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THE COLLECTION OF DATA ON FERTILITY AND MORTALITY IN AFRICAN CENSUSES OF POPULATION

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Introduction

1. The present position of the African region concerning the availability of accurate fertility and mortality data is highlighted by the fact that for the crude birth rate, complete registration statistics cover only 3 per cent of the total population of the region. Estimates obtained from ad hoc demographic sample surveys cover 36 per cent of the population (adjusted survey estimates are available, computed on basis of comparison of the total and the cumulated current fertility data, for 22 per cent of the population, and on basis of recall analysis for 3 per cent of the population). "Reverse survival" estimates cover another 24 per cent of the population, of which data of relatively low or uncertain accuracy cover 14 per cent of the population: estimates obtained by other methods relate to 22 per cent of the population. This comparatively unsatisfactory progress in regard to vital statistics was also noted by the Fifth Conference of African Statisticians.

2. The population enquiries which provided direct estimates of the current levels of fertility and mortality were not generally complete censuses at the national level, except in some specific areas (usually urban). The approach for the 1970 round of censuses, evolved by the two regional working groups on the 1970 round of population and housing censuses and endorsed by the Fourth and Fifth Conferences of African Statisticians,[1/] has been to encourage the African countries to undertake complete censuses instead of sample surveys. As many of the countries may not be able to undertake both a population census and an ad hoc demographic sample survey very soon one after the other, efforts are needed to utilise the census medium to collect data on fertility and mortality so as not to leave any gap in data-analysis relating to population dynamics, required for planning for economic and social

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1/ African Recommendations for the 1970 Population Census (E/CN.14/CAS.5/-CPH/9).

development, until another census is conducted, generally with an interval of ten years. The Census also provides the base population required for computing different vital rates.

World recommendations and African variants

3. The World recommendations for the 1970 population censuses, adopted by the Statistical Commission at its fourteenth session, include topics on total fertility (children born alive, and children living) as "recommended" items.[2/] The African variant of the world recommendations, endorsed by the Fifth Conference of African Statisticians, also include the topics on total fertility as "recommended" topics, and those on current fertility and mortality (live births in last 12 months, and deaths in last 12 months by sex and age) as "other useful" topics, all of these to be collected on a sample basis.[3/]

Methods of enumeration

4. The collection of fertility and mortality data in connection with African population censuses may be done in either of the three ways: (i) collection of data in the census proper with universal coverage; (ii) collection of additional data from a sample of population concurrently with the census (and not in a separate enquiry); and (iii) use of the post-enumeration field surveys (which have been endorsed by the Fifth Conference as an important part of population censuses) as a means of collecting other demographic data including vital statistics.[4/]

2/ Principles and Recommendations for the 1970 Population Censuses, United Nations, Statistical Papers, Series M, No.44 (Sales No.: 67.XVII.3), 1967.

3/ African Recommendations ....., para. 19.

4/ The Census frame and other information may also be utilized in designing subsequent demographic sample surveys. This aspect is not being discussed in the present paper, but reference may be made to the document, Sampling for Demographic and Housing Surveys and Civil Registration, prepared for the Seminar on Sampling Methods (E/CN.14/SM/3).

5. Collection of data in the census proper with universal coverage: This, the simplest procedure of all, has however certain limitations: in addition to loading the census questionnaire, obtaining accurate information on fertility and mortality require more elaborate formulation by better-trained enumerators than is possible in the census proper. However, in countries with relatively small populations, it may be feasible to collect these data on a complete enumeration basis, as was done in the Census of Swaziland in 1966.

6. Collection of data on a sample basis[5] concurrently with the census: This may take either of the two forms:

(i) Collecting the data from a sample of households, for example, from every tenth household enumerated by all the enumerators;

(ii) Completely enumerating a sample of areas by a specially trained corps of enumerators using a more detailed questionnaire.

7. The first method, in addition to the risk of biased sampling by the enumerators, again has the limitation that the better enumerators cannot solely be used for collecting the additional data, although a comparative analysis of the data obtained by these and other enumerators might, if the design so permits, reflect the differential biases of the different types of enumerators. The second method avoids these limitations[6]. In addition, non-sampling biases are likely to be much less in this procedure because of the possibility of the cross-check of the data of neighbouring households: also deaths to single-member households, no longer existing at the time of the enquiry (a more general but less common case is the deaths to all members of a household) are also obtainable preferably on the complete enumeration of the compact areal units and enquiring about

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5/ We shall always consider probability samples, in which all the units of the statistical universe have definite, known chances of being included, and from which estimates of the generally unknown universe characteristics can be built up with attached probability statements.

6/ Also see paragraph 51 of Use of Sampling in Population and Housing Censuses (E/CN.14/SM/4/; E/CN.14/CPH/8).

such cases in say every tenth household:[7] this method, which has been used in other regions, may also be tried in the African countries. The possibility of reduction of non-sampling errors can often outweigh theoretical advantages of reduction of sampling errors by sub-sampling for households within the areal units.

8. Collection of Data in the post-enumeration field surveys: As the post-enumeration checks have been recommended to be conducted in the form of probability area samples, the same advantages as for the last mentioned method will also apply.[8]

9. Periodic (follow-up) and continuous observation sample surveys: These might also be used in connection with population censuses. They involve fewer assumption than a single-round retrospective enquiry, but cost much more at the field stage and generally involve greater complexity at the processing stage.[9]

Errors and biases in collected data

10. The recommended and other useful topic on total (or historical) fertility and on current fertility and mortality have already been mentioned in paragraph 2. In addition to sampling errors (if the data are collected on a sample basis), these type of data are also subject to non-sampling errors and biases which are often larger in magnitude than the sampling errors.[10] The response (or ascertainment) errors may consist of the following factors, either singly or in combination:- recall lapse; boundary effect (under- or over-enumeration of events arising from extending or shortening the reference period); age mis-statement; under-

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7/ See also, Sampling for Demographic and Housing Surveys and Civil Registration, Section 3.

8/ For further details see Use of Sampling in Population and Housing Censuses.

9/ For details, see Sampling for Demographic and Housing Surveys and Civil Registration, Section 3.

10/ For further details see R.K. Som, Recall Lapse in Demographic Enquiries Asia Publishing House, Bombay 1968.

enumeration of children ever born, resulting from the exclusion of those since dead, especially shortly after birth, and those living elsewhere; under-enumeration of deaths resulting from the sorrows attached; under-enumeration of births owing to superstition in reporting; and not differentiating own children from others.

Suggested procedures

11. There are two advantages in asking both the current and the historical types of fertility and mortality data; first, these can be used as cross-checks, and second, analytical methods developed can be used to obtain more accurate estimates from these data, than can be obtained from either singly.[11/]

12. Topics and questions: It will be convenient at this stage to distinguish the topics to be covered and the questions to be asked. A common mistake in schedule design is to restrict oneself to the items for which final estimates are required, and not to include their components or those which are required to elicit the desired information. The inclusion of such auxiliary items in the schedule at a marginal cost has two advantages: first, such information acts as checks on that on the principal items; second, these may be standardized and not left to the enumerators to formulate.

13. Total fertility:[12/] On the topics on total fertility, instead of asking the simple questions, "How many children were born alive?" and "How many children are now alive?", it should be advantageous to have information separately collected for all women (irrespective of their

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11/ A.J. Coale and P. Demeny, Methods of Estimating Fertility and Mortality from Censuses of Population, Princeton, 1966; Methods of Estimating Basic Demographic Measures from Incomplete data, United Nations Publication (Sales No.: 67.XIII.2); W. Brass, A.J. Coale, P. Demeny, D. Heisel, A. Romaniuk, and E. van de Walle, The Demography of Tropical Africa, Princeton University Press, 1968 (in press).

12/ Also see, African Recommendations ....., paras. 110-114; and Demographic and Housing Statistics, Recommendations for the Improvement and Standardization of Vital Statistics: Draft Proposals, Statistical Commission, Fifteenth session (E/CN.3/388/add.1).

marital status and the legitimacy of the children's birth) on those born alive but since dead and those living, and among the same category, those living in the present household and those living apart, these numbers being expressed separately for the two sexes. Again the total number of children dead might be separated into those who died in the last 12 months and those who died before that period. For women married more than once, information might be collected separately for each marriage.

14. The boundary effect would be absent in the data on total fertility unless the fertility performance and the mortality effects to the children are sought to be analysed for the different durations of marriage. Historical calendars have sometimes been used with varying degrees of success to reduce such boundary effects in total and current types of fertility and mortality data.

15. Current births and deaths:[13/] If the question on current births is asked of the mothers who are alive on the census date, those occurring to mothers who were dead by the census date would be omitted; similarly, there should be some procedure of collecting information on deaths to all the members of a household, or to persons after whose death the household dissolves or reforms in more than one part. Thus, unless such births and deaths are included, we would not get the totality of all the births and deaths in the reference period. The procedure adopted for recording deaths in the Indian National Surveys since 1958 has been as follows: if a household disintegrates consequent on the death or a person, his death will be recorded in the household in which the surviving members are residing as normally resident members. If a household splits up consequent on the death of, for example, the head of a joint family, and his widow survives, the death will be recorded in the household where she is now considered as a usual member; otherwise,

13/ Also, see African Recommendations....., paras. 115-119; and Demographic and Housing Statistics .....

the order would be the senior male survivor down through all the males; and if none, the senior female survivor down through all the females.[14/]

16. It may also be noted that mortality estimates for African countries are generally much less satisfactory than fertility estimates; infant mortality rates are, moreover, subject to proportionately greater error than crude death rates, since deaths of infants are more likely to escape reporting.

17. Additional items: The items mentioned above are the basic minimum for estimating vital rates. However, the greater the details recorded, the better will be the possibilities of obtaining more accurate estimates and a deeper understanding of the underlying factors. These may relate either to the study of the fertility and mortality differentials according to different social and economic indicators, such as education, economic activity, etc. of the parents, or to the studies of intrinsically demographic interest. For the latter purpose in a study of historical fertility may be collected additional data for each couple on ages at formal marriage, at effective marriage, at termination of marriage (if terminated), and at present of the husband and the wife, the interval between successive births, the present age (or age at death, if dead) of the children, etc. The additional data on current births may include, among others, presence of the mother and the child in the household, age of mother at reported birth and at first birth, interval since previous births, order of birth, sex, date of birth and mode of determination, place of birth, type of medical attendance at birth, for those born alive present age of the child if now living (and age at death, if since dead), or whether born dead, and the relation of the child to the informant; those on deaths should include,among others, relation to head of household, age at death, sex, date of death, and how determined, place of death, type of medical attendance, and relation of deceased to the informant.

14/ Indian Statistical Institute, National Sample Survey, Seventeenth Round, Instructions to Field Workers, 1961, Calcutta.

18. Recall lapse observed in current and historical fertility and mortality data can be examined and sometimes adjusted by recall analysis[15].

19. Dates of last birth and death: It may also be advisable, as was done in some French-speaking African countries, to ask for the dates of the last birth and death in the household and then to decide whether or not the events should be allocated to the last 12 months, rather than leave it to the judgement of the respondents.

20. Data on survival of parents: While plausible estimates of the levels of infant and child mortality could generally be obtained from the data on historical and current fertility and mortality data asked of adult women, estimates of the levels of adult mortality had to be made from single-parametric model life tables. It had been suggested earlier by Louis Henry that in order to estimate adult mortality the members of the household should be asked whether their parents have survived.[16] The analysis would involve a complex system of weighting depending on the number of children of the parents and probability of inclusion in the sample: the system of polygamy, prevalent in many African societies, would introduce an additional complicating factor. The question was included in some sample surveys conducted in Chad and in parts of Cameroon, and William Brass has evolved a technique of analysing the results and converting them into standard life table functions: the preliminary analysis of the small amount of data so far available showed that the procedure could give sensible results and therefore encourages further exploration.[17] The inclusion of such a question has been recommended recently by the Regional Advisor on Demographic Statistics of the Economic Commission for Africa for the projected Censuses in Uganda and Kenya. These questions, which are straight-forward, involve no dating, and should normally be answerable by the respondents without difficulty, might be considered for inclusion in the population censuses in other African countries.

15/ R.K. Som, Op. cit.
16/ L. Henry, "Mesure indirecte de la mortalité des adultes", Population, 1960, No.3.
17/ W. Brass, manuscript, 1967.

Concluding Remarks

21. It would appear that with the present limitation of resources and skilled personnel in most of the African countries, there is no choice but to conduct demographic enquiries on a sample basis to provide short-term accurate vital data, for the alternative would be to collect scarcely any data at all. The opportunity provided by the census medium should be taken advantage of by integrating such enquiries with it. Such sample surveys will also make it possible to ensure quality checks and incorporate special analytical techniques to adjust for response biases in the collected data.

22. However, as was stressed in the Seminar on Vital statistics in Africa in 1964, in the attempt to detect and correct response errors there could be no routine procedure. Methods suitable to the particular records should be applied as critically as possible. Assessment must be made from detailed comparisons with the help of all the knowledge about the characteristics of the population and field procedures which could be obtained. The greater the detail recorded and tabulated in the survey the more powerful the checks could be and the more likely that important discrepancies could be detected and allowed for in the estimates. It appeared that more accurate estimates of fertility, mortality and natural increase could be made from the data on vital events, collected in surveys, than might be expected in view of the response errors and indirect nature of the observation. A combination of several methods of data collection and analysis is naturally likely to give better results than the use of any single method. For these methods to be effective, these should be built into the survey design so as to permit the required analysis. With improvement in the methods of data collection and analysis in the retrospective enquiries, whether on a census or a sample basis, better estimates of vital rates could be derived by relatively cheap means.[18/]

18/ Final Report of the African Seminar on Vital Statistics, United Nations Publication (Sales No.: 65.XVIII.6), New York.