful" topics are those which may be of the first importance for particular countries but which did not seem to be of equal urgency throughout the region. Sampling is suggested for a number of the recommended topics and for all the "other useful" topics.

112. It was recognized as a first consideration that the population census should provide information on the topics of the greatest value of the country. Experience had shown that national needs will be best served if the census includes topics generally recognized as of basic value and defined in accordance with international and regional standards. Nevertheless, some countries may find that it is not necessary or practicable to include certain of the recommended topics in their censuses. Their decisions would depend on a balanced appraisal of how urgently the data are needed and whether the information could be obtained equally well or better from other sources. It was suggested therefore that the regional recommendations be adhered to by the countries unless there are very important over-riding factors present. It was also recognized that many countries would find it necessary to include in the census some additional topics of national or local interest; however, it would be important to ensure that such topics are not included at the cost of the more important items, that the full implications are realized, and that trained personnel are available to analyse special topics.

113. The seminar took note of the observations and suggestions made in the two working papers, Age data in African censuses and surveys (E/CN.14/CPH/13), and The collection of data on fertility and mortality in African censuses of population (E/CN.14/CPH/14) (Volume II, Papers VIII and VII); mention was also made of other relevant documents on economic characteristics, marital status, and migration, prepared for the First Working Group on Censuses of Population and Housing.^{1/}

^{1/} Some problems of enumerating economic characteristics of the population for African censuses (E/CN.14/CAS.4/CPH/3); Collection of statistics of marital status in Africa (E/CN.14/CAS.4/CPH/5); The collection of migration statistics in Africa (E/CN.14/CAS.4/CPH/6).

114. The African region is unique in including topics on both life-time (total) and current fertility (in addition to that on current mortality) as "recommended" topics, which reflects the desire of the African countries to obtain accurate measures of fertility and mortality. The actual or planned inclusion of these topics in some population censuses in the region were described by the delegates.

115. The importance of the data on literacy and school attendance was also recognised in connexion with economic and social development and the programmes of the United Nations and the UNESCO to eradicate illiteracy.

116. The seminar endorsed the importance of the data on the economic characteristics of the population that are required for manpower planning and for planning for economic and social development. Special mention was made in this connexion of the Programme for African Manpower Planning, embarked upon by the ILO. The difficulties and problems involved in the collection of such data were noted, and the need for giving careful instructions to the enumerators was emphasised. Such data have been recommended for collection on a sample basis, and the seminar had earlier suggested that, when this was done concurrently with the census it should be entrusted to a specially trained corps of enumerators. It was recognized that conditions in some countries might make it imperative to deviate from the recommended regional definitions; however, in these situations, data might be obtained in such a manner and tabulations so planned, that regional and international comparability could later be achieved. The inclusion of the data on the economic characteristics of the population in the census would in no way supersede special manpower and labour force sample surveys, planned or being undertaken in some African countries; the latter ~~would~~ continue to fulfill certain specific functions.

117.

117. One participant pointed out that neither labour force sample surveys nor the inclusion of the relevant data to be collected on sample basis in the census met the requirements of governments interested in knowing the number and geographical distribution of persons with certain rare occupations; in such situations, of course, the items may be collected on a complete enumeration basis in the census.

118. The seminar noted that the recommendations for the tabulations represented the selection of basic tabulations that would yield the data required most urgently for development programmes. The "recommended" tabulations incorporated only the recommended topics and constituted the body of statistical information which it is considered each country would regard as necessary.

119. It was recognized that the tabulations constituted a modest programme, and that many other worthwhile and practicable tabulations could be included in the census programme of any country with sufficient resources. The seminar had earlier endorsed the use of sampling in obtaining additional tabulations including meaningful cross-classifications of the topics.

120. Although the recommendations did not provide for a tabulation of enumeration areas by population enumerated therein, the importance of such data for various subsequent inquiries was appreciated and it was urged that such data should be retained in the census offices for later use.

Housing Censuses

121. In considering the topics to be included and the tabulations to be compiled from a housing census the same general principles apply as were referred to in the discussion on population censuses, particularly in respect to the priority of national needs and the desirability of international comparability of the data obtained.

122. The objective of a housing census, as noted in para. 8 above and in Principles and Recommendations for the 1970 Housing Censuses, is the provision of data in the form required for economic and social planning; the data must be such as to provide a physical inventory of the housing stock, information on the structural characteristics of the living quarters enumerated and on such demographic, economic and social characteristics of the population in the living quarters as are required to meet local needs and conditions. Homeless persons should be enumerated as a separate category.

123. Housing data are intended to complement statistical data on size and structure of population and on agricultural production so that a co-ordinated description may emerge of the relations between population as such and the supply of food and shelter available. The census data on housing (like those on population and agriculture) must be supplemented by current statistics so that an assessment may be made of whether the supply of housing is adequate to meet housing needs; methods of estimating these needs are given in Methods of Estimating Housing Needs (United Nations publication, Sales No.: 67.XVII.15).

124. The meeting noted the economic importance of investment in housing construction in generating incomes and employment, and the utility of the corresponding statistical data in national accounting.

125. Because of the importance of the quality of the housing stock in regard to its "acceptability", as judged by the criteria of the density of occupation, the protection it gives from the elements and the sanitary and hygienic facilities it affords, etc., certain data on housing characteristics have been recommended as valuable indicators of levels of living; these are presented in Statistical Indicators of Housing Conditions (United Nations publication, Sales No.: 62. XVII.7).

126. The African Recommendations for the 1970. Housing Censuses (E/CN.14/CAS.6/2) were considered by the meeting in respect of the topics to be investigated and the tabulations to be compiled. While specifically aimed at meeting the needs of the African region, the Recommendations retain comparability with the world Principles and Recommendations (except in one minor respect relating to investigation of materials of construction and even here it is suggested that the world recommendation may in practice be preferred by some countries). The African Recommendations were endorsed by the Seminar on Housing Statistics and Programmes for Africa, which was held in Copenhagen, Denmark, in 1966, the final report of which is in preparation.

127. The discussion centred on four main aspects of housing censuses in Africa: (a) the relationship between housing units and households, (b) differences in conditions in urban and rural areas, and the greater practicability at present of putting urban housing statistics to use in physical planning, (c) the question of mobility leading possibly to fairly large differences between the de facto and de jure populations, and (d) the extended family system, often associated with the compound (concession).

128. It was the feeling of the meeting that the distinction between household and housing unit must be preserved in order to obtain data on households sharing housing units, and that data obtained in the form of facilities available to households, though of considerable social interest, were inadequate for obtaining the inventory of the housing stock and for measuring density of occupation. These problems are usually less acute in rural areas. In urban areas especially, the possibility of obtaining accurate data both on housing units and on the households therein, depended very much on training and on practical experience gained in trial interviews by each enumerator. In the case of complicated groups living together, as in the compound for example, it was considered that the distinction between the household and the nuclear families within it, would facilitate the enumeration; experience in French-speaking West Africa supported this view.

129. As for the question of mobility, the African recommendation that the de facto population be preferred as the base for the census plan, should be modified where conditions required it; the enumeration of Residents present, Residents absent and Visitors as separate categories would permit the study of both the de facto and the de jure populations.

130. The meeting endorsed the recommendation of the Fifth Conference of African Statisticians on the utility of sampling in the investigation of housing conditions in the region.

131. The meeting noted that few countries in the region are yet in a position to obtain satisfactory current housing statistics; however, the use of building permits was reported by some countries and suggestions made about means of over-coming the defects of these statistics.

DESIGNING THE QUESTIONNAIRES

132. No special working paper had been prepared for this item of the agenda, but a comprehensive discussion of questionnaire design was contained in the Handbook of Population Census Methods, Vol. I, Chapter IV section D. Specimens of census questionnaires used in various countries were circulated in the meeting.

Types and styles of questionnaire

133. Three basic types of questionnaire were described. First, there was that in which one line of each questionnaire was used for each household; this type was in fairly common use when the technique of "group enumeration" was practised in earlier African censuses (e.g. Kenya 1962), and it had also been adopted in the 1967 census of Tanzania, where the enumeration had been conducted on an individual basis and the only questions asked in 80% of rural areas were age and sex.

134. Secondly there was the type of questionnaire involving the use of a separate form for each household, and one line or column for each person in the household. This type was that most widely used all over the world. Generally the questions on different characteristics were arranged horizontally across the form, and one line used for each person; but sometimes the questions would be arranged vertically, and a separate column used for each person. The latter arrangement had been used, for example, in Tunisia (1966), in the Republic of South Africa (1960), and in the Ghana P.E.S. (1960); it suffered from the disadvantage that it increased the total size of the form since an equal width of column had to be devoted to each question, whereas with the horizontal arrangement the width of the columns could be varied according to the requirements of the different questions.

135. Thirdly there was the type of questionnaire in which a separate form was used for each person enumerated. This type had advantages from the standpoint of processing, and its use could eliminate the need for punching. It had been used in Canada in 1956, and there were plans for its adoption for the 1969 census of Zambia, where it would be used in conjunction with a photo-optical device for transferring the information directly from the census questionnaires to magnetic tape. It suffered from the disadvantages, however, that a much greater number of forms would be needed, and the characteristics of different members of the same household could less readily be checked against each other for incompatibilities (e.g. ages of children and their parents). There was also a problem in collating the data by household, although this could be overcome by a suitable system of reference numbers.

136. The use of books of questionnaires was advocated, since it minimised the likelihood of their being lost, and facilitated the process of checking that all the forms issued to a field worker were duly returned; it was suggested that the numbers of questionnaires per book should not exceed 50, and sometimes smaller numbers might be used to prevent wastage. It was urged that the total size of the questionnaire should not be too large, and its general appearance should be such that it should "not only be easy to fill in, but should also look easy to fill in".

Framing and ordering of questions

137. The principle that particular care should be taken to ensure that the wording of every question should be clear and unambiguous was stressed, and it was suggested that special attention should be given to translations. The need for clarity of the question headings was raised by various delegates, and it was noted that these headings needed to be much fuller when the questionnaire was to be completed by the householder than when it was to be completed by the enumerator; the necessity in some countries (e.g. Mauritius) to print the headings in two languages was noted.

138. Alternative methods of posing certain questions were discussed - such as age and date of birth, and the splitting of the question on children ever born into three parts - those alive and living at home; those alive and living elsewhere; and those who had died.

139. It was advocated that in general the most important questions, such as sex and age, should come first in the questionnaire, and those which applied only to restricted categories of persons, such as the fertility questions for women only, should come last. Related questions, such as the "economic" ones on type of activity, employment status, occupation and industry, or again the fertility questions, should be grouped together on the questionnaire. It was urged that the persons responsible for the data processing should always be consulted before the questionnaire is finalised, particularly as regards the framing and ordering of inter-related questions.

Types of questions and methods of entering replies

140. Census questions could generally be divided into two categories: "closed" questions, to which there were only a small number of possible answers, such as sex; and "open" questions, to which there was an almost unlimited number of possible answers, such as occupation.

141. In several recent censuses (e.g. Ghana 1960, Sierra Leone 1963, Tunisia 1966 and Malawi 1966) the possible answers to the closed questions had been specified on the questionnaire with a "box" against each, the enumerators being required to place a tick in the appropriate box. It was suggested however that this procedure had certain disadvantages: tests had shown that enumerators were more likely, by sheer carelessness, to place the tick in the wrong box than to record the wrong answer when required to write it out in full or in the form of some meaningful abbreviation; or the ticks would sometimes be so badly placed that it was impossible to tell which "box" they related to.

142. The use of meaningful abbreviations such as "M" for male and "F" for female, had advantages: they helped to reduce the size of the questionnaire and provided a small saving in time and labour.

Pre-coding

143. In some recent censuses - most notably that of Tanzania in 1967 - extensive use had been made of pre-coding; the enumerators were required to enter an appropriate code number (e.g. 1 for male and 2 for female) instead of an answer in the form of words. This procedure could save considerable time and labour for the coding clerks in the census office, but it had its dangers. The enumerators were in fact being asked to do two jobs at once: they were acting not only as enumerators but also as coding clerks and the potential numbers of mistakes they were liable to make was thereby doubled. While an error made by a coding clerk in the census office could be detected and corrected, since the original entry was there to be seen, a coding error made by an enumerator in the field was virtually impossible to correct. However, when used on a limited scale, such as in the 1966 census of Swaziland for the questions on education and economic activity only, pre-coding had its uses.

144. On the assumption that most of the coding would have to be done in the census office, rather than pre-coded in the field, the question was raised as to whether it should be done on a separate coding sheet or on the original questionnaire, which should be designed accordingly. Since coding on the questionnaire had numerous advantages, methods of providing space on it for the codes were discussed, such as subdividing the columns vertically (as had been done in Swaziland), or dividing the lines horizontally (Turkey 1965) or marking off a corner of each line/column compartment (Algeria 1966).

Instructions for completing the questionnaires

145. The question was discussed as to whether the instructions for completing the questionnaires should be kept fairly brief, in the hope that the enumerators would then be more likely to read them, or should be as detailed as possible, in an attempt to forestall all likely errors. The opinion of the meeting generally seemed to favour detailed instructions, provided that the supervisors ensured that the enumerators read them thoroughly during the training courses.

146. When the questionnaires were to be completed by the householders rather than by the enumerators, abbreviated instructions had sometimes been printed on the back of the questionnaire. This procedure was not generally successful, however, as the householders rarely bothered to turn the form over and read the instructions on the back. The best alternative seemed to be to print fairly detailed headings to each question on the front of the questionnaire.

Methods of relating population and housing questionnaires in a combined population/housing census (or survey)

147. Two methods of collecting both population and housing data on the same questionnaire were described: either a special "box" containing the housing questions could be inserted in a corner of the population questionnaire (e.g. Kenya 1962 - urban areas only); or the population questions could be printed on one side and the housing questions on the other (e.g. Algeria 1966).

148. It was recognised that the use of the same questionnaire for both population and housing particulars entailed difficulties when the units of enumeration were not co-terminous - i.e. when there was more than one household living in a housing unit, or when a single household was occupying more than one housing unit. Methods of overcoming this difficulty were described.

GEOGRAPHIC WORK FOR THE CENSUS AND PREPARATION OF CENSUS CONTROL LISTS

149. The seminar had for its consideration the following working papers: Cartography for Census Purposes (E/CN.14/CPH/6), Locality listing and Delimitation of Enumeration Areas (E/CN.14/CPH/9), Preparation and Use of Census Control Lists (E/CN.14/CPH/5, and Mapping for the 1966 Census of Swaziland (E/CN.14/CPH/19), (see Papers IX, X, XI and XII in Volume II).

150. The importance of mapping for census of population and housing was recognized by the meeting. There were, however, different degrees of emphasis in this matter, as some participants were inclined to rely more on locality lists in the actual field work. A few participants explained the thorough cartographic work their countries had done in recent censuses whereas others have either found it so far impossible or have not considered it indispensable to delimit enumeration areas on maps. The reasons for this have variously been the lack of basic maps or of competent staff or of resources while in some conditions enumerators can not be expected to be able to use maps. In many countries mapping can be made very complete in towns but not in rural areas.

151. It was observed that highly skilled staff is in short supply and while some census offices have employed geographers, cartographers and draftsmen (often on loan from their regular jobs), others have arranged to have the mapping done by the cartographic service of the government. Experience shows that when mapping is done in a hurry or using unskilled staff, it tends to be of poor quality and often worthless.

152. The need for good area sampling frames and permanent, multi-purpose area samples makes thorough mapping extremely desirable. Mapping is an operation which, once done, will yield results for a long time to come because it is a relatively much smaller job to update maps for further surveys and censuses.

153. The importance of map acquisition was stressed by a delegate who pointed out that very useful maps may have been prepared by malaria control teams, water resources surveys and many others.

154. It was also pointed out that maps presenting selected results of the census will appreciably improve the value of the census publications.

155. Experience in delimitation of enumeration areas was discussed at considerable length and it was felt that whether it was done on the basis of maps or not, it should be done in the field by competent staff of an intermediate-level office in close contact with village headmen and other persons who know the local conditions. The importance of noting alternative names of localities, names of village headmen and other information which helps the identification of small inhabited places, was repeatedly stressed.

156. The uses of census control lists were reviewed in the light of documentation collected by the UN Statistical Office. The uses to which control lists have been put and the forms and ways in which they have been prepared, have been manifold. The most important use of census control lists in the region has been, and apparently will be in the 1970 round, the control of enumeration. The lists, indicating buildings/compounds and/or living quarters and/or households are made shortly before the enumeration or during it and on the same occasion the units are visibly numbered.

157. The preparation of permanent village indexes (fichiers de villages) was considered a useful part of pre-enumeration field work. Such indexes have been prepared or are being prepared in a number of African countries and they contain information on the location and accessibility of the village, on its satellite hamlets and settlements, on schools, hospitals, missions, establishments, on the most common crops and on many other subjects. A village index is of very great help not only for the statistician but also for administrators and workers in every branch of the government.

OTHER PRE-ENUMERATION FIELD WORK

158. The participants at the Seminar were provided with a working paper entitled Pilot Surveys and Pre-tests of Census Procedures, E/CN.14/CPH/12, (Volume II, Paper XIII). This paper, corresponding to item (a) in the discussion programme contains other points which are comprehensively dealt with in the Hand-book of Population Census Methods, ST/STAT/SER.F/5/Rev.1.

Pilot surveys

159. The need to carry out one or several pilot surveys before the actual census was emphasised; note was also taken of the successful experiments of several countries in this field both with respect to pre-tests and pilot censuses. It was observed that purposive selection was the most suitable for pre-census testing, for it makes it possible to include the areas with specific problems. All the census procedures including those of an administrative nature must be tested, and this can be carried out in several stages.

160. The seminar dwelt on such problems as the pre-testing of questionnaires, training of enumerators and processing, which includes computer coding as well as programming. In view of the fact that the questionnaire is very often prepared both in English and French, it was regarded as a factor for enlarging the geographical field of the pilot survey. As several participants stressed, such a pilot survey facilitates the processing of census results and the publication of these results several months earlier.

161. The participants recognized that pilot surveys help solve various problems such as the operating efficiency of the enumerators and the size of the enumeration zones; furthermore, they noted that these surveys should be carried out in conditions that are similar to those of an actual census. It was considered imperative that there should be sufficient time between the pilot survey and the census. On the other hand, it was pointed out that the determination of concepts could be greatly facilitated by a pilot survey and reference was made to an experiment in which such a survey made it possible to achieve the best definition of the family unit.

Recruitment of staff

162. While some participants preferred that officials, including, teachers, should not be engaged as enumerators because of their inadaptability, many others described their satisfactory experiences in this respect. It appeared that there is a marked tendency to use staff from the civil service; this solution enables the saving of a substantial amount of money, and at times it is the only feasible arrangement where schooling has not advanced. In some cases, even school pupils were used and it was noted that, in Swaziland, secondary school students proved to be good enumerating officers.

Staff training and handbooks

163. Staff training methods were examined in detail by the participants, especially those from Gabon, the UAR and Tunisia. It seems that such training is often carried out in three stages, the supervisory staff beginning training during the pilot survey. Training in the field was combined with courses of a theoretical nature, since field work makes it possible to check the knowledge acquired and to select the staff.

164. Various opinions were expressed concerning the optimum training period for enumerators and there were discussions regarding the relation between such training and the actual census. The question of handbooks was considered by the seminar; it was stressed that they are an important aid to the local authorities whose contribution may be vital. Enumerators must be trained in how to approach the population as well as in actual census methods. For example, they must learn how to present themselves and how best to begin the interview.

Transportation

165. Wherever the co-operation of the administration is difficult to obtain, provision must be made for special items in the census budget to cover the acquisition of vehicles; this is a heavy burden on the budget. On the other hand, in favourable circumstances, arrangements may be made for the allocation of a maximum number of vehicles for the transportation of enumerators during the census period.

166. Some countries have been able to obtain the assistance of the armed forces. It was emphasized that communications in general must not be neglected, and that transportation is only one aspect of this problem. Information must reach the central office from the enumerators and it is thus absolutely necessary that the communications system be thoroughly worked out. In some countries, the radio was used for the transmission of messages.

Distribution of supplies

167. Several participants described the measures taken in their countries to assure adequate distribution of supplies. To this end, it was agreed that the documents and materials required by each enumerator should be distributed well in advance; in some cases, a special office was responsible for these matters.

ENUMERATION PROBLEMS AND PROCEDURES

168. The seminar discussed this topic on the basis of the working paper: Enumeration Problems and Procedures (E/CN.14/CPH/11) (Volume II, Paper XIV of this report), and the background paper Handbook of Population Census Methods Vol. 1 (ST/STAT/SERF/5/Rev.1). The working paper dealt with some of the main problems that might be encountered by census and survey planners; problems which could render census plans ineffective if not given serious consideration in census planning. The special attention given to difficulties in Africa is summarised below.

Physical environment, pattern of settlement and mode of living.

169. This was recognised as giving rise to a number of problems that could lead to errors and particularly to the omission of hamlets and sometimes even large villages. Inaccessibility of some localities especially in thick forest and swampy areas was recognised as a difficult problem. It was agreed that enumerators were sometimes not anxious to get to the very remote hamlets in forest and mountain areas.

170. Another major problem discussed under this topic was the fact that in some arid areas enumerators had to walk long distances to reach widely dispersed settlements.

171. The seminar next considered the differences between urban and rural settlements, their special problems and the procedures required to deal with them. The differences between the types of dwelling houses, the way they are built and modes of living in urban as opposed to rural areas make it imperative that different methods be adopted in order to avoid both duplication and omission in a census or survey.

172. The problems were thought to be more acute in rural areas where the haphazard arrangement of houses makes it difficult for enumerators to cover all of them systematically and therefore leads to omissions. In these areas the difficulty of dividing bigger localities into two or more enumeration areas by boundaries identifiable on the ground was also given attention. Another problem was the possibility of enumerators splitting up certain localities in their work because these might consist of groups of dwelling houses which might appear to be separate hamlets.

173. In urban areas the main difficulties were thought to be the enumeration of slum areas and outdoor sleepers and the special problems of finding the never-at-home single people.

Enumeration of nomads

174. Participants from countries possessing nomads related their experiences in using different methods of enumerating these people.

Among these were:

- (a) Random selection of tents (households) which are grouped with the help of headmen and then enumerated.
- (b) The selection of encampments.
- (c) Selection of water points and their enumeration, particularly during periods when there are concentrations of nomads at these points.
- (d) Selection of groups - tribes or clans - and enumeration of all tents in these groups.
- (e) Selection of sections (fractions) of tribes, the members of which are under the same head, and completely enumerating these sections.
- (f) Enumeration by aerial surveys, which was considered to be possible only in open areas.

175. On the enumeration of nomads special problems were pointed out, including:

1. Enumerators have to be very capable and willing to travel long distances on camels. Attention was drawn to the need for guides who could also look after the animals and it was noted that these requirements could often be met when camels were hired rather than purchased.
2. A hierarchical approach is often necessary in investigating nomadic populations.
3. Nomads are in the habit of crossing national boundaries.

176. It was suggested that the ECA secretariat should encourage studies on nomads by organizing a seminar on their enumeration and also by undertaking special studies of the problem. Countries were requested to send reports on their experiences to ECA.

The enumeration of migrant labourers

177. The problems connected with the enumeration of migrant labourers either in their place of origin (during their absence) or in the places to which they migrate were discussed. The three major difficulties were:

- (a) The fears of migrants during enumeration in their new places of residence, that they might be expelled as a result of the answers given. This was thought to lead to unreliable replies by migrant labourers.
- (b) Where enumeration is on a de jure basis the question of residence qualifications also leads to problems in enumerating migrants who stay for only short periods.
- (c) The main problem in enumerating migrants in their place of origin during their absence is the possibility of getting unreliable replies from people reporting on their behalf. To overcome this it was agreed that questions on absentees should be limited to the barest minimum and to topics which could easily be reported on by others with some accuracy.

178. Before the seminar discussed the next set of topics the means by which the problems already discussed above were considered: These included the following:

- (a) Thorough preparation at all stages of censuses or surveys.
- (b) Proper and clear definition and demarcation of enumeration areas.
- (c) Preparation of complete lists of localities
- (d) Preparation of complete lists of houses before enumeration.
- (e) Numbering of all houses as part of normal administrative work
- (f) Thorough and widespread publicity on the census or survey, giving its aims, uses, etc.
- (g) Co-operation with tribal or village chiefs or headmen.
- (h) The use of special enumerators; e.g., the use of females to enumerate females in Purdah in Moslem areas.
- (i) The division of extremely difficult areas into smaller enumeration areas than in other areas.

Respondents' inability or unwillingness to answer correctly.

179. The seminar gave considerable time to this topic. It was generally agreed that, though groups of respondents might sometimes refuse to co-operate, the main problem in Africa was the inability of respondents to answer correctly as a result of illiteracy, ignorance, forgetfulness and superstition.

180. The main topics considered to raise the most difficult problems were:

- (a) Age:-- This was thought to be the most difficult topic in censuses and surveys in the region. It was agreed that calendars of events should be carefully considered and pretested before use. It was also stressed that these calendars should always go to the local level rather than covering only a few national events which may not be known by the majority of the rural population. In addition to this the use of relative ages or comparison of ages of different persons in a compound or even in a village was recommended as a good supplement to calendars of events in estimating ages.

Attention was also drawn to the possibility that inaccurate age estimates might result from the choice of historical events included in the calendar, particularly if the events listed held some attraction through reasons of national prestige, etc.

The question of rectification and smoothing of the recorded age distribution was discussed. It was recognised that much smoothing might frequently eliminate genuine irregularities in the age distribution, and could be justified only if there was reason to suppose that the graduated figures were in fact nearer the truth than the recorded figures.

The seminar agreed also that improvement of census age data ultimately depended on improvement in civil registration, and supported the United Nations World Programme for the Improvement of Vital Statistics.

(b) Retrospective questions on fertility and mortality

The main difficulties here were recognised to be forgetfulness and sometimes superstition. It was agreed that one way of helping respondents to remember past events was to break up the questions into a number of probing inquiries instead of making a direct request for the facts. The seminar was informed in detail of a socio-medical survey planned in Gabon, the aim of which was to find the causes of the special demographic situation there. In this survey, owing to the nature of the questions and the confidentiality attached to some of them, the plan was to use male nurses to interview male respondents and female nurses to interview female respondents. The ECA secretariat and the representative of WHO expressed great interest in this survey and hoped it would yield good results.

(c) Questions on economic activity

The difficulty experienced in obtaining clear answers to those questions was noted. For industry one way of getting the correct information was to ask for the major product of a person's place of work from which the industry could be determined at the processing stage.

(d) Birth place and usual residence

The principal problem in connection with these questions arises from the tendency of respondents to identify the place of usual residence with birth place. There is also the possibility that either of these may be confused with the home town of a respondent.

(e) Names:

Lastly the problem of respondents declaring different names in the main census or survey and in the post-enumeration check was given attention. It was agreed that one solution is to ask all respondents to declare all their names in both operations.

Enumerators errors.

161. The seminar also considered problems arising from enumerators' errors. Participants were warned of the desire of enumerators to simplify their work and the errors to which this might lead. Among these errors are:

- (a) Biases in estimating ages.
- (b) Enumeration of people in groups in public places instead of individually in their houses.
- (c) Fictitious entries.
- (d) Missing and inconsistent entries.

It was stressed that in order to avoid these errors training should be thorough and supervision in the field very strict and comprehensive.

DATA PROCESSING AND PUBLICATION PROGRAMME

182. As basis for the discussion of this subject the meeting had the following papers: E/CN.14/CPH/7 and E/CN.14/CPH/7/Add.1 entitled Electronic Data Processing of Census Data Part I, Machine Processing of Census Data, and Part II, Some Principles of Computer Processing of Census Data, respectively (which are reproduced as Paper XV in Volume II of this report).

Data Preparation

183. It was noted that, in addition to the punched card, the punched papertape and the mark-sensing card of standard format, larger formats for mark sensing as well as forms for optical character reading are now available.

184. It was mentioned that one of the participating countries is going to make an experiment with the IBM Model 1287, Optical Character Reader. The test, scheduled as a part of a pilot census to be taken around August 1968, is planned to give answers to the following questions:

- 1) Is the handwriting among the coders readable to an acceptable degree by the 1287?
- 2) Is that part of the coding, that is going to be made in the field, working acceptably?
- 3) Is the physical condition of the questionnaires, after having been filled in the field, acceptable?

The country in question intended, if the test proved successful, to use the 1287 for its 1969 census of population and housing, and pointed out that, in this case, it expected to make the data preparation faster and cheaper than with ordinary key-punches.

185. As for key-punching, it was mentioned that, with respect to the well known difficulties in training personnel for efficient use of the automatic punching and verifying equipment, it might be as well to use ordinary hand-punches and hand-verifiers. It was, however, noted that hand-verification must be supplemented with special arrangements for re-verification. This is particularly important where a bonus-payments system might encourage operators to pass un-checked cards.

Editing and correcting

186. The need and usefulness of automatic editing was, quite naturally, recognized, both at the pre-tabulation stage and at the different stages between tabulations. The possibilities of using the computer for automatic corrections were explained. It was noted, that there are special difficulties in creating suitable criteria for such corrections in countries without previous census experience.

Elimination or reduction of manual checking

187. It was mentioned that the checking by computer might make it possible to reduce manual revision of coding as well as verification of punching to a sample level. The traditional method for checking left - or right-shifted punching was described.

Choice of input method

188. In an intermediate summary it was stated, that a wide variety of input methods was available, and that a rational choice between them would require a thorough testing, well in advance of the fixed census date, should such date be fixed at all before the testing.

Tabulation

189. The often disastrous effects of delayed planning of the tabulations were noted. Two very large underestimates of processing time requirements made by two service-bureaus in Africa, were reported. It was stressed, that a "dress-rehearsal" of the tabulation programme was the necessary - although not always the sufficient - condition for a successful and timely processing of a census.

Analysis

190. It was mentioned that the editing in its later stages - could be developed to serve not only as an error-finding tool but also as an analytical tool. Immediate analysis in each stage could be used to detect, early enough, misunderstandings or bad habits among the coders.

Steps in the production of tables

191. It was noted that it might be useful, especially for African countries without a census tradition, to prepare and study preliminary tables before finalising the tabulation programme to be used for the census publications.

Offset printing

192. Different methods of preparing documents for offset printing were described: printing on continuous stencil forms, superimposition of text and frames through the use of transparent media, electronic photo composition etc. The meeting recognized the advantage of the offset method over the ordinary type-setting method in cost, speed and accuracy. It was noted that proofreading could be almost eliminated if offset plates were derived directly from the machine tabulations.

Technical assistance, cooperation and services

193. United Nations Technical Assistance in the data processing field at the national, regional and inter-regional levels was mentioned as well as the corresponding assistance given by the Bureau of the Census in the United States. The efforts of the Secretariat to develop a series of generalized procedures for the processing of censuses of population and housing were described. The meeting was informed of the present computerization of the demographic statistics at the Secretariat and of its interest in receiving data for the international statistics being compiled on magnetic tape.

194. The meeting was also informed of ECA's effort to upgrade its³⁴⁶ present data processing equipment with the addition of magnetic tapes and disks in order to make it more suitable for training and for compilation of statistical data for the region. It was noted that the secretariat also hoped to undertake processing on a service basis.

Computer-coordination

195. It was noted that some African countries have appointed special data processing committees to coordinate the governmental procurement and use of computers.

EVALUATION OF CENSUS RESULTS

196. The working paper for the session was Methods of Evaluating the Reliability of Population and Housing Census Data, (E/CN.14/CPH/4). (See Volume II of this report, Paper XVI).

Objectives of an evaluation programme

197. The seminar discussed and agreed that the basic objectives of a complete evaluation programme should be:

- (a) to determine the level of accuracy of the census results in regard to their coverage and content;
- (b) to indicate to the users of the data the limitations of the results and, if possible, to correct some of the errors; and
- (c) to determine the causes of errors, which would also include an investigation of the characteristics of the living quarters, households and persons involved.

198. The delegates accepted the fact that no censuses or surveys are free from error, so that an evaluation of data is important, and also agreed that any evaluation programme which points out the limitations of published data increases the value of and confidence in the data.

The sources and types of errors in census enumerations

199. There are two main types of errors:

- (a) Errors of coverage which can be either under-enumeration or over-enumeration of the population or housing units, or erroneous inclusions. Under-enumeration may arise as a result of omission of living quarters, households, persons within households, etc. Over-enumeration can of course, arise from duplications in respect of these factors.
- (b) Errors of content: These are errors which arise as a result of the respondent's inability to give correct answers to questions asked.

200. The possible sources of error were thought to be:

- (a) Inadequate preparations for the census,
- (b) Use of inadequate maps and incomplete locality lists in the census.
- (c) Inadvertent omission of houses due to the haphazard arrangement of houses in certain places.
- (d) Inaccessibility of certain areas in certain difficult parts of a country.
- (e) Enumerators' inability to get to some areas for one reason or another.
- (f) Fictitious enumeration by some enumerators.
- (g) Lack of supervision during enumeration.

201. Errors of content usually arise from:

- (a) The inability of enumerators to put census questions properly.
- (b) Respondents' unwillingness to answer certain questions correctly because of ignorance, superstition or other reasons.
- (c) Ambiguous questions.

Methods of Evaluation

202. Post-enumeration sample field check. This involves the comparison of records from the census with records independently obtained by field methods. A true post-enumeration field check must meet three specific criteria.

- (a) It must be independent of the original enumeration.
- (b) It must be representative of the whole country and all population groups.
- (c) It must involve one-to-one matching of records to produce an identical group from each operation.

203. The seminar agreed that, as a sampling frame for the post-enumeration check, a list of complete enumeration areas or segments of them is to be preferred to a list of houses, households or persons. It was also agreed that one-to-one matching in the office might still leave some unanswered questions which in most cases can only be resolved by going back to the field. In Africa in particular matching is made extremely difficult by the fact that some persons may give two different names during the two operations.

204. The merits and demerits of post-enumeration surveys were discussed at length, with illustrations of experiences from some countries in the region. Two other methods of checking on census results were described by one delegate.

205. The first method involves recording both the de-facto and de jure populations in surveys and comparing the two to see how much they differ. The second involves the comparison of questionnaires completed during successive visits to the same houses.

206. Though the seminar accepted post enumeration field checks as the most direct and objective method of checking census and survey results, it also warned that it is a very costly venture and should be carried out with great care and thorough preparation to ensure success. It was stressed that these checks were themselves subject to errors and in fact might in some cases produce results less accurate than the main operation, if not organized properly. Care should be taken to ensure that concepts and definitions used in a post enumeration check are not different from those used in the main census or survey; that the frames used in selecting the sample are complete, and that the check is undertaken as soon as possible after the census or survey. Lastly it was stressed that care should be taken in interpreting the results of any post enumeration check and that all discrepancies found between the census and post enumeration checks should not automatically be considered as errors in the census.

207. Checking census results against records from other sources. This method was accepted as worthwhile but of very little relevance in Africa at present because the records usually required for such comparisons are not available and even where available are very incomplete. However though records such as population registers and birth registers are usually not available, it was agreed that census records could be compared with school enrolments for some areas and perhaps data on foreigners could be checked against foreign residents' registers where these existed.

208. Analytical checks of the reliability of the data obtained. These are indirect methods of detecting errors in the enumeration consisting of critical analysis of the internal consistency of census results and finding out how far the results conform to expected values obtained from other sources. These methods cannot, in themselves, produce an assessment of accuracy; all they can do is to produce a clue to possible errors which must be followed up by additional analyses designed to prove or disprove the possibilities.

209. One of the methods, the balancing method, usually employed in analytical checks on census coverage is, however, not applicable in Africa at present because the data required for this check - registered births, deaths, immigrants and emigrants - are not available,

210. Analytical studies of certain characteristics obtained in a census can be carried out. These include distributions of the population - or sections of it by age and sex and marital status, etc. It was pointed out that in making analytical studies of census data care should be taken to avoid interpreting as an error every peculiarity which makes a population different from the norm expected in the advanced countries. Where these peculiarities can be fully explained they should not be considered as errors.

Evaluation techniques in African censuses.

211. Available data show that 12 countries have carried out post enumeration field checks of population census results and two on housing census results. Out of these 12 only four carried out checks on content error. It was, however, pointed out that the results of many of these checks have not been published and that publication of the results was vital since it helps countries to learn from experiences elsewhere in the region.

OTHER BUSINESS

212. In its earlier discussions, the seminar had drawn attention to the importance of circulating material on all aspects of census organization between countries, either direct or through ECA. As an additional means of ensuring the fullest utilisation of regional experience, the seminar proposed that countries undertaking population and housing censuses should accept trainees from other countries. It was noted that arrangements in this connection were a normal function of the secretariat, but that no provision for fellowships was included in the regional budget.

213. However, the meeting was pleased to learn that the Population Council would be prepared to consider applications for fellowships. Other possible sources of finance were the African governments themselves and UN country technical assistance programmes. It was emphasized that all arrangements for training of the type discussed would need to be initiated well in advance of the actual visits. The participants from Morocco and Togo indicated the willingness of their countries to receive trainees, provided funds for fellowships could be made available.

214. In reply to an enquiry, it was stated that no progress could yet be reported on the possible establishment of census training courses at the Yaoundé statistical centre. This matter had previously been discussed by the Fifth Conference of African Statisticians and the project was being considered by the UNDP (Special Fund).

215. The seminar expressed its regret that there was no definite news regarding the establishment of these facilities. However, demographic courses were available for English speaking trainees at the US Bureau of the Census, and USAID were organising a course on population change. Countries had been informed of arrangements for these projects.

216. The secretariat undertook to ensure that statistical working documents would be circulated to all African Statistical Offices, irrespective of whether these offices were sending participants to meetings.

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Seminar Programme

1. Opening addresses.
2. Seminar programme.
3. General census planning.
4. Co-ordination between housing censuses and population censuses and of these censuses with other statistical inquiries and compilations
5. Structure of the census organisation and estimation of the number of field staff.
6. System of payments to field staff and of cost estimates.
7. Use of sampling in conjunction with censuses.
8. Selecting topics, planning the tabulation programme and designing the questionnaire(s).
9. Geographic work for the census and preparation of census control lists.
10. Other pre-enumeration field work.
11. Enumeration problems and procedures.
12. Data processing and publication programme.
13. Evaluation of census results.
14. Adoption of report.

Guide for Discussion

Monday 17 June

a.m.

Item 1

Opening addresses

Item 2

Seminar Programme

Monday 17 June

p.m.

Item 3

General Census Planning

Chairman: Mr. Colecraft

Discussion leaders:

Miss Powell

Mr. Kannisto

Principal issues

- (a) Definition, objectives and essential features of a population census and of a housing census
- (b) Census planning and the timing of the various operations, including the choice of the census date
- (c) Legal basis
- (d) Simultaneity
- (e) Budgeting and cost control

Working paper:

Planning a Population and Housing Census
(E/CN.14/CPH/18)

Background papers:

Principles and Recommendations for the 1970 Census of Population (ST/STAT/SER.M/44)

Principles and Recommendations for the 1970 Census of Housing (ST/STAT/SER.M/45)

Handbook of Population Census Methods Vol. I
(ST/STAT/SER.F/5Rev.1)

Plans for the 1970 Census of Population and Housing in the United States

Tuesday 18 June

a.m.

Item 3

General Census Planning (cont.)

Chairman: Mr. Naceur Ledjri

Discussion leaders:

Mr. Kannisto
Mr. Blacker

Principal issues

- (f) De facto or de jure population or a compromise between the two
- (g) Type of design for the field enumeration
- (h) Publicity
- (i) Programme of analysis of census data
- (j) Recording of census experience

Working and background papers:

As for the preceding session with the addition of The Development of Demographic Surveys in the French-speaking African States (E/CN.14/CPH/17)

Tuesday 18 June

p.m.

Item 4

Co-ordination between housing censuses and population censuses and of these censuses with other statistical inquiries and compilations

Chairman: Mr. El Baz Rizk

Discussion leaders:

Miss Powell
Miss Jupp

Principal issues

- (a) Housing and population censuses: Co-ordination between the two operations in respect of
 - (i) Preparatory work, enumeration and processing and (ii) common or related conceptual elements of topics to be investigated; (iii) advantages and disadvantages of combined and separate operations
- (b) Housing and/or population censuses in relation to other statistical operations: (i) agricultural censuses, (ii) censuses of establishments, (iii) inter censal sample surveys of various kinds, (iv) current statistics

Working paper: Co-ordination between Housing Censuses and Population Censuses and of these Censuses with Other Statistical Inquiries and Compilations (E/CN.14/CPH/3)

Wednesday 19 June

a.m.

Item 5

Structure of the census organization and estimation of the number of field staff

Chairman: Mr. Dassoundo

Discussion leaders:

Miss Jupp
Mr. Ghansah

Principal issues

- (a) Central census office and regional (provincial) or district officers; various intermediaries depending on the size and complexity of the country; supervisors; enumerators
- (b) Structure of the central census office and numbers of staff of various grades required
- (c) Census advisory committee
- (d) Liaison with other government departments and universities
- (e) Estimating the number of field staff required
- (f) Use of auxiliary field staff: guides, interpreters, headmen, etc.
- (g) Recruitment of staff

E/CN.14/423
E/CN.14/CAS.6/7
ANNEX III
Page 4

Item 5 (cont'd)

Working papers:

Planning a Population and Housing Census
(E/CN.14/CPH/18) paras. 69-93.

Structure and Size of African Census Organizations
and Estimation of Census Costs (E/CN.14/CPH/10)

Background papers:

Summaries of procedures adopted in recent censuses
in selected African countries

Wednesday 19 June

p.m.

Item 6

System of payments to field staff and
of cost estimates

Chairman: Ato Mekonnen Tekle Haimanot

Discussion leaders:

Mr. Blacker

Mr. Ba

Principal issues

- (a) Payment of supervisors and enumerators by single lump sum; by lump sum for training period plus daily or hourly rates for the enumeration; payment per head of population enumerated; no payment at all; compensation to government employees for census work; etc.
- (b) Other items of census costs: Salaries of central and district staff; printing, stationery, equipment; travel and transport charges; salaries of processing staff and rental of machines; mapping; contingencies, etc.
- (c) Methods of presenting the census costs

Working paper:

Structure and Size of African Census Organizations
and Estimation of Census Costs (E/CN.14/CPH/10)

Background papers:

Summaries of procedures adopted in recent censuses
in selected African countries

Thursday 20 June

a.m.
p.m.

Item 7

Use of sampling in conjunction
with censuses

Chairman:

Discussion leaders:

a.m. Mr. Monyake
p.m. Mr. Falodun

Mr. Som
Miss Jupp

Principal issues

- (a) Advantages and disadvantages of sampling
- (b) Conditions of acceptable sample operations
- (c) Testing of census procedures
- (d) Collection of data on additional topics
- (e) Post-enumeration field checks
- (f) Quality control of data processing
- (g) Tabulation of provisional results
- (h) Additional tabulations
- (i) The census as a basis for subsequent sample inquiries

Working papers: Use Use of Sampling in Population and Housing Censuses
(E/CN.14/CPH/8)

The Development of Demographic Surveys in the
French-speaking African States (E/CN.14/CPH/17)

Background paper: African Recommendations for the 1970 Population
Censuses (E/CN.14/CAS.6/1)

Friday 21 June

a.m.

Item 8

Selecting topics and planning the
tabulation programme

Chairman: Mr. Walusiku

Discussion leaders:

Mr. Som
Miss Jupp
Mr. Ghansah

Principal issues

- (a) Brief resume of factors determining choice of topics and tabulations in a population census; the African recommendations for the 1970 population censuses; definitions and specifications of fundamental importance
- (b) Similarly for housing censuses

Working papers:

The Collection of Data on Fertility and Mortality
in African Censuses of Population (E/CN.14/CPH/14)
Age Data in African Censuses and Surveys
(E/CN.14/CPH/13)

Background papers:

Principles and Recommendations for the 1970
Population Censuses (ST/STAT/SER.M/44)

Principles and Recommendations for the 1970 Housing
Censuses (ST/STAT/SER.M/45)

African Recommendations for the 1970 Population
Censuses (E/CN.14/CAS.6/1)

African Recommendations for the 1970 Housing
Censuses (E/CN.14/CAS.6/2)

Friday 21 June

p.m.

Item 8 (cont'd)

Designing the questionnaires

Chairman: Mr. Byarugaba

Discussion leaders:

Mr. Blacker

Mr. Kannisto

Principal issues

- (a) Types and styles of questionnaire
- (b) Framing and ordering of questions
- (c) Types of questions and methods of entering replies
- (d) Merits and de-merits of pre-coding; use of code lists
- (e) Instructions for completing the questionnaires
- (f) Methods of relating population and housing questionnaires in a combined population/housing census (or survey)

Working papers: As for preceding session

Background paper: Handbook of Population Census Methods, Vol.1

Monday 24 June

a.m.

Item 9

Geographic work for the census
and preparation of census control
lists

Chairman: Mr. Wesner Joseph

Discussion leaders

Mr. Kannisto
Mr. Blacker
Miss Powell

Principal issues

- (a) Organization and staffing of geographic unit
- (b) Map requirements and availability
- (c) Steps in a mapping programme
- (d) Locality listing and urban/rural classification
- (e) Census administrative divisions and enumeration area mapping and description
- (f) Delimiting EAs without the use of maps
- (g) Uses, preparation and content of control lists of houses or of households

Working papers:

Cartography for Census Purposes (E/CN.14/CPH/6)

Locality Listing and Delimitation of Enumeration
Areas (E/CN.14/CPH/9)

Preparation and Use of Census Control Lists
(E/CN.14/CPH/5)

Mapping for the 1966 Census of Swaziland
(E/CN.14/CPH/19)

- 9 -

Monday 24 June

p.m.

Item 10

Other pre-enumeration field work

Chairman: Mr. Jacques Akehossi

Discussion leaders:

Mr. Van den Reysen
Miss Jupp

Principal issues

- (a) Testing of census questionnaires; pilot tests of other aspects of census procedures; evaluating results of pre-tests
- (b) Sources of recruitment for African censuses
- (c) Training courses: timing and length of training period; class work; field-work; examinations
- (d) Manuals of instructions to field workers
- (e) Transportation
- (f) Despatch and control of supplies

Working paper:

Pilot Surveys and Pre-Tests of Census Procedures
(E/CN.14/CPH/12)

Background papers:

Handbook of Population Census Methods, Vol. I
(ST/STAT/SER.F/5/Rev.1)

Tuesday 25 June

a.m.

Item 11

Enumeration Problems and Procedures

Chairman: Mr. Sayed Omer El Tay

Discussion leaders:

Mr. Ghansah

Mr. Van den Reysen

Principal issues

Difficulties arising in Africa from:

- (a) The physical environment, patterns of settlement and mode of living; different procedures required in the case of urban populations, rural/sedentary, rural/dispersed, semi-nomads, nomads.
- (b) Migrant labourers
- (c) Respondents' inability or unwillingness to answer correctly because of forgetfulness, ignorance, or specific religious, ethnic or other reasons.
- (d) Enumerators' errors

Working paper:

Enumeration Problems and Procedures (E/CN.14/CPH/11)

Background paper:

Handbook of Population Census Methods Vol.I
(ST/STAT/SER.F/5/Rev.1)

Tuesday 25 June

p.m.

Item 12

Data processing and publication
programme

Chairman: Mr. Abdellatif Imani

Discussion leaders:

Mr. Berggren
Mr. Kannisto

Principal issues

- (a) Checking, editing, coding and hand-processing
- (b) Machine processing by conventional equipment
- (c) Electronic processing
- (d) Programme for publication of census results: provisional totals, advance tabulations, final tabulations; additional tabulations; tabulations not intended for publication

Working papers:

Electronic Processing of Census Data

Part I. Machine Processing of Census Data
(E/CN.14/CPH/7)

Part II. Some Principles of Computer Processing
of Census Data (E/CN.14/CPH/7/Add.1).

Wednesday 26 June

a.m.

Item 13

Evaluation of census results

Chairman: Mr. Mwaniki

Discussion leaders:

Mr. Ghansah
Miss Jupp

Principal issues

- (a) The sources and types of errors in census enumerations
- (b) Objectives of an evaluation programme
- (c) Field checks
- (d) Checking against records from other sources
- (e) Analytical checks of reliability of the data obtained
- (f) Evaluation techniques in African censuses

Working paper:

Methods of Evaluating the Reliability of Population
and Housing Census Data (E/CN.14/CPH/4)

Wednesday 26 June

p.m. and

Thursday 27 June

a.m.

Free

Thursday 27 June

p.m.

Adoption of report (cont.)

Mr. M. Etienne

Adoption of report

Mr. M. Etienne

Friday 28 June

a.m.

Closing session

LIST OF DOCUMENTS

Code	Title	Languages	
E/CN.14/CPH/1	Provisional Seminar Programme	E	F
E/CN.14/CPH/2	Provisional Guide for Discussion	E	F
E/CN.14/CPH/3 ST/STAT/21	Co-ordination between Housing and Population Censuses and of these Censuses with other Statistical Inquiries and Compilations	E	F
E/CN.14/CPH/4 ST/STAT/19	Methods of Evaluating the Reliability of Population and Housing Census Data	E	F
E/CN.14/CPH/5 ST/STAT/22	Preparation and Use of Census Control Lists	E	F
E/CN.14/CPH/6 ST/STAT/25	Cartography for Census Purposes	E	F
	Electronic Processing of Census Data	E	F
E/CN.14/CPH/7	Part I. Machine Processing of Census Data		
E/CN.14/CPH/7 Add.1 ST/STAT/33	Part II. Some Principles of Computer Processing of Census Data		
E/CN.14/CPH/8	Use of Sampling in Population and Housing Censuses	E	F
E/CN.14/CPH/9	Locality Listing and Delimitation of Enumeration Areas	E	F
E/CN.14/CPH/10	Structure and Size of African Census Organizations and Estimation of Census Costs	E	F
E/CN.14/CPH/11	Enumeration Problems and Procedures	E	F
E/CN.14/CPH/12	Pilot Surveys and Pre-Tests of Census Procedures	E	F
E/CN.14/CPH/13	Age Data in African Censuses and Surveys	E	F
E/CN.14/CPH/14	The Collection of Data on Fertility and Mortality in African Censuses of Population	E	F
E/CN.14/CPH/15	Provisional List of Documents	E	F
E/CN.14/CPH/16	Provisional List of Participants	Bilingual	
E/CN.14/CPH/17	The Development of Demographic Surveys in the French-speaking African States	E	F
E/CN.14/CPH/18	Planning a Population and Housing Census	E	F
E/CN.14/CPH/19	Mapping for the 1966 Census of Swaziland	E	F

The following background papers will also be available:

Code	Title	Languages	
ST/STAT/SER.M/44 Sales No.:67.XVII.3	Principles and Recommendations for the 1970 Population Censuses	E	F
ST/STAT/SER.M/45 Sales No.: 67.XVII.4	Principles and Recommendations for the 1970 Housing Censuses	E	F
E/CN.14/CAS.6/1	African Recommendations for the 1970 Population Censuses	E	F
E/CN.14/CAS.6/2	African Recommendations for the 1970 Housing Censuses	E	F
ST/STAT/SER.F/5 Rev.1 Sales No.:58.XVII.6	Handbook of Population Census Methods, Vol. I.	E	-
...	Plans for the 1970 Census of Population and Housing in the United States	E	-
...	Summaries of Procedures Adopted in Recent Censuses in Selected African Countries.	Original language	