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REGIONAL INSTITUTE
FOR POPULATION STUDIES

FOLLOW-UP SURVEYS IN DEMOGRAPHIC STUDIES

Part one and two

Traduction de l'ouvrage

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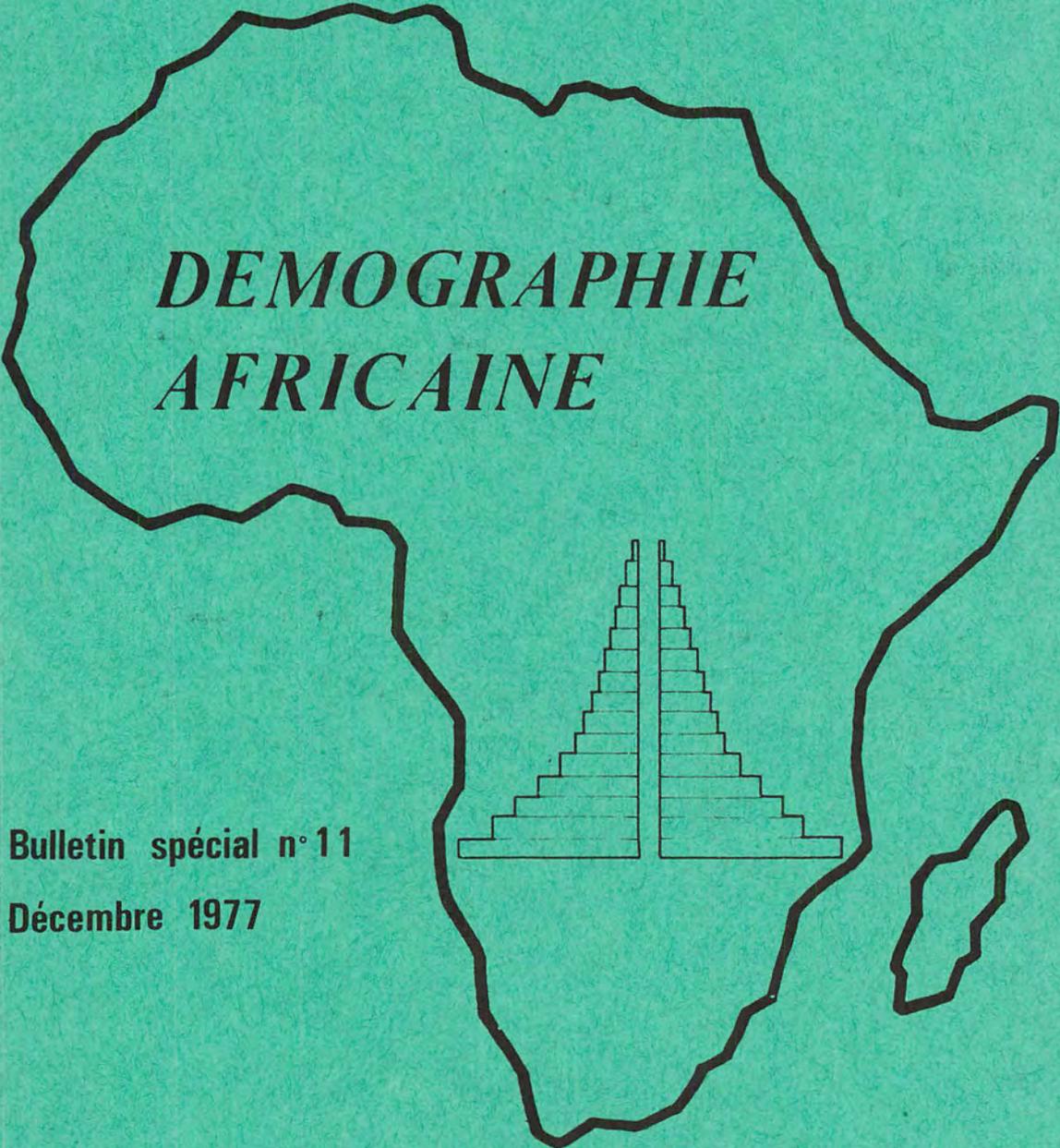
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FOLLOW-UP SURVEYS IN DEMOGRAPHIC STUDIES

*traduction de l'ouvrage du groupe
«Les enquêtes démographiques à passages répétés», publié en 1971*

PART ONE



**DEMOGRAPHIE
AFRICAINA**

Bulletin spécial n° 11

Décembre 1977

BULLETIN DE LIAISON

The African Demography Working Group IDP - INED - INSEE - MICOOP - ORSTOM

Is an informal body intended to facilitate communication between statisticians, demographers and other specialists concerned with population problems in developing countries.

It deals with methodology of data collection and the techniques appropriate for synthesis of findings in the countries; it reviews work of more general demographic interest and seeks to inform interested persons on all aspects of African demography. This newsletter is the principal vehicle for achieving these ends.

Publications du groupe

- «Afrique Noire, Madagascar, Comores. Démographie comparée» tomes I et II, INSEE, INED, DGRST, Paris 1967.
- «Les enquêtes démographiques à passages répétés», Application à l'Afrique d'expression française et à Madagascar. Méthodologie. ORSTOM, INSEE, INED, Paris 1971
- «Sources et analyse des données démographiques», Application à l'Afrique d'expression française et à Madagascar. INED, INSEE, MICOOP, ORSTOM, Paris 1973-1977.
 - Première partie : Sources des données
 - Deuxième partie : Ajustement de données imparfaites
 - Troisième partie : Analyse
- Bulletins de liaison
 - Edition française «Démographie africaine»
 - Numéros ordinaires : 0 à 25 édités à Paris - numéros ultérieurs en principe édités par l'IFORD (Yaoundé).
 - Numéros spéciaux : 1 à 11 édités à Paris ainsi que les futurs numéros dont un prochain sera consacré à la 2ème partie du présent ouvrage
 - Edition anglaise «African Demography»
 - Numéros 0 à 4 : édités à Paris
 - Numéros 5 et 6 : édités par le RIPS (Accra), ainsi que les numéros ultérieurs.

FOLLOW-UP SURVEYS IN DEMOGRAPHIC STUDIES

Their Use in French-Speaking Africa and Madagascar

Translated by Alan D. HORSNTEIN

**Office de la Recherche Scientifique et Technique d'Outre-Mer
Institut National de la Statistique et des Etudes Economiques
Institut National d'Etudes Démographiques**

S U M M A R Y

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ADVERTISEMENT

This special issue of the Liaison Bulletin is devoted to the publication of the first part of the english version of the manual:

"Follow up Survey in Demographic Studies ; their use in French-speaking Africa and Madagascar".

This first part, "Presentation of the Surveys" comprises the following chapters :

- 1 Algeria
- 2 Tunisia
- 3 Senegal
- 4 Cameroon
- 5 Madagascar

The second part (Synthesis, appendices, bibliography) will be the subject of another special issue to be published later.

NOTE

This study has been written by a staff made up of representatives of the following organizations :

Morocco : Service Central des Statistiques.

Algeria : Sous-Direction des Statistiques.

Tunisia : Institut National de la Statistique (INS).

Senegal : Direction de la Statistique.

Madagascar : Institut National de la Statistique et de la Recherche Scientifique (INSRE).

France : Office de la Recherche Scientifique et Technique Outre-Mer (ORSTOM).

Institut National de la Statistique et des Etudes Economiques (INSEE).

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- Conditions in which survey was carried out : P. CANTRELLE, J. VALLIN.
- Survey techniques : J. VALLIN, A. PODLEWSKI.

- Processing : F. PRADEL de LAMAZE.
- Analysis : F. GENDREAU.
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- Abidjan : C. ROY.
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- Kinshasa : J. BOUTE.
- Burundi : C. ROY, M. TAHON.

Bibliography : P. CANTRELLE, F. GENDREAU.

These chapters have benefitted from the remarks and criticisms made by other members of the staff as well as by the participants in the Colloquium on African Demography, held in Paris from 6-9 October 1970⁽¹⁾.

Our study has been limited to follow-up surveys in demographic studies, these carried out either with or without sampling.

In this form it gives a sketch of studies which for practical reasons have been restricted to French-speaking countries. This work thus complements the projected handbook of the African Economic Commission on demographic surveys by sampling in Africa, whose subject matter, including single-round surveys, is necessarily broader.

This study, however, is unlike the planned handbook of the Population Council, which under the heading "population growth estimation" uses a method which involves the comparison of two independent series of observations.

Both in the title and the work itself, we have used "follow-up surveys" to refer to the method used. Other terms have been used in the past to speak of techniques which are more or less the same - permanent observations or surveys, continuous observation, repeated observation, repeated-round surveys, etc. The same proliferation of terms is found in French. Current usage seems to have settled on the term used here.

(1) Minutes of this Colloquium, held under the auspices of INED, INSEE and ORSTOM, can be found in Cahiers ORSTOM, series "Sciences Humaines", VIII N° 1, 1971.

INTRODUCTION

1. A Historical Note

The need for surveys

It is only recently that we have come to grips with demographic problems. With the exception of Japan, which has intentionally followed a policy of birthcontrol from the end of the last world war, there are only a few countries that have concerned themselves with the ordered development of their numbers. In France itself, the full seriousness of the demographic situation in the 1930's was not generally realized by the officials in charge at the time.

There is thus nothing surprising in the fact that the countries of the Third World also did not give the special attention to their population problems that these must have required. For lack of proper information, the seriousness and extent of these problems have not become obvious until very recently, when the consequences have become evident to the naked eye.

This situation might seem paradoxical when one considers the generally satisfactory quality of demographic statistics in most developed countries nowadays. It is in fact doubtless this high quality which explains the trouble some of the developing countries are having in equipping themselves with efficient data gathering schemes.

Demographic statistics, that is, are traditionally based on two sources of information, censuses and the regular registration of vital statistics, of which the latter's improvement over the years has enabled the developed countries to dispose of relatively good and extensive documentation.

The automatic transposition of this scheme to Third World countries could only be disappointing. In these countries a census worthy of the name can often create such problems that it must be given up midway. In other cases, the census provides such scanty and incomplete results that special surveys must be carried out afterwards to correct and complete it.

The registration of vital statistics, for lack of attention, is generally incomplete, and what is perhaps more serious, is an area where generally very little progress is made.

Single-round surveys

In these circumstances, developing countries could use widely only those surveys which were carried out by sampling, and the demographic records of these countries that we currently have available comes mainly from this source, which has been used both to complement the census and to replace all the usual sources of information.

It was after the last world war, along with the increasing awareness of Third World countries of the modern problems of development and the need to have at hand extensive and accurate quantitative information to solve these problems, that special demographic surveys by sample-taking became numerous.

Two schools of thought then came into being :

- In those countries which have had a long tradition of census-taking (Latin America, Southeast Asia, North Africa), just as in most of the English-speaking Africa countries (which are now starting their own series of censuses), the surveys have been conducted to gather directly data concerning population changes (basically vital rates), which neither census-taking by its very nature, nor the registration of vital statistics (because it worked so poorly) could reasonably furnish.

- In the francophone countries of black Africa and in Madagascar, for reasons doubtless related as much to history as to differences in administrative methods, the surveys were conceived as a substitute both for census-taking and for the registration of vital statistics.

These two ways of looking at things are not as different as they seem. Even when used to complement census-taking, a survey involves setting a figure beforehand, and this figure is often used as a control of the census. Most of all, these surveys share their most original feature, which is, also, their greatest drawback. Their questions about births and deaths (like in some cases their questions on population shifts based on retrospective questioning) rely on the memories of the people concerned. Memory's gaps and lack of exactitude are well-known, whether it be a matter of going into the more or less recent past (tracing female descent in each generation and the survivors) or something recent and theoretically invariable (births and deaths occurring during a given period, most often the last twelve months).

The data gathered cannot generally be used directly. They must be combined and most often rearranged so that the information gathered is by and large consistent. Various methods have been perfected for making the necessary corrections, of which some specific uses have been described in print⁽¹⁾.

Follow-up surveys

At the same time as these experiments were being made, it became clear that the methods of observation had themselves to be improved. Carrying out follow-up surveys, that is, the observation on different occasions of a fixed sampling of the population, makes it possible to follow much more closely than during single-round surveys the modifications resulting from births and deaths, including those that have come about from temporary or long-lasting population shifts, from changes in age, and from changes in the economic and social status of the various elements.

It is this possibility to do follow-up work which is the principal advantage of the new method. Replacing to some extent the memories of the people being questioned, it makes it possible to locate with greater accuracy the events or phenomena which affect them, therefore, to examine more precisely and thoroughly the data gathered. In addition, this method makes it possible to study more completely the geography of population shifts, since it includes both the arrivals and departures of people, and not simply the arrivals, as was the case in the single-round surveys. Lastly, as the data gathered concerns a fixed sampling, it is possible to apply to them the methods of longitudinal analysis.

This type of survey can be used alone, as is done in the francophone countries of Africa, or combined with another system of registration, which is generally the case in Asia.

It must be said that the various operations conducted in French-speaking countries have also involved the comparison with other systems of registration or data recording, but these involving only complementary or localized data samples, they do not form - as in the Asian surveys - one of the foundation stones in the system of observation. It should be noted,

(1) See especially, Afrique Noire, Madagascar, Comores : Démographie Comparée (Paris, INED, DGRST, 1967) and William BRASS, A.J. COALE, et al., The Demography of Tropical Africa (Princeton : Princeton University Press, 1968).

finally, that the Asian surveys have used as "second registration schemes" both the official registration of vital statistics and registration schemes developed for the occasion. Sometimes, even single-round surveys have been used⁽¹⁾.

The current situation

Important progress has thus been made in the methodology of demography and it seems fitting to single out the stage which is responsible for these recent improvements.

Such is the aim of this work, which is given over to the study of follow-up surveys recently carried out in the French-speaking countries of Africa. The authors wanted especially to make available to future organizers of surveys - and at the earliest possible date - a tool which would be useful and which would take into account as much as possible of the experience now acquired.

It is also proper to indicate the limits in the advances that have taken place, for the final goal is to give to the countries in question a system of observation that will be able to follow regularly all types of population change that they are likely to experience. So long as the surveys planned are not on a permanent basis, our goal will clearly not have been reached. Follow-up surveys, like the use of combined systems of observation of more or less similar complexity, are but a new and important stage on the way to this goal.

This might, however, be the crucial stage, for the tool's accuracy proved, it only remains to adapt it gradually so as to be able to use it on a permanent basis. And here there are many possibilities open, either carrying out surveys proper at more frequent intervals (if need be on smaller samplings), or making the official system of registration of vital statistics more mobile, so as to reach the people meant to be covered in the areas used for sampling, even only temporarily. Or thirdly, there might be some sort of combination of the two schemes, this adapted to a country's or region's particular conditions.

(1) William SELTZER, "Some Results from Asian Population Growth Studies", Population Studies, XXIII (November 1969) 395-406.

The growth and extension of a system of official vital data registration is just as important in improving a developing country's general administration as it is in providing demographic statistics. Consequently, it would have been natural for schemes improving official registration to have received a certain amount of encouragement. But at the same time, the official registration of vital statistics does not best lend itself to longitudinal studies. Virtually all shifts due to migration escape reporting. This should indicate the particular value of follow-up surveys, in these two regards at least.

2. Follow-up Surveys in French-speaking Africa and Madagascar

Follow-up surveys are nothing new in French-speaking Africa and Madagascar, for as early as the 1955 survey in Guinea, the first demographic survey (this single-round) undertaken on a nationwide level in these countries, an attempt was made to set up an "itinerant registration of vital statistics" in four cantons, this only half-successful.

It was not until the comprehensive survey in Morocco, on the one hand, and those of Yaoundé (Cameroon) and Abidjan (Ivory Coast), on the other hand, that this new style of survey got its real start in rural as well as in urban areas. Since that time the process has developed and has reached by now some urban and rural areas of Senegal, of Cameroon, of Madagascar, of Burundi, and on a nationwide level, Tunisia, Algeria and Morocco (in preparation).

All told there have been sixteen separate studies incorporating the techniques of follow-up surveys since 1955 (four more will be completed in the near future). These sixteen studies have touched on about 31.5 million people in the five countries where they have been made nationwide (Morocco, Algeria, Tunisia, Senegal, Burundi), and about 1.6 million people in the seven countries only partially covered (Senegal, Guinea, Ivory Coast, Cameroon, Gabon, Zaïre, Madagascar).

The number of people actually polled is naturally much less, most of these surveys having been done by sampling, something like 700.000 people for the first category of country, and 300.000 people for the second. On the other hand, however, if one bears in mind the visits successively

I. Surveys completed or in progress

Country	Dates of field work	Area covered	Numbers of people (in thousands)		Progress in research (end of 1970)
			under study	polled	
1.* Morocco	1961-63	Rural area	8000	1st round : 330 2d round : 65	report published
2.* Algeria	1969-71	Nationwide	12000	350	in progress
3.* Tunisia	1968-69	Nationwide	4500	140	being worked up and published
4.* Senegal	1963-65	2 rural arrondissements (Sine, Saloum)	50	50	report published
	1966-70	villages of the same arrondissement (Ndemen-Ngayorhem)	10	10	publication in progress
5.* "	1964-70	1 arrondissement and 1 commune (Khombol-Thiënaba)	13 (children)	13 (children)	publication in progress
6.* "	1966-70	1 section of the city of Dakar (Pikine)	100	5	publication in progress
7.* "	1970-71	Nationwide	3500	120	in progress
8.* Guinea	1955-56	4 rural cantons	35	35	report published
9. Ivory Coast	1963-64	City of Abidjan	200	35	report published
10. Cameroon	1964-65	City of Yaoundé (consumer survey)	110	20	report published
11.* "	1966-68	2 rural cantons (Adamaoua)	15	15	report published
12.* Gabon	1962	10 rural cantons	40	40	plans for publication cancelled
13. Zaïre (formerly Congo-Kinshasa)	1969-70	City of Kinshasa	1000	4	in progress
14. Burundi	1970-71	Nationwide	3500	25	in progress
15.* Madagascar	1967-68	Commune of Ambinanitelo	15	15	report published
16.* "	1969-71	Sub-prefecture of Ankazoabo	25	25	in progress

* Surveys treated in this study.

II. Surveys planned

Country	Date	Area covered	Numbers of people (in thousands)	
			under study	to be polled
Morocco	1971-72	Nationwide	15 000 000	*
Ivory Coast	1971	Nationwide	4 000 000	400 000
Cameroon	1972	Nationwide	6 000 000	*
Gabon	1971	Rural areas	75 000	75 000

* Figures not available

III. Summary of surveys completed or in progress

Type of survey	General Totals			Surveys treated in this study		
	Numbers of people		Individual observations	Numbers of people		Individual observations
	Under study	polled		under study	polled	
Nationwide	31.5	0.7	2.1	24.5	0.6	1.8
By localities	1.6	0.3	1.1	0.2	0.1	0.7
Total	33.1	1.0	3.2	24.7	0.7	2.5

made⁽¹⁾ to the numbers of people involved, the number of individual observations is much higher : approximately 2.1 million cases for the first group of countries and 1.1 million for the others, that is, a total of more than three million individual observations.

This gives some idea of the extent to which efforts have been made over the last fifteen years, these efforts unprecedented when compared with the single-round surveys, which over the same period of time and only in the tropical African countries, involved two million individual observations. This also gives some idea of the abundant documentation that has been gathered, whose quality, accuracy and wealth of information cannot be compared to that which had been collected before.

It is these reasons that warrant the synthesis we have undertaken here.

3. Format of the Book

In this collection only nine studies can be considered⁽²⁾ and treated thoroughly (Algeria, N° 2 in Table I; Tunisia, N° 3; Senegal, N° 4 and 6; Cameroon, N° 11; Madagascar, N° 15 and 16). The surveys of Morocco, Senegal (nationwide), Abidjan, Zaïre and Burundi are described in short notices but are not taken up in the long chapters. The other surveys were not able to be used at all, either because they were merely projected at the time this was being written or because publications of the results had been cancelled. In some cases sufficient information about the methodology used was lacking.

It should be emphasized that of the studies that have been treated, many were only in the process of being analysed and worked up, and some were even being completed in the field. The lessons that these surveys offer are thus in all respects only temporary in incomplete. However, it seemed useful to us to consider them as new and special experiments.

It is certainly true that the results of such experiments are always incomplete; even as they are being written up, further studies are being made, new conclusions are reached and lessons learnt which sometimes contradict what was accepted before; the results of these new advances too is also incomplete.

- (1) In the course of these studies, three rounds were generally made, though some go up to five rounds and even higher. After the first round, the survey in Morocco, however, involved only a selective sampling of the people contacted during the first round.
- (2) These represent a total of 24.7 million people under study (including the Moroccan study), 700.000 people polled and 2.5 million individual observations.

This being said, the work is organized in the following way :

- In the first part, the surveys previously spoken of are briefly discussed, and insofar as possible, following a standard format, in general the following :

1. Goals
2. Range of study
3. Numbers involved
4. Method used in sample taking
5. Duration of the survey
6. Conditions in which survey was carried out
7. Survey techniques
8. Processing, Analysis
9. Results
10. Bibliography.

- The second part includes the analyses proper. Each of the above categories is taken up again but studied comparatively. The solutions adopted in each case (and whenever possible in response to specific recommendations) are examined critically. At the end there is a brief "score sheet" listing lessons to be learnt from the different syntheses. And it is this "score sheet" which is to some extent the beginning of what might become a valid guide to the organization of follow-up surveys once this new type of survey has been broken in enough and once those carrying them out can define their methodologies with sufficient critical distance.

GEOGRAPHY OF THE SURVEYS



PART ONE

PRESENTATION OF THE SURVEYS

Chapter 1

ALGERIA

National Vital Statistics Survey

1. Goals

It was decided to organize a survey in Algeria after comparing the information needed in this area with the data that was available. That there was a definite need for information was obvious. The people of Algeria are very mobile, both domestically - with a high (approximately 3.2 %) vital growth rate, a young population (median age approximately 18 years), constantly changing social structures (increased schooling, economic activity very sensitive to the economic and political situation of the time), rapid growth of cities, etc. and in relation to certain changes involving the outside world (high rates of immigration and emigration, relatively large foreign population).

The resources available can be used only with difficulty. Outside of a general census in 1966, the data are of mixed quality, as for example the censuses taken prior to 1966 (1948 and 1954), which yield little ready results. The registration of vital statistics is incomplete in spite of the visible improvement made in recent years. Statistics concerning population shifts are too one-sided and there is practically nothing of real scientific value concerning employment.

In these circumstances, it seemed appropriate to try to follow population changes by making a survey of a particular area, a survey which would on the one hand make it possible to "bring to life" the 1966 census, and on the other hand make it possible to measure reasonably accurately the main vital rates : births, deaths, fertility, migrations, rate of economic activity, and the various factors explaining them, particularly those relating to age.

N.B. - It is the intention of some of its organizers that this survey should, in addition, be part of a long term study of the Algerian population, following an alternating scheme - ten-year censuses (in 1976, 1986, etc.) and demographic surveys (in 1971, 1981, 1991, etc.), these at some time to be linked up with a simplified census.

2. Range of study

The survey treats all of Algeria, a territory which is vast and varied, including both big European-style cities as well as very traditional rural areas, with population densities ranging from 150 inhabitants/sq. km. (in the coastal area) to those of the Sahara desert.

The population, however, can be divided into three main categories⁽¹⁾ :

- European-style population, generally educated and active, living most often in the cities important during the colonial period. This part of the population includes approximately 1.000.000 inhabitants, and surveys involve in general no problems. The questionnaires can be filled in by the subjects themselves, the significant events in question are usually well-known and it is easy to determine ages and dates. The reception encountered in these social classes has sometimes presented rather great difficulties, but once these have been surmounted, the survey proceeded easily.

- Traditional population, this composed basically of country people (either literally speaking or those who have been transplanted to an urban setting while maintaining the ways of living and thinking of the country). This is the largest section of the population (approximately 10.000.000 people) and it was here that survey-taking met up with numerous problems. Often illiterate and little involved with events in the outside world, itself frequently disturbed by political events, this population is difficult to study in a survey in spite of its very obvious good will : ages are not accurately known; dating is subject to flights of imagination; events are easily forgotten. In addition, it is also in this group of the population that social and religious habits have the greatest weight; it is, for example, extremely difficult to meet the women (who are traditionally kept apart from the men), and they are often neglected in the surveys.

- Nomad population, living in tents in or close to the heart of the Sahara.

(1) In the utilization of certain information (for example, the active population classified by age and sex) a fourth group should be considered, the foreigners, whose social structures and characteristics are very different from those of the general population.

3. Numbers involved

The survey is meant to treat theoretically the entire resident population of Algeria, that is, approximately 13.000.000 people at the beginning of 1969. The population was studied by sampling, the sample used being relatively large (about 400.000 people). The population groups described above can be broken down further as follows:

- a. urban (large and average size cities), approximately 4.000.000 people;
- b. semi-urban or modernized rural (roads, electricity), 4.000.000-5.000.000 people;
- c. little modernized rural (unpaved roads, dirt roads), 3.000.000-4.000.000 people;
- d. nomads, approximately 7000.000 people.

4. Method used in sample taking

The setting up of a method of a sample taking is related both to the aims of the survey and the practical considerations involved.

The survey has basically two different aims: a demographic survey proper, that is, finding the traditional information sought in such cases, and obtaining a more vivid restatement of the results of the 1966 census. Because of these goals, a relatively large random sample was used for a sufficient number of births and deaths to reduce the error involved in sampling. As a larger sampling was not necessary for all the problems in question, it was decided to use a subsample chosen from the basic sample.

The size of the sample was set by a comparative study of the 1966 census and by the registration of vital statistics. This procedure naturally gives only an approximate calculation, as we know how irregular such registrations are. In addition, some preliminary figures were made by estimating as best as possible birth and death rates by age groups. This study revealed that in order to set up a table of death rates by age groups, approximately 5.000 deaths a year had to be considered, thus a sampling of approximately 350.000 people.

The subsamples were drawn for the detailed studies of fertility, education, and employment. For the study of fertility a sampling based on 6.000-7.000 women was used; for that of employment, approximately 20.000 people (because of conditions of employment in Algeria, the sampling is essentially restricted to men, except in the cities).

There were two practical problems to be faced in carrying out the sampling. What sampling frame could be used and what sampling unit? The 1966 census provides a sampling frame, not too up-to-date but relatively accurate. This census was made following the administrative division by communes, but the communes themselves were subdivided into smaller units, the districts. The sampling unit might thus be:

- a - the individual (though it is difficult to single out and grasp the events that concern him);
- b - the household (a cluster which is easier to work with but not always easy to define and locate);
- or c - an even larger cluster, a group of households.

It was the census district that was finally chosen, this covering a well-defined geographic area with its population figure known from the sampling frame. These districts represent roughly a cluster of 500 people, that is, a hundred households, which is a number relatively easy to locate.

In order to get results that could be applied according to certain geographic units and to make field work easier while lowering the costs of the survey, these were "stratified" before the drawing. The following strata were adopted (Figure I):

- 0 - regional capitals (Algiers, Oran, Constantine and Annaba);
- 1 - urban communes (e.g., Blida, Tebessa, Mascara, etc.);
- 2 - densely populated areas, districts with grouped settlements (roughly speaking, the coastal region);
- 3 - densely populated areas, districts with scattered settlements;
- 4 - sparsely populated areas, districts with grouped settlements;
- 5 - sparsely populated areas, districts with scattered settlements;
- 6 - Sahara.

One of the principal concerns of the organizers of the survey was to carry out a sampling in which the numerical analysis could be made as easily as possible. A uniform sampling fraction for all of the strata (except the Sahara) was consequently adopted and in each of these strata, the drawing was carried out in such a way that the survey could be treated like a census. The probability of being interviewed is the same for each person, whatever his stratum or district - 1/33.

The drawing was carried out as follows:

- stratum 0 : regular drawing of one out of every thirty-three districts, the four cities together treated as a whole.

stratum 1 : drawing in two steps, the first being the drawing of a city with the probability proportionate to the number of districts included. This works out to be the same thing as the probability proportionate to population size, assuming that the average population of the districts is the same in all the primary sampling units. Following this is a drawing in each sample city with a fixed number of districts (i.e., four).

strata 2, 3, 4, 5 : the same procedure is used but the drawing rates of the primary and secondary sampling units vary in such a way that the sampling is proportionally more "concentrated" when the population density is small (in the densely populated areas there were to be four districts per sample commune; in sparsely populated communes, eight). The division between districts with continuous and scattered settlements is due to the drawing's invariability in the second step.

stratum 6 : sampling done by setting up quotas.

It should be noted that the drawing is in fact in three steps, the third step being that of individuals within the districts. This third step in the drawing covers everyone. In drawing by clustering it is necessary for the size of the clusters to be as similar as possible. For this reason certain districts were redesigned before the drawing.

The subsamples will be drawn from the list of households in this basic sampling, when such is available. For the sampling on fertility, one household out of every ten will be drawn and all women in the household capable of childbirth will be questioned. For the sampling on employment, two separate samples, each of 1/10 households, will be drawn, the surveys being made during the two final rounds and all men in the household older than 15 (and women from 15 to 50, in urban areas) questioned.

To be perfectly scientific, one should take into consideration the division of the survey into several steps when random error is being calculated. In fact, though, when the size of the sample is considered, as well as the fact that the errors in sampling will be few compared to those made in observation, it seems possible, as a preliminary precaution, to calculate the error in sampling as if the drawing had taken place only in one step.

5. Duration of the survey

As the survey was divided into three rounds, it was desirable that these rounds be as regular as possible, and that the first and

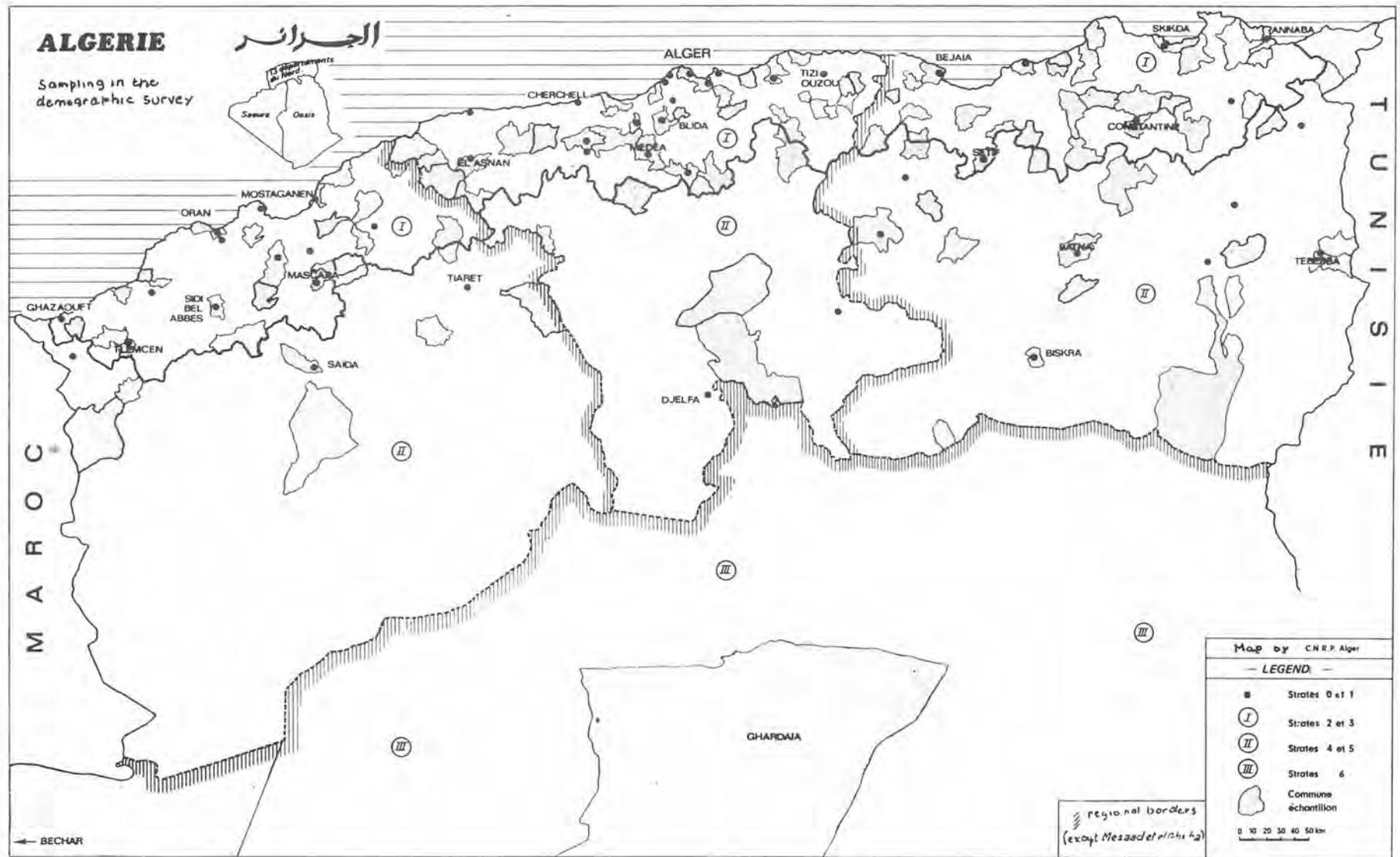


FIGURE 1. SAMPLING IN THE SURVEY.

that the first and third rounds especially take place one year apart for each household. Quite obviously things will come up and this established plan will be upset, but it will nonetheless be followed as closely as possible⁽¹⁾.

The first round in the households got under way on 20 August 1969 and ended in January 1970. The order in which rounds were made in the households was established after considering the difficulties set by geography and climate. As the sampling was by clustering, organization was more easier, since interviewing teams could work in the sample districts just as they would have during a census. The second and third rounds are to be carried out following an identical procedure, the second having begun on 1 March 1970 and to be completed near the end of July, the third round beginning on 20 August 1970 and ending in January 1971. The dates of the rounds in the districts was thus set up at six month intervals, the rounds in the households not to vary from this greatly.

In rural areas, in fact, it is relatively easy to locate the households and consequently to keep to the timetable. Conditions are different in urban areas, where many households are difficult to contact.

One solution to this problem that was proposed was to imagine that the survey of a household had taken place on a set day (for example, 15.10.1969, 15.04.1970 and 15.10.1970) and asking the enumerator to take into account the conditions of the household on these dates even if he did the interviewing later. In spite of its advantages, this suggestion was not followed, as it would have been demanding too much both from the people interviewed and from the enumerators.

The difficulties caused by geographic mobility should also be mentioned. Many households could not be contacted during the three rounds, either because they had left the sampling zone between two rounds or because they had come into it during the time the survey was being held. This is a problem of sampling and its utilization which we shall speak of later.

We should also mention various other problems which were to some extent predictable and which can make it difficult to keep to the timetable that is so necessary in surveys - changes in staff on all levels, road accidents, flooding, etc.

(1) It should be noted that even if this schedule could not be kept to strictly for each household, it would always be possible to relate the events recorded at the exact observation period for the corresponding part of the population.

6. Conditions in which survey was carried out

It was the Algerian Statistical Office which was directly in charge of carrying out the survey (Ministry of Finance and Planning, Statistical Branch). The same groups were in charge of financing, the budget allotted being close to seven million dinars⁽¹⁾, of which more than half was given over to salaries and social expenditures for a period that was initially expected to last twenty months.

All the staff carrying out the survey was Algerian, as was the supervisory administration. Though help in the conception of the survey was sometimes requested from foreign experts, Algerian participation was always very great. (Only one person out of the 250 people working full-time on the survey was a foreigner).

The following diagram illustrates the division and organisation of this staff (Figure II).

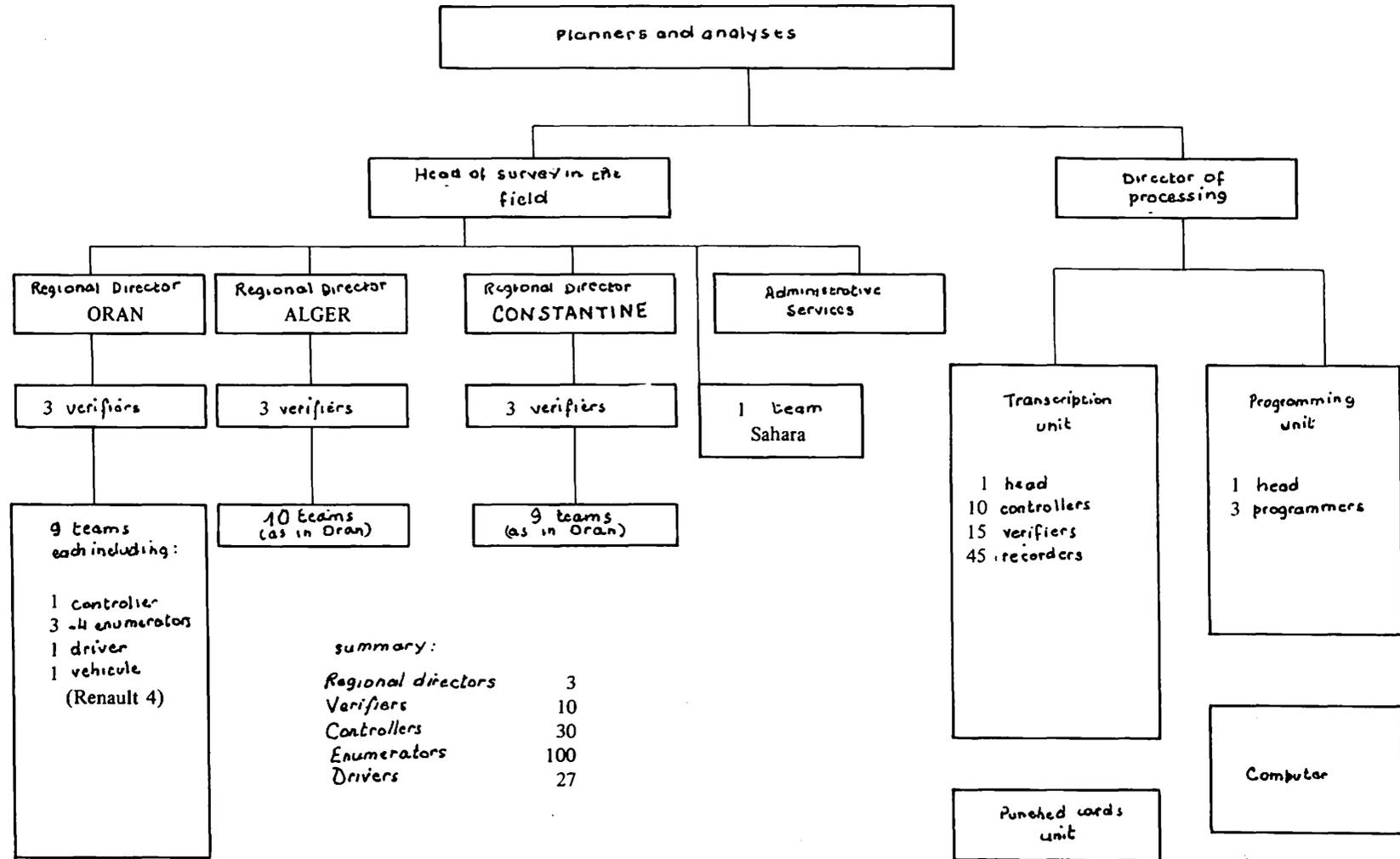
Staff hiring relied on two basic sources : staff having already taken part in similar operations (censures, other surveys), these people forming the bulk of the supervisory administration (controllers, supervisors, etc.) and new staff, with academic backgrounds equivalent to that of the B.E.P.C. *, these constituting the bulk of the people actually carrying out the survey (enumerators and recorders). Part of the staff is female in order to make the work of the survey easier. In Algeria, where few women work, this raised some awkward problems in hiring and in integration with the male enumerators, who were in the majority. At the beginning at least, the women enumerators were rather poorly welcomed.

The training of the staff took place in a series of training programmes on each level. The working principle was that the people on each level were to train the people working under them, hence the "downward chain" of training programmes : one week for the verifiers (15-23 June 1969); two weeks for the controllers (1-13 July 1969); four weeks for the enumerators (15 July-10 August 1969). As things worked out, it was not until after the controllers' training period that the next group could be trained, by them, and even then these operations were closely supervised. The basic idea was to give people practical training in communes that were not in the sampling. So as to keep only those enumerators who were suitable, it was necessary at the end of the training programmes to reduce the number of applicants by 30% (50% among the female applicants).

(1) - 1 Algerian dinar = 1.12 French Francs (1970, S 1.00(U.S.)= 5.5 French Francs).

(2) - Translator's Note : The B.E.P.C. is a school examination taken at age 14-16, at the end of the "troisième" form.

FIGURE 2 — ORGANIZATION CHART OF SURVEY STAFF



When the length of the training periods is considered, along with the degree of training received in the field and the good will of the staff in general, one can say that the whole body of enumerators, controllers and verifiers thus trained was already at the beginning of the survey of rather high quality. Some problems remained, however, in the quality of those with supervisory functions and in their mobility; fatigue and boredom of the staff (after eighteen months of holding rather similar interviews), loss of professionalism, etc.

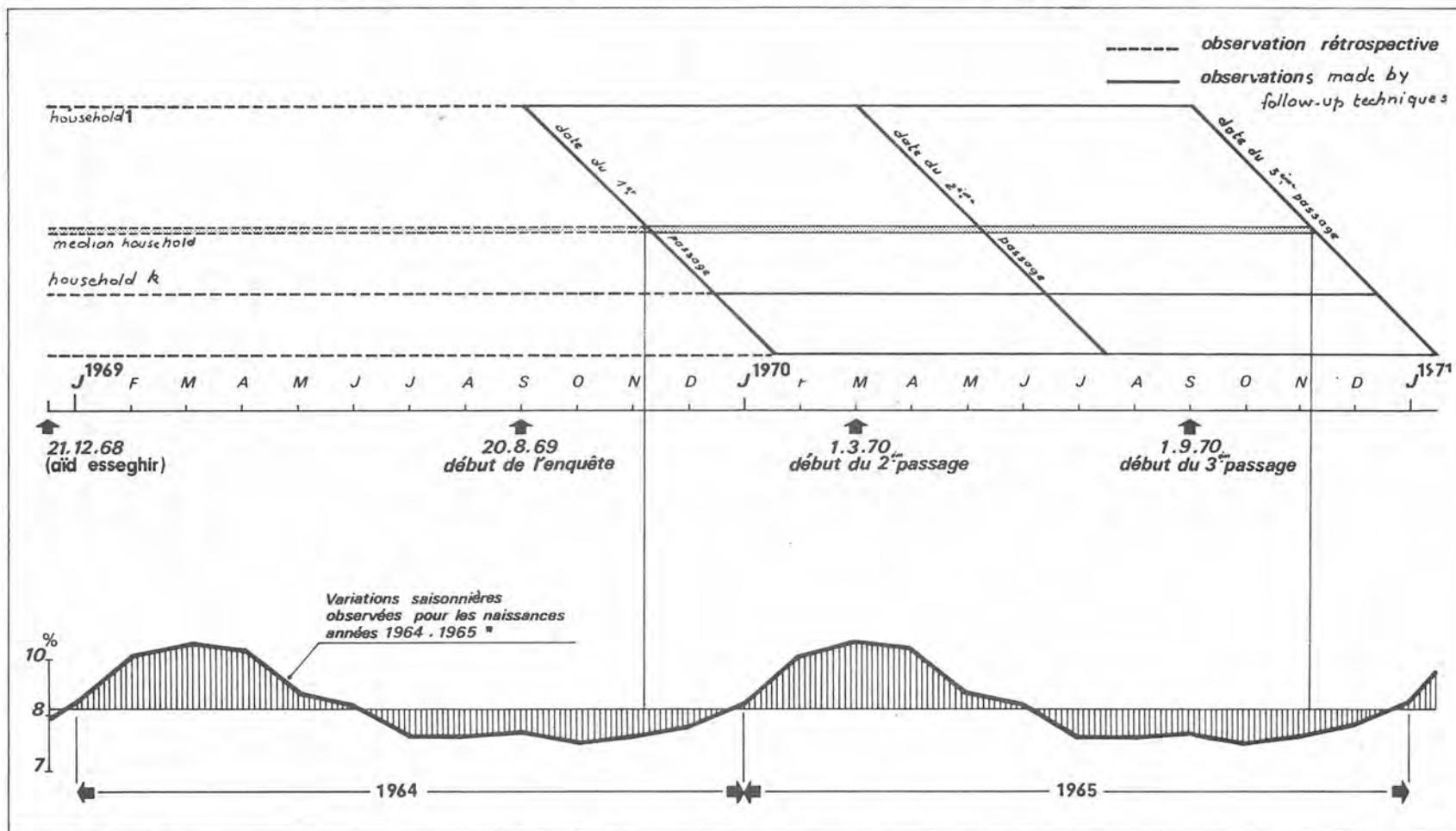
The reception of the population might a priori create some misgiving. But on the whole their reception was excellent and the good will met with in the households was noteworthy. Before the enumerators' rounds, there was a "publicity campaign", this relatively limited for two reasons. As the survey was by sampling, it was not desirable that this publicity reach all households, as there would have been too many protests. This ruled out campaigns in the mass media (radio, press, television). As illiteracy was widespread it would have been useless to send letters to each household. As a result, while using the above mentioned resources to some small extent, efforts were limited to reaching people by village assemblies, by people in the administration and religious world, etc. In general the results in rural zones, where word of mouth is particularly effective, were satisfactory (though what was reported was sometimes subject to misinterpretation). In the cities, notices about forthcoming rounds were regularly distributed, these printed in French and in Arabic.

The real problem was not getting into the households but getting accurate information. Though there were practically no cases of people's refusing to answer questions, there were a fair number of fanciful answers given in which the good will of those interviewed was not at fault but rather ignorance (of ages and dates, general forgetfulness, etc.). There was also the question of trying to interview the women rather than the men, as the women were in general better informed about what touched their lives. It was for this purpose that female enumerators had been hired, but the way of life of some Algerian women (who after puberty are kept practically entirely removed from contact with outsiders) meant that some of the information received was often less than satisfactory.

7. Survey techniques

The survey studies the population and demographic occurrences. There is nothing new about studying the population, the information being asked for being rather traditional. Insofar as possible, de facto

FIGURE 3 - PLAN OF THE VARIOUS ROUNDS IN THE HOUSEHOLDS - INFLUENCE OF SEASONAL VARIATIONS



Etat Civil Naissances 1964 et 1965 (Sous Direction des Statistiques : service Etat Civil Août 1968)

situations rather than what existed de jure was noted: real ages (in spite of declarations made to the registrar of vital statistics), true marital status (the law is rather complicated in this area because of the intermeshing of civil and religious or traditional law), etc.

Demographic occurrences concern two reference periods : the observations made between a set date (Aïd-es-Seghir, 21 December 1968) and the first visit in a household, during which time one tried to record all the events (births and deaths) with as much accuracy and detail as possible, as was the case during the three rounds; and secondly, the observations made in between the rounds, at a time when there was theoretically little danger of making oversights, since for each household the list of households made at the beginning (during the first round) and the list made at the end was available.

By repeating the same questions during the three rounds, especially those questions involving recall (events occurring between Aïd-es-Seghir and the first rounds), it is possible to measure changes in people's recollections of events, since it is a ten month period, observed first at the very end and then from a distance of six months to a year, which is involved.

The final reference period is to fall between the dates midway between the rounds, and it thus extends approximately from 16.10.1969 to 15.10.1970.

Questionnaires⁽¹⁾

Considering the complexity of the survey, the idea at the beginning was to draw up the questionnaires in their final form. Two major problems made it necessary to adopt a different solution : first of all, it was practically impossible to set the questions in one language that could be understood through the entire country, because of differences between literary Arabic and Arab dialects, unwritten languages, etc.; and secondly, the difficulties of designing such a questionnaire would have been practically insurmountable. What was finally done was to write in French the questions as they were to be asked, setting up a set of possible answers in the form of summary charts. Moreover, the most awkward parts of the questionnaire were printed separately, along with a section carrying over some of the answers, so as to be able to check that the interviewers were following the prescribed format (see questionnaire C especially).

(1) - All the questionnaires have been reproduced in Appendix 1.

There are several different types of questionnaires. Types A, B, and C are those which can be used for all of the population involved, and these are used in the three rounds. Except for type C, the questionnaires are summaries in which appear all general information concerning a household or concerning each individual taken separately. Questionnaire C was to be used for all women capable of childbearing, and makes it possible to cover thoroughly the observation period (from Aïd-es-Seghir up to the survey) and to detect any event involving reproduction. If the order of questions is kept to, it is impossible to "leave" the questionnaire until all the events have been noted. And these events are carried over to questionnaire B.

For the part of the survey treating fertility studies (this touching a subsample of about 10,000 women), a questionnaire was devised that could be adapted to both ordinary and complicated cases. As it was desirable to retrace the entire reproductive lives of the women questioned, it was decided to work by repetition so as to include all events. First, all marriages will be examined, the children of these marriages recorded. Then, each period of a woman's married life will be examined so as to trace all the events (miscarriages and still births especially) which might have been forgotten in the first investigations that were made. This explains why a set of questionnaires - F, G, H, I and J - have been used.

Questionnaires F and G : these are to trace the number of successive marital unions of each woman questioned. When there is only one, questionnaire F is sufficient and the children of this union are noted. When there are several unions, as many copies of questionnaire G as are necessary are used, each union taking up a separate sheet. (For example, a woman who has had four unions will have one questionnaire F and three questionnaires G).

Questionnaires H, I and J : with questionnaires F and G, it was possible to record some of the children born. From that we go to a more detailed study of the intervals between the births. If one child was reported, one sheet H is used on which information about the date on which the marriage was consummated and the birth of the first child is listed. From this, the interval between the two events can be calculated. Depending on the length of this interval, the answers will be accepted (for a period up to one year), or other intermediate events (or an explanation for the lack of such) will be sought. When several children are declared, the same process is repeated

with sheets of questionnaire I for the interval between two children or between the marriage and the first child, or between the last child and the date of the survey.

Although this system is a bit complicated, it seemed to be the only one which made it possible not to omit any of those events often forgotten by the mother herself, this after a test survey in which female enumerators had been used.

Questionnaires D, E and J require no comment. These are either questions specially designed to better situate a particular woman (D - information about the household; E - information about the previous husband) or charts on which information gathered in questionnaires F and I, once arranged, has been carried over.

8. Processing and Analysis

At the beginning, each round will be processed separately, something which makes it possible to obtain rapidly analyses of cross-sections, that is, the results one would get from three censuses each taken six months apart. During this stage, by provisional processing of the results from questionnaires concerning births and deaths, it should also be possible to start longitudinal analysis.

Afterwards, the three rounds will be compared so as to be able to go on to a straightforward analysis of the marriage cohorts. If the problem raised by inconsistencies concerning a single person are not considered, we have available, a priori, seven populations.

- a. population contacted only during one of the rounds (1, 2 or 3);
- b. population contacted during two rounds (1 and 2, 2 and 3, 1 and 3);
- c. population contacted during the three rounds (1, 2 and 3).

It would seem to be the population of type c that would furnish the richest material for analysis, but one has to reckon with the reasons for which a person would belong to populations a or b (birth or death in the course of the survey, migration).

One difficulty comes from the fact that for many people, the information is not likely always to be the same on each round, something which might indicate human error (different birthdays, for example) or possibly a significant event (migration for professional reasons, for example). When the reports go through computer processing, round by round, certain data can be corrected; thus there will be :

- a. the regular correction of obvious mistakes (the sex of a mother, for example);
- b. the random correction of certain data (ages, etc.);
- c. the replacement of certain unusable records.

These corrections are warranted if they are not too numerous, but they will raise some problems when the three tapes, corresponding to each of the three rounds, are compared. After preliminary and separate processing of each of the rounds, similar tapes will have to be reconstructed, at least for that information concerning the populations met during the three rounds.

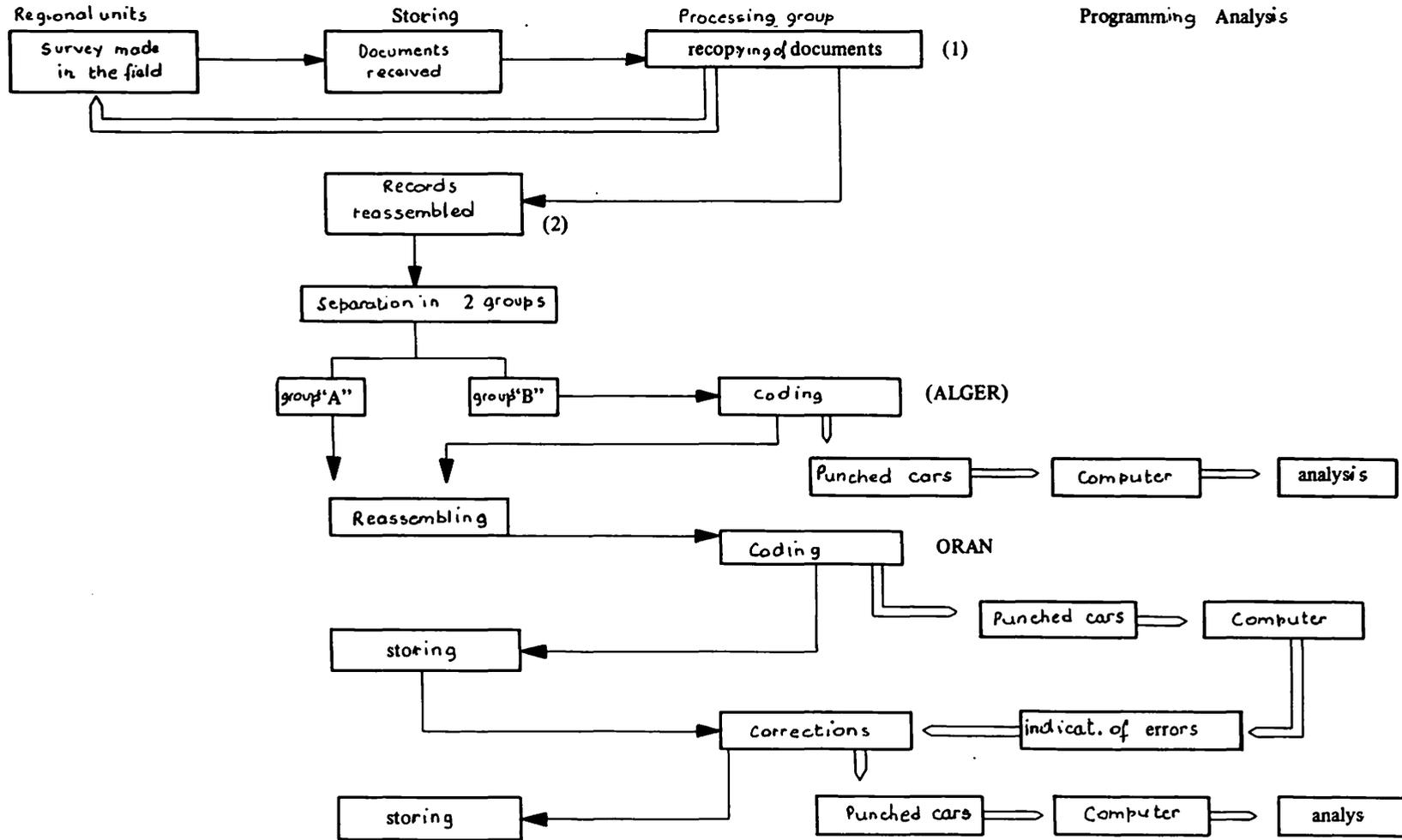
If there were only a small number of mistakes, there would be no drawbacks to this method. Unfortunately, it is possible for errors to occur at three levels : the gathering of the information, and in the coding and recording on punched cards. Moreover, and this is especially true of migrations, the disappearance of an individual from one round to the next cannot be thought of as a random phenomenon.

It is therefore necessary to be very careful when analysing the results obtained by longitudinal processing. However this may be, processing was organized so as to be as simple as possible :

There will be three basic cards files established for each round - one card file for each household, one card file for each person, and one card file for each event (these subdivided according to the event). These card files can be put on punched cards after having been recorded on coding grids (Appendix 2) and transcribed on tapes afterwards.

Preliminary processing will eliminate errors, either by listing those errors that have been made or by making automatic corrections, this depending on the type of error (automatic corrections, whether systematic or random, have always been preferred when they can be used).

FIGURE 4 - ORGANIZATION OF PROCESSING.



→ mouvement des questionnaires complets
 ⇨ autres mouvements (cartes perforées etc.)

(1) Préparation de questionnaire pour le passage suivant : on recopie l'identification de la liste des membres du ménage
 (2) Rapprochement des questionnaires concernant un même ménage à des passages différents

As soon as the tapes are "cleaned", i.e., they have had their errors removed, a series of tables will be drawn up following a relatively simple scheme.

It will then be possible to get tables as they are needed - and rather quickly. This is true at least of simple tables (those bringing together three or four features).

All the tables that have been planned for should be sufficient for rudimentary analysis, but it is obvious that being able to produce other tables as necessary will enable one to go on to more complex analyses. The investigators should, however, take into account the limitations inherent in a survey made by sampling. Moreover, the errors made in observation, although they seem to have been eliminated during taping, still remain to some extent, since the methods by which they were corrected is necessarily arbitrary.

In order to measure the extent of these errors, several methods can be used. As for sampling errors, there is no problem in making one's calculations, in spite of the various effects of clustering⁽¹⁾. For errors of observation, the method of Chandrasekhar and Deming might be used, observations parallel to those of the survey having been organized in some districts. The fact that the three rounds are relatively independent of one another might be of some use here, to the extent that the same questions are asked again after a relatively long lapses of time.

The practical organization of processing was doubtless made easier by the presence of a processing district in Oran, where it had been set up for the census. Facilities, supplies as well as part of the supervisory staff, was thus available to the survey. It was, however, still necessary to hire seventy additional workers who began coding in January 1970 after their training periods. There is thus a lapse of about six months between the time the survey was carried out in the field and the time it was processed. Normally, at least tentative results should be available in the course of the survey so as to have the possibility of going back to do additional field work if necessary.

(1) See Part Two, Chapter 4, "Method used in sample taking".

The above chart (Figure IV) indicates the circulation of the various documents during processing. The chart was made up at a time when a system of partial and rapid processing of some of the documents (Group B) in Algiers was being considered. It was thus possible to settle more quickly and easily some of the problems that arose in the correction of errors, taping, production of tables, etc., and in addition, to gauge the extent of errors that were perhaps being regularly made in processing.

The fact that this processing chain was not located far from the group in charge of the survey in Algiers also had its advantages. Unfortunately, it was necessary to abandon the use of a second processing chain on account of practical considerations (lack of space, staff, etc.).

9. Results

The results listed below (see Table I) come from the first round and refer to the part of the survey involving recall (for a household, the time interval used is that between Aïd-es-Seghir and the date of the first round in this household).

These conclusions require some comment :

As they concern the part of the survey involving recall, it is likely that the number of events was underestimated. The birth rates indicated there must be slightly lower - the death rates considerably lower - than the true rates.

The general male sex ration (49 %) suggests that the estimate of the total population is correct since during the census more men than women were counted, clearly the sign of the incomplete registration of women. (Other reasons, however, can be cited to explain the small number of women).

The division of births by sex (48 % are female) suggests that the omissions concern females most of all and very likely those who died at an early age. This would explain in part the difference between the death rates of men and women and also the relatively low child mortality rate.

The very clear difference between the death rates for each sex might be explained in several ways, but most of all it is a matter of omissions made in the declarations of women's deaths. In any event, the non-recall part of the survey should make it possible to avoid these errors, and the death rates will undoubtedly be considerably higher.

Table I. Summary of results of first round (20.08.1969 to 31.01.1970)

Régions	Number of households interviewed	Number of inhabitants (according to sex)			Occuring after 21.12.1968						Deaths of people less than one year old (according to sex)		
					Births (according to sex)			Deaths (according to sex)					
		Male	Female	Total	Male	female	total	Male	female	Total	Male	female	total
Algiers	21,600	59,947	63,234	123,181	2801	2590	5391	643	566	1209	282	268	550
Oran	17,984	53,188	53,961	107,149	2488	2312	4800	705	537	1241	327	276	603
Constantine	19,529	59,804	62,428	122,232	2721	2408	5129	805	682	1487	305	232	537
Total	59,113	172,939	179,623	352,562	8010	7310	15,320	2153	1785	3938	914	776	1690

Régions	Size of household	Sex ration		Births (according to sex) %		Births rate (per 1000)	Deads rate (according to sex) (per 1000)			Child mortality rate (per 1000)
		Male	Female	Male	Female		Male	Female	Total	
Algiers	5,7	49	51	52	48	47,5	11.6	9.3	10.7	102
Oran	6.0	49.5	50.5	52	48	48.6	14.5	10.8	12.6	126
Constantine	6.3	49	51	53	47	45.7	14.6	11.8	13.3	105
Total	6.0	49	51	52	47	47.5	13.5	10.8	12.1	110

The child mortality rate given here is reported only as a matter of information.

All of the data gathered which can be seen in the questionnaires that follow, will go through the first stage of processing at the end of each round (general demography, study of the working population, of the population attending school, of births, deaths, migrations).

The number of tables to be made up from these questionnaires is considerable⁽¹⁾.

But even this list does not aim to be exhaustive, and to the extent that it is possible, requests for additional tables will be honoured.

10. Bibliography

Published results are available at the "Sous-Direction des Statistiques" in Algiers. Many volumes are planned, on methodology as well as on the results.

Sous-Direction des Statistiques, Etude Statistique Nationale de la Population, programme d'exploitation (Algiers, May 1970)

(1) - Sous-Direction des Statistiques, Etude Statistique Nationale de la Population, programme d'exploitation (Algiers, May 1970)

NUMEROS D'ORDRE DES FEMMES DE MOINS DE 50 ANS NON-CELIBATAIRES NOM ET PRENOMS									
	NOMBRE TOTAL DE MES VIVANTS QUE VOUS AVEZ EUS AU COURS DE TOUTE VOTRE VIE ?								
	SEXE MASCULIN								
	SEXE FEMININ								
	ENSEMBLE								
	COMBIEN AU TOTAL PARI MI CEUX-CI SONT DECEDES A LA DATE DE LA VISITE ?								
	SEXE MASCULIN								
	SEXE FEMININ								
ENSEMBLE									

Vous devez avoir posé toutes les questions du tableau ci-dessus pour toutes les femmes du Ménage âgées de moins de 50 ans et non-célibataires, résidentes présentes ou résidentes absentes.

Date du Contrôle :

Nom et Prénoms du Contrôleur :

Nature du Contrôle :

- Ménage enquêté en présence du Contrôleur :
- Ménage réenquêté entièrement par le Contrôleur :
- Ménage réenquêté partiellement par le Contrôleur :
- Dossier contrôlé en présence de l'enquêteur :
- Dossier contrôlé en chambre :

Autres Observations (Contrôles de Cohérence) :

Signature du Contrôleur :

République Algérienne
Démocratique et Populaire

Commissariat National
du Recensement de la Population

ETUDE STATISTIQUE NATIONALE de la POPULATION

Visa C. O. C. O. E. S. N° 69-03

Feuille des Naissances et Grossesses survenues dans le Ménage dopula l'Atd Esoghir du 21 Décembre 68
(1 Choual 1388)

Modèle Commu B

A toutes les femmes du Ménage de moins de 50 ans, non-célibataires.

Numéro du passage (1, 2, 3) :

Strate : , Département : , Arrondissement : , Commune :
District :

Numéro du Ménage pour l'exploitation :

Numéro de la Feuille de Naissances : Nombre de Feuilles de Naissances utilisées :

Nom et Prénoms du Chef de Ménage :

Adresse très précise :

Numéros d'ordre dans le Ménage des femmes de moins de 50 ans, non-célibataires :

Nombre des femmes du Ménage de moins de 50 ans, non-célibataires :

Date du passage :

Nom et Prénoms de l'enquêteur :

Numéro de l'enquêteur :

Numéro du Ménage dans le travail pour le contrôle :

Degré de Participation : très bonne : bonne : passable :
mauvaise : très mauvaise : refus total :

Observations :

Signature de l'enquêteur :

2 - TYPE B. BIRTHS AND PREGNANCIES IN HOUSEHOLD SINCE 21.12.1968
WHITE, 32 x 44 cm. PAGES 1 and 4

TABEAU SYNOPTIQUE RESUME DES QUESTIONNAIRES DES NAISSANCES ET GROSSESSES SURVENUES DANS LE MENAGE DEPUIS L'AID ESSEGHIR DU 21 DECEMBRE 1968 OU 1 CHOUAL 1388

N° d'Ordre des Femmes Non célébrées CSO e Nom et Prénoms						
Date de l'issue :						
Age à l'issue : (en années)						
Nature de l'issue : ou Mois en cours						
Simple ou Multiple :						
Nom et Prénoms du nouveau-né :						
Sexe						
Lieu de Naissance du Nouveau-né :						
Assistance :						
Résidence du Nouveau-né :						
Date du décès :						
Age au décès : (Préciser Jour/Mois)						
Lieu du décès du Nouveau-né :						
Rang de Naissance Intervalle depuis la dernière Naissance :						
Date de l'issue :						
Age à l'issue : (en années)						
Nature de l'issue : ou Mois en cours						
Simple ou Multiple :						
Nom et Prénoms du Nouveau-né						
Sexe						
Lieu de Naissance du Nouveau-né :						
Assistance :						
Résidence du Nouveau-né :						
Date du décès :						
Age au décès : (Préciser Jour/Mois)						
Lieu du décès : du Nouveau-né						
Rang de Naissance Intervalle depuis la dernière Naissance :						

N'y a-t-il pas eu dans ce Ménage depuis l'Aid
Esseghir du 21-XII-1968, une ou plusieurs
Naiissances vivantes, de femmes aujourd'hui
Non Résidentes : absence, parties ou mortes?

Oui Non

Si Oui : Combien ?

(Consacrer pour chacune de ces femmes une
colonne non numérotée où vous consi-
gerez tous les renseignements requis concer-
nant ces naissances vivantes, ainsi que
les renseignements concernant les mères :
Date du départ, raison, destination
Corriger s'il y a lieu la feuille de Ménage et
de Décès).

Nombre Total de Naissances M :
vivantes dans le Ménage F :
depuis l'Aid Esseghir du
21 Décembre 1968 : Ens :

Nombre Total de celles qui, M :
parmi celles-ci, sont déjà F :
décédées lors de la
visite : Ens :

**S'IL N'Y A EU AUCUNE NAISSANCE VIVANTE
DANS LE MENAGE DEPUIS L'AID ESSEGHIR DU 21
DECEMBRE 1968**

Date de la dernière
Naissance Vivante ?

Sexe :

Actuellement en vie ?

Oui : Non :

Si Oui : Résidence Actuelle ?

Si Non :

Date du décès :

Age au décès :
(Préciser l'unité : J. M. ou A)

Lieu du décès :

Etranger : Pays

Algérie : Commune actuelle :

QUESTIONNAIRE des NAISSANCES et GROSSESSES SURVENUES DEPUIS L'AID ESSEGHIR du 21 DECEMBRE 1968 (1 CHOUAL 1388)
 Modèle Complet : Femmes de moins de 50 ans, non célibataires. VISA C. O. C. O. E. S. 89 03

Modèle Complet : Femmes de moins de 50 ans, non célibataires.

Numéro du passage :

Strate, Département, Arrondissement, Commune :

District :

Numéro du Ménage pour l'exploitation :

Numéro de la Femme interrogée dans le Ménage :

Nom et Prénoms de la Femme interrogée :

Age de la Femme interrogée (en années révolues) :

1 AVEZ-VOUS ETE RECENTMENT, OU BIEN ETES-VOUS ACTUELLEMENT ENCEINTE ? OUI : Passer en 3 NON : Passer en 2

2 N'avez-vous cependant jamais eu de grossesses, de fausses-couches ou d'enfants nés non-vivants ? OUI : Passer en 3 NON : **TERMINE**

3 QUELLE EST LA DATE EXACTE DE L'ISSUE DE CETTE GROSSESSE ?

Notes des Issues :

Avant l'AID Esseghir du 21 Décembre 1968 : Passer en 4

Depuis l'AID Esseghir du 21 décembre 1968 : Reportez cette date précise dans la case du tableau B

a) Passer en 9

b) Passer en 9

c) Passer en 9

EN COURS : Passer en 5

4 Avez-vous eu un autre accouchement depuis l'AID Esseghir du 21 décembre 1968 ? OUI : Repasser en 3 NON : **TERMINE**

5 Quel âge avez-vous ? (Reporter cet âge révolu précis en années dans la case "Age" du tableau B)

6 A quel mois de grossesse en êtes-vous ? (Reporter le n° au mois dans la case "Nature de l'Issue ou Mois" du tableau B)

7 Avez-vous déjà été enceinte auparavant ? OUI : Passer en 8 NON : **TERMINE**

8 Quel délai s'est-il écoulé depuis l'issue de votre dernière grossesse ? (Reporter ce délai dans la case "Intervalle" du tableau B, en précisant soigneusement l'unité : M pour mois, A pour années), puis passer en 3

9 A QUEL MOIS DE VOTRE GROSSESSE L'ACCOUCHEMENT EST-IL INTERVENU ?

Moins de 7 mois : Fausses-Couches

7 mois et plus : Morto-Nés et Naissances Vivantes

Noter F. C. dans la case "Nature de l'Issue" du Tableau B

a) Passer en 10

b) Passer en 10

c) Passer en 10

a) Passer en 12

b) Passer en 12

c) Passer en 12

10 Avez-vous déjà été enceinte auparavant ?

a) OUI : Repasser en 3 NON : Passer en 11

b) OUI : Repasser en 3 NON : Passer en 11

c) OUI : Repasser en 3 NON : Passer en 11

11 Avez-vous été enceinte depuis cette fausse-couche ?

a) OUI : Repasser en 3 NON : **TERMINE**

b) OUI : Repasser en 3 NON : **TERMINE**

c) OUI : Repasser en 3 NON : **TERMINE**

12 Cette grossesse était-elle multiple ?

a) OUI : Passer en 13 NON : Passer en 14

b) OUI : Passer en 13 NON : Passer en 14

c) OUI : Passer en 13 NON : Passer en 14

13 De quel ordre ?

a) 2 : , 3 : , 4 : Inscrire l'ordre indiqué dans la case "Simple ou Multiple du tableau B"

b) 2 : , 3 : , 4 : Inscrire l'ordre indiqué dans la case "Simple ou Multiple du tableau B"

c) 2 : , 3 : , 4 : Inscrire l'ordre indiqué dans la case "Simple ou Multiple du tableau B"

Reprenez à 14 pour chaque nouveau -né.

14 L'ENFANT A-T-IL CRIE ?

a1) OUI : Né(e) Vivable NON : Morto-Nés

a2) OUI : Né(e) Vivable NON : Morto-Nés

b1) OUI : Passer en 17 NON : Passer en 15

b2) OUI : Passer en 17 NON : Passer en 15

c1) OUI : Inscrire M.V. dans la case "Nature de l'Issue" NON : Inscrire M.N. dans la case "Nature de l'Issue"

c2) OUI : Inscrire M.V. dans la case "Nature de l'Issue" NON : Inscrire M.N. dans la case "Nature de l'Issue"

15 Avez-vous déjà été enceinte auparavant ?

a) OUI : Repasser en 3 NON : Passer en 16

b) OUI : Repasser en 3 NON : Passer en 16

c) OUI : Repasser en 3 NON : Passer en 16

16 Avez-vous été enceinte depuis ce Mort Né ?

a) OUI : Repasser en 3 NON : **TERMINE**

b) OUI : Repasser en 3 NON : **TERMINE**

c) OUI : Repasser en 3 NON : **TERMINE**

17 Quel était votre âge exact lors de cette naissance ? (âge en années révolues)

18 Quel est son Sexe ? (Masculin : M, Féminin : F)

19 Quel est son Sexe ? (Masculin : M, Féminin : F)

20 Où est-il né ? (Etranger : Pays, Algérie : Commune actuelle)

21 Qui vous a assisté lors de cet accouchement ? (Médecin : M, Sage-Femme : SF, Personne : SA)

22 Avez-vous accouché chez vous ? à l'hôpital ? ou en Clinique ? (Domicile D, Hôpital H, Clinique C)

23 L'ENFANT EST-IL ENCORE EN VIE AUJOURD'HUI ?

a1) OUI : NON :

a2) OUI : NON :

b1) OUI : Passer en 24 NON : Passer en 25

b2) OUI : Passer en 24 NON : Passer en 25

c1) OUI : Passer en 24 NON : Passer en 25

c2) OUI : Passer en 24 NON : Passer en 25

24 Où est-il à présent ? : Noter le renseignement dans la case "Résidence", Contrôler la Feuille de Ménage : A et Passer en 28

25 A quelle date précise est-il mort ? (préciser le jour, le mois et l'année)

26 Il a vécu combien de temps ? (Compter en Jours ou en Mois révolus. Préciser bien J ou M)

27 Où est-il mort ? (Etranger : Pays, Algérie : Commune actuelle)

28 Avez-vous déjà été enceinte avant cette naissance ?

a) OUI : Passer en 29 NON : Inscrire 1 dans la case "Rang"

b) OUI : Passer en 29 NON : Passer en 33

c) OUI : Passer en 29 NON : Barrer la case "Intervalle"

29 Avez-vous eu au moins une naissance vivante avant celle dont nous parlons ?

a) OUI : Passer en 30 NON : Passer en 32

b) OUI : Passer en 30 NON : Passer en 32

c) OUI : Passer en 30 NON : Passer en 32

30 Combien de Naissances vivantes avez-vous eues avant celle dont nous parlons ? Cet enfant dont nous parlons est donc votre^{ième}..... enfant? Reporter le numéro obtenu dans la case "Rang"

31 Quelle durée sépare la naissance de cet enfant de la précédente naissance vivante ? Reporter le délai en précisant l'unité : M pour Mois ou A pour Années dans la case "Intervalle" du tableau B. Puis reprendre en 3

32 Une ou moins de vos précédentes grossesses ont-elle donné lieu à un nouveau -né ayant crié ?

a) OUI : Passer en 30 NON : Passer en 33

b) OUI : Passer en 30 NON : Passer en 33

c) OUI : Passer en 30 NON : Passer en 33

33 Avez-vous été enceinte à nouveau depuis l'Accouchement dont nous parlons ?

a) OUI : Repasser en 3 NON : **TERMINE**

b) OUI : Repasser en 3 NON : **TERMINE**

c) OUI : Repasser en 3 NON : **TERMINE**

Observations

Signature de l'Enquêteur

Signature du Contrôleur

C - Si la femme n'a eu aucune grossesse

Porter cependant en 3 sur le modèle H l'intervalle entre la date de consommation du 1er mariage et la date de l'enquête, en l'expliquant s'il est supérieur ou égal à 24 mois.

RELIER PAR UN TROMBONE TOUS LES FEUILLETS E, F, G, H, I CONSACRES A UNE MEME FEMME. INTERROGER DE LA MEME FACON TOUTES LES FEMMES DU MENAGE, en prenant garde de ne pas mélanger leurs dossiers.

IV - FEUILLE MENAGE, Modèle D.

Une fois que toutes les femmes du ménage ont été interrogées, remplir le modèle D (voir au verso), avec la chef de ménage. Puis insérer tous les dossiers des femmes interrogées à l'intérieur de la chemise modèle D.

V - RECAPITULATIFS, Modèle J.

Le soir, une fois le travail sur le terrain achevé, établir les récapitulatifs modèles J - Pour ce faire, on utilisera deux séries de documents :

- 1 - Le dossier de l'enquête fécondité établi dans la journée
 - 2 - Le questionnaire général correspondant aux ménages interrogés lors de l'enquête fécondité
- Les contrôleurs devront mettre ces questionnaires à la disposition de l'enquêtrice. On transcrit les renseignements concernant le ménage, le chef de ménage, les femmes interrogées et éventuellement leur conjoint.

Il doit y avoir un récapitulatif par femme interrogée. Répéter les renseignements concernant le ménage sur chaque récapitulatif, même si plusieurs femmes appartiennent au même ménage.

Ranger les récapitulatifs relatifs à un même ménage dans le dossier modèle D correspondant

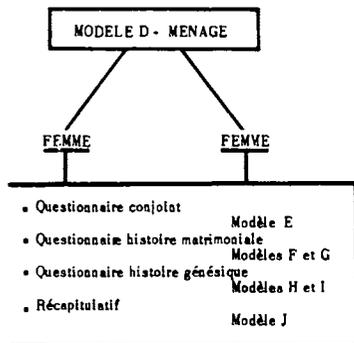


- TOUTES LES FEMMES DU MENAGE DE MOINS DE 50 ANS, NON CELIBATAIRES, AVEC OU SANS ENFANTS, DOIVENT ETRE INTERROGÉES

- TOUTS LES INTERVALLES, DUREES ET AGES DOIVENT ETRE CALCULES EN JOURS JUSQU'A 1 MOIS, EN MOIS JUSQU'A 3 ANS, EN ANNEES REVOLUES AU DELA DE 3 ANS.

- TOUT INTERVALLE ENTRE LES GROSSESSES SUPERIEUR OU EGAL A 24 MOIS DOIT ETRE EXPLIQUE.

SCHEMA DU DOSSIER :



Lien de parenté entre les conjoints :

CM : cousins maternels PE : Parents éloignés
CP : cousins paternels N : Nul

Situation matrimoniale du conjoint :

MG : monogame PG : Polygame

Résidence actuelle des enfants :

M : dans le ménage A : ailleurs

Nature des issues :

EC : en cours FC : fausse couche
MN : mort-né C : "à crié", né-vivant
C.EV : né-vivant, actuellement en vie
C.DE : né-vivant, actuellement décédé.

ETUDE STATISTIQUE DE LA POPULATION

Etude de la fécondité - Feuille ménage - Modèle D

Vies COCOES N° 69-08

Numéro de passage _____ Date du passage dans le ménage _____
 Strate _____ Wilaya _____ Daira _____ Commune _____
 District _____ Numéro du ménage pour l'exploitation _____
 Chef lien de commune : Oui Non - Habitat : aggloméré épars
 Numéro d'ilot ou de zone épars _____ Numéro de construction _____
 Nombre de femmes : non célibataires de moins de 50 ans _____
 Nom et prénom du chef de ménage : _____
 Adresse très précise : _____

RENSEIGNEMENTS CONCERNANT LE MENAGE														
M A T R I A T	- Texte	<input type="checkbox"/>	- Eau à domicile	OUI <input type="checkbox"/> NON <input type="checkbox"/>										
	- Bataque, gourbi	<input type="checkbox"/>	- Electricité	OUI <input type="checkbox"/> NON <input type="checkbox"/>										
	- Maison traditionnelle habitée par un seul ménage	<input type="checkbox"/>	- Gaz ou butane	OUI <input type="checkbox"/> NON <input type="checkbox"/>										
	- Maison traditionnelle habitée par plusieurs ménages	<input type="checkbox"/>	- " " - de ville	OUI <input type="checkbox"/> NON <input type="checkbox"/>										
	- Appartement dans immeuble	<input type="checkbox"/>	- Nombre total de pièces habitées :	_____										
	- Villa	<input type="checkbox"/>												
Observations : _____														
S T R U C T U R E	NATURE	Périodicité Régularité	A la journée		A la semaine ou à la quinzaine		Au mois		Tous les 3 mois		A l'année		Autres périodicités	
			R	I	R	U	R	I	R	I	R	I	R	I
	- Revenus commerciaux													
	- Revenus agricoles													
	- Revenus artisanaux													
	- Salaires													
	- Rentes, loyers													
	- Pensions, retraites													
	- Aides diverses													
	- Autres													
STRUCTURE FAMILIALE DU MENAGE :														
Nom de l'enquêtrice : _____ Numéro de l'enquêtrice : _____														
Signature de l'enquêtrice _____														

QUESTIONNAIRE DE L'HISTOIRE GÉNÉRIQUE - MODÈLE II

A toute femme du ménage non célibataire de moins de 50 ans

Numéro d'ilot ou de zone éparce _____ Numéro de construction _____
 Numéro de la feuille d'histoire générique utilisée _____
 Nombre de feuilles d'histoire générique utilisées _____
 Nom et prénom de la femme interrogée _____
 Date de naissance _____ Age actuel _____
 Nom et prénom de l'enquêteur _____ Numéro _____

Identification

1 - CONSOMMATION DU PREMIER MARIAGE (Rappel)

Date _____ Si la femme a déclaré des enfants au cours de l'histoire matrimoniale _____
 Si non, rechercher les événements possibles et _____

INTERVALLE ENTRE 1 et 4 _____

Explication : _____

Si il y a un autre événement _____
 PASSER EN 2
 Si non PASSER EN 7

4

N° d'ordre de l'union _____ FC, EC, mois de grossesse _____
 C, FC, MN : Date de l'issue _____
 C, FC, MN : Age de la mère à l'issue _____
 C, MN : Assistance à l'issue _____ Multiplicité _____ Sexe _____
 C : Nom et prénom _____
 C : Durée de l'allaitement _____
 C, EY : Age révois actuel _____ Résidence actuelle _____
 C, DE : Age au décès _____ Date du décès _____

Porter le numéro de l'issue dans la case blanche de l'axe
 Remplir le tableau
 PASSER EN 5

Si il y a deux événements intermédiaires, INTERVALLE ENTRE 4 et 2 _____
 PASSER EN 8

Si il n'y a qu'un événement intermédiaire, INTERVALLE ENTRE 4 et 2 _____
 PASSER à la feuille suivante

Explication éventuelle de cette durée : _____

6

N° d'ordre de l'union _____ FC, EC, mois de grossesse _____
 C, FC, MN : Date de l'issue _____
 C, FC, MN : Age de la mère à l'issue _____
 C, MN : Assistance à l'issue _____ Multiplicité _____ Sexe _____
 C : Nom et prénom _____
 C : Durée de l'allaitement _____
 C, EY : Age révois actuel _____ Résidence actuelle _____
 C, DE : Age au décès _____ Date du décès _____

Porter le numéro de l'issue dans la case blanche de l'axe
 Remplir le tableau
 PASSER EN 7

INTERVALLE ENTRE 6 et 2 _____
 PASSER à la feuille suivante DANS TOUS LES CAS

Explication : _____

8

Nom et prénom _____ Sexe _____
 - EY : Age actuel _____ Résidence actuelle _____
 - DE : Age au décès _____ Date du décès _____

Remplir le tableau et
 PASSER EN 3

2 - PREMIER ENFANT DÉCLARÉ au cours de l'histoire matrimoniale (ainé/précédent)

Date de naissance _____
 Age de la mère à la naissance _____
 Assistance à l'issue _____ Multiplicité _____
 Durée de l'allaitement _____
 Numéro d'ordre de l'union _____

8 - TYPE H. QUESTIONNAIRE ON CHILDBEARING HISTORY PINK - 23 x 30 cm. PAGE 1 - PAGE 2 : BLANK

QUESTIONNAIRE DE L'HISTOIRE GÉNÉRIQUE - MODÈLE I

A toute femme du ménage non célibataire de moins de 50 ans

Numéro d'ilot ou de zone éparce _____ Numéro de construction _____
 Numéro de la feuille d'histoire générique utilisée _____
 Nombre de feuilles d'histoire générique utilisées _____
 Nom et prénom de la femme interrogée _____
 Date de naissance _____ Age actuel _____
 Nom et prénom de l'enquêteur _____ Numéro _____

Identification

1 - ENFANT DÉCLARÉ (Rappel de dernier enfant porté sur la feuille précédente)

Date de naissance _____ Si la femme a déclaré un autre enfant au cours de l'histoire matrimoniale _____
 Si non, rechercher les événements possibles et _____

INTERVALLE ENTRE 1 et 4 _____

Explication : _____

Si il y a un autre événement _____
 PASSER EN 3
 Si non PASSER EN 7

4

N° d'ordre de l'union _____ FC, EC, mois de grossesse _____
 C, FC, MN : Date de l'issue _____
 C, FC, MN : Age de la mère à l'issue _____
 C, MN : Assistance à l'issue _____ Multiplicité _____ Sexe _____
 C : Nom et prénom _____
 C : Durée de l'allaitement _____
 C, EY : Age révois actuel _____ Résidence actuelle _____
 C, DE : Age au décès _____ Date du décès _____

Porter le numéro de l'issue dans la case blanche de l'axe
 Remplir le tableau
 PASSER EN 5

Si il y a deux événements intermédiaires, INTERVALLE ENTRE 4 et 6 _____
 PASSER EN 8

Si il n'y a qu'un événement intermédiaire, INTERVALLE ENTRE 4 et 2 _____
 PASSER à la feuille suivante

Explication éventuelle de cette durée : _____

6

N° d'ordre de l'union _____ FC, EC, mois de grossesse _____
 C, FC, MN : Date de l'issue _____
 C, FC, MN : Age de la mère à l'issue _____
 C, MN : Assistance à l'issue _____ Multiplicité _____ Sexe _____
 C : Nom et prénom _____
 C : Durée de l'allaitement _____
 C, EY : Age révois actuel _____ Résidence actuelle _____
 C, DE : Age au décès _____ Date du décès _____

Porter le numéro de l'issue dans la case blanche de l'axe
 Remplir le tableau
 PASSER EN 7

INTERVALLE ENTRE 6 et 2 _____
 PASSER à la feuille suivante DANS TOUS LES CAS

Explication : _____

8

Nom et prénom _____ Sexe _____
 - EY : Age actuel _____ Résidence actuelle _____
 - DE : Age au décès _____ Date du décès _____

Remplir le tableau et
 PASSER EN 9

2 - DURÉE ENTRE -1 et 2 et 3 ont rempli -1 et la date de l'enquête dans le cas contraire

3 - DURÉE DEPUIS LA CONSOMMATION DU PREMIER MARIAGE

4 - ENFANT DÉCLARÉ au cours de l'histoire matrimoniale (précéder son numéro d'ordre)

9 - TYPE I. QUESTIONNAIRE ON CHILDBEARING HISTORY PINK - 23 x 30 cm. PAGE 1. PAGE 2 : BLANK

RENSEIGNEMENTS CONCERNANT LE MENAGE

Nombre total de résidents RP : _____ RA : _____
 Nombre total de femmes non célibataires de moins de 50 ans _____
 Nombre total de leurs enfants résidents dans le ménage : _____
 Structure familiale du ménage : _____ Nombre de personnes occupées _____

HABITAT					
- Tente	1.	<input type="checkbox"/>	- Eau	OUI <input type="checkbox"/>	NON <input type="checkbox"/>
- Baraques, gourbi	2.	<input type="checkbox"/>	- Electricité	OUI <input type="checkbox"/>	NON <input type="checkbox"/>
- Maisons traditionnelles habitées par un seul ménage	3.	<input type="checkbox"/>	- Gas - Butane	OUI <input type="checkbox"/>	NON <input type="checkbox"/>
- Maisons traditionnelles habitées par plusieurs ménages	4.	<input type="checkbox"/>	- de ville	OUI <input type="checkbox"/>	NON <input type="checkbox"/>
- Appartement dans immeuble	5.	<input type="checkbox"/>	Nombre total de pièces habitées : _____		
- Villa	6.	<input type="checkbox"/>			
OBSERVATIONS : _____					

REVENUS (par ordre d'importance dans le ménage)															
NOMBRE D'ORDRE DES MENAGES S'ILS RESIDENT DANS LE MENAGE	NATURE	Périodicité		A le		A le		Au		Tous les		A		Autres	
		Régularité		jour		semaine		mois		3 mois		l'année		périodicités	
		R	I	R	I	R	I	R	I	R	I	R	I	R	I
	Revenus commerciaux														
	Revenus agricoles														
	Revenus artisanaux														
	Salaires														
	Rentes, Loyers														
	Pensions, retraites														
	Aides diverses														
	Autres														
OBSERVATIONS : _____															

- Date de contrôle _____
 - Nom et prénom du contrôleur _____
 - Nature du contrôle : Femme enquêtée en présence du contrôleur
 Femme entièrement renseignée par le contrôleur
 Femme partiellement renseignée par le contrôleur
 Dossier contrôlé en présence de l'enquêtrice
 Dossier contrôlé en chambre
 Récapitulatif établi par le contrôleur
 - Autres observations (contrôles de cohérence) _____

 - Signature du contrôleur _____

ETUDE STATISTIQUE DE LA POPULATION

Ville COCOES N° 60-03

Récapitulatif - Etude de la Fécondité - Modèle J - Pour toute femme de ménage de moins de 50 ans, non célibataire, avec ou sans enfants

Numéro du passage _____
 Sexe _____ Département _____ Arrondissement _____ Commune _____
 District _____ Numéro de ménage pour l'exploitation _____
 Chef-lieu de commune : Oui Non
 Habitat : Aggloméré Epars
 Nature du passage dans le ménage : _____
 Numéro d'ilot ou de zone épars _____ Numéro de construction _____
 Nombre de récapitulatifs utilisés pour la femme _____ Numéro de récapitulatif _____
 Nombre de récapitulatifs utilisés pour le ménage _____
 Nom et prénom de chef de ménage _____
 Adresse très précise _____
 Nom et prénom de la femme interrogée _____
 Numéro d'ordre dans le ménage _____

TABLEAU SYNOPSIS, RESUME DE L'HISTOIRE MATRIMONIALE					
	- 1 -	- 2 -	- 3 -	- 4 -	- 5 -
1 - Numéro d'ordre de l'union					
2 - Date de début de l'union (M ou A)					
3 - Age de la femme au début de l'union					
4 - Durée de l'union (M ou A)					
5 - Date de fin de l'union (M ou A)					
6 - Age de la femme à la fin de l'union					
7 - Intervalle entre les unions ou durée du célibat actuel (M ou A)					
Lien de parenté avec le dernier conjoint _____					

- Date du passage _____
 - Nom et prénom de l'enquêtrice _____
 - Numéro de l'enquêtrice _____
 - Heure de la visite _____ Durée totale de la visite _____
 - Degré de participation : Très bonne Bonne Passable
 Mauvaise Très Mauvaise Refus total

OBSERVATIONS : _____

 Répertoire de l'enquêtrice

TAB. CAU SYMPTOMES - NOMBRE DES GROSSESSES

1 - Numéro d'ordre de l'issue	- 1 -	- 2 -	- 3 -	- 4 -	- 5 -	- 6 -	- 7 -	- 8 -	- 9 -	- 10 -
2 - Numéro d'ordre de l'union										
3 - Nature de l'issue, mois de grossesse (FC, FC')										
4 - Date de l'issue (préciser mois et année)										
5 - Age révolu de la mère à l'issue										
6 - Intervalle depuis issue précédente ou durée depuis la consommation du premier mariage (préciser M ou A)										
7 - Raisons de cet intervalle ou de la durée depuis la consommation du premier mariage										
8 - Assistance à l'issue										
9 - Multiplicité										
10 - Sexe										
11 - Durée de l'allaitement maternel (en mois)										
12 - Résidence actuelle et N° d'ordre dans le ménage s'il y a lieu										
13 - Date du décès (préciser M et A)										
14 - Age révolu du décès (préciser J, M ou A)										

- Somme des durées des unions depuis la consommation du premier mariage (préciser M ou A) : _____
 - Durée totale d'exposition (durée précédente moins les périodes de stérilité temporaire décelées dans le tableau) (préciser M ou A) : _____
 - Nombre total d'unbes : _____
 - Age à la consommation du premier mariage : _____
 - Date de consommation du premier mariage : _____
 - Nombre total de grossesses : _____
 - Nombre total de mortués : _____
 - Nombre total de fausses-couches : _____
 - Nombre de néo-nés : _____
 - Masculins : _____
 - Féminins : _____
 - Ensemble : _____
 - Nombre de décès : _____
 - Masculins : _____
 - Féminins : _____
 - Ensemble : _____

Renseignements concernant	Numéro d'ordre	Résidence	Date de naissance et Age révolu actuel	Résidence au 1-IV-66	Durée de résidence	Nationalité	Langue maternelle	Langues lues et écrites couramment	Sait actuellement ou enseignement régulier	Niveau de dernier enseignement suivi	Niveau d'instruction	Situation individuelle	OCCUPATION PRINCIPALE, OCC : Situation actuelle, STDT : dernière situation					Situation matrimoniale	Sexe	Durée totale d'absence durant la dernière année conjugale	Si décédé, date de décès	
													Profession individuelle	Qualification	Situation dans la profession	Branche d'activité économique	Secteur					durée de l'occupation ou de chômage actuel
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
La femme																						
Le dernier conjoint de cette femme																						
Le chef de ménage																						

HOUSEHOLD-HEAD OF HOUSEHOLD

Type of card used	A 1
Number of round	2
Stratum, Wilaya, Daïra, Commune	8
District	11
Household's processing number	14
Settlement	15
Type of round in this household	16
Reference number of head of household	18
Residence	19
Current age in completed years	21
Date of birth	24
Residence on 01-04-1966	28
Length of residence	31
Nationality, native language	33
Written language, current school attendance	35
Most recent schooling, level of education	38
Situation, profession, skills	42
Status in profession, branch of economic activity, sector	46
Length of employment	49
Marital status	50
Sex	51
Total number of residents (RP + RAA + RAE)	53
Total number of non-single women under age 50	54
Total number of their children resident in household	56
Total number of people employed	57
Family structure of household	58
Type of housing	59
Number of rooms used for habitation	61
Water, electricity, gas	62
Number of regular incomes entering more frequently than monthly	63
Number of regular monthly incomes	64
Number of regular incomes entering less frequently than monthly	65
Total number of regular incomes	66
Total number of incomes entering irregularly	67
Total number of incomes in household	68
Date of this round	71
Number of the female enumerator	74
Participation	75

Card B

SPOUSE

Type of card used	<u> B </u>	1
Number of round	<u> </u>	2
Stratum, Wilaya, Daïra, commune	<u>_____</u>	8
District	<u>_____</u>	11
Household's processing number	<u>_____</u>	14
Settlement	<u> </u>	15
Type of round in this household	<u> </u>	16
Spouse's reference number	<u>_____</u>	18
Residence	<u> </u>	19
Current age in completed years	<u>_____</u>	21
Date of birth	<u>_____</u>	24
Résidence on 1. IV. 66	<u>_____</u>	28
Length of residence	<u>_____</u>	31
Nationality, native language	<u> </u> <u> </u>	33
Written language, current school attendance	<u> </u> <u> </u>	35
Most recent schooling, level of education	<u>_____</u> <u> </u>	38
Situation, profession, skills	<u> </u> <u>_____</u> <u> </u>	42
Status: B E A, Sector	<u> </u> <u>_____</u> <u> </u>	46
Length of employment	<u>_____</u>	49
Marital status	<u> </u>	50
Sex	<u> 1 </u>	51
Total length of absence during last year of married life	<u>_____</u>	54
Age at end of union if woman is widowed, divorced, separated	<u>_____</u>	56
Is this the most recent spouse ?	<u> </u>	57

WIFE

Type of card used	<u> C </u>	1
Number of round	<u> </u>	2
Stratum, Wilaya, Daira, Commune	<u>_____</u>	8
District	<u>_____</u>	11
Household's processing number	<u>_____</u>	14
Settlement	<u>_____</u>	15
Type of round in this household	<u>_____</u>	16
Women's reference number	<u>_____</u>	18
Residence	<u> 2 </u>	19
Current age in completed years	<u>_____</u>	21
Date of birth	<u>_____</u>	24
Residence au 1.IV.66	<u>_____</u>	28
Length of residence	<u>_____</u>	31
Nationality, native language	<u> </u>	33
Written language, current school attendance	<u> </u>	35
Most recent schooling, level of education	<u>_____</u>	38
Situation, profession, skills	<u>_____</u>	42
Status in profession, branche of economic act. sector	<u>_____</u>	46
Length of employment	<u>_____</u>	49
Marital status	<u>_____</u>	50
Sex	<u> 2 </u>	51
Reference number of most recent spouse	<u>_____</u>	53
Total length of unions	<u>_____</u>	56
Total exposure time	<u>_____</u>	59
Total number of unions	<u>_____</u>	60
Age at consumation of first marriage	<u>_____</u>	62
Date of consumation of first marriage	<u>_____</u>	65
Total number of pregnancies	<u>_____</u>	67
Total number of stillbirths	<u>_____</u>	68
Total number of miscarriages	<u>_____</u>	69
Total number of live births	M <u>_____</u> F <u>_____</u>	73
Total number of live births now deceased	M <u>_____</u> F <u>_____</u>	77

UNIONS

Card D

Type of card	<input type="checkbox"/> 1	<input type="checkbox"/> 1	<input type="checkbox"/> 1	<input type="checkbox"/> 1
Number of round	<input type="checkbox"/> 2	<input type="checkbox"/> 2	<input type="checkbox"/> 2	<input type="checkbox"/> 2
Stratum, Wilaya, Daïra, Commune	<input type="checkbox"/> 8	<input type="checkbox"/> 8	<input type="checkbox"/> 8	<input type="checkbox"/> 8
District	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 11	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 11	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 11	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 11
Household's processing number	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 14	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 14	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 14	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 14
Settlement	<input type="checkbox"/> 15	<input type="checkbox"/> 15	<input type="checkbox"/> 15	<input type="checkbox"/> 15
Type of round	<input type="checkbox"/> 16	<input type="checkbox"/> 16	<input type="checkbox"/> 16	<input type="checkbox"/> 16
Women's reference number	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 18			
Number of this union	<input type="checkbox"/> 19	<input type="checkbox"/> 19	<input type="checkbox"/> 19	<input type="checkbox"/> 19
Date of the beginning of union	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 22			
Age of woman at beginning of union	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 24			
Length of union	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 27			
Date of the end of this union	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 30			
Age of woman at the end of union	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 32			
Interval separating this union from previous union	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 35			
Length of current single period if woman w. d. or sep	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 38			
Number of pregnancies	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 40			
Number of live births	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 42			
Is this the most recent union?	<input type="checkbox"/> 43	<input type="checkbox"/> 43	<input type="checkbox"/> 43	<input type="checkbox"/> 43
Most recent union only Reference number of most recent spouse	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 45			
How related to spouse	<input type="checkbox"/> 46	<input type="checkbox"/> 46	<input type="checkbox"/> 46	<input type="checkbox"/> 46
Age difference with spouse	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 49			

OFFSPRING

Card E

	Type of card	<input type="checkbox"/> E 1			
	Number of round	<input type="checkbox"/> 2	<input type="checkbox"/> 2	<input type="checkbox"/> 2	<input type="checkbox"/> 2
	Stratum, Wilaya, Daïra, Commune	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 8	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 8	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 8	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 8
	District	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 11	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 11	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 11	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 11
	Household's processing number	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 14	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 14	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 14	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 14
	Settlement	<input type="checkbox"/> 15	<input type="checkbox"/> 15	<input type="checkbox"/> 15	<input type="checkbox"/> 15
	Type of round	<input type="checkbox"/> 16	<input type="checkbox"/> 16	<input type="checkbox"/> 16	<input type="checkbox"/> 16
	Mother's reference number	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 18			
	Reference number of union	<input type="checkbox"/> 19	<input type="checkbox"/> 19	<input type="checkbox"/> 19	<input type="checkbox"/> 19
	Reference number of offspring	<input type="checkbox"/> <input type="checkbox"/> 21			
	How term ended, month of pregnancy	<input type="checkbox"/> <input type="checkbox"/> 23			
	Date of end of term	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 26			
	Date of consumation of last marriage	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 29			
	Age of mother at end of term	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 31			
	Interval separating this from last term, cause	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 35	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 35	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 35	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 35
	Period of non exposure since last term	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 38			
	Assistance received at term	<input type="checkbox"/> 39	<input type="checkbox"/> 39	<input type="checkbox"/> 39	<input type="checkbox"/> 39
	Sex	<input type="checkbox"/> 40	<input type="checkbox"/> 40	<input type="checkbox"/> 40	<input type="checkbox"/> 40
If live birth still living	Number of term	<input type="checkbox"/> 41	<input type="checkbox"/> 41	<input type="checkbox"/> 41	<input type="checkbox"/> 41
	How long breast fed	<input type="checkbox"/> <input type="checkbox"/> 43			
	Number of this delivery	<input type="checkbox"/> <input type="checkbox"/> 45			
If live birth now deceased	Number of this birth	<input type="checkbox"/> <input type="checkbox"/> 47			
	Current age in completed years	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 50			
	Current residence	<input type="checkbox"/> 51	<input type="checkbox"/> 51	<input type="checkbox"/> 51	<input type="checkbox"/> 51
Late offspring only	Reference number in household if resident there	<input type="checkbox"/> <input type="checkbox"/> 53			
	Age at death	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 56			
	Date of death	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 59			
	Interval elapsed since this term	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 62			
	Causes for this interval	<input type="checkbox"/> 63	<input type="checkbox"/> 63	<input type="checkbox"/> 63	<input type="checkbox"/> 63

Democratic and Popular Republic of Algeria Form C 1

NATIONAL VITAL STATISTICS SURVEY
CODING GRID - HOUSEHOLDS (Card 1)

Type of card used	□ □	1
Number of round	□	2
Stratum, wilaya, daïra, commune	□ □ □ □ □ □ □ □	8
District	□ □ □ □	11
Processing number	□ □ □ □	14
Seat of commune ? Settlement	□	15
Type of round in this household	□ □	18
Date of first round	□ □ □ □	19
Number of first enumerator	□ □ □ □	22
Date of this round	□ □ □ □	25
Number of enumerator on this round	□ □ □ □	28
Participation	□	28
Residence in 1966	□ □ □ □ □ □ □ □	35
Total number of residents (cards 2)	□ □ □ □ □ □ □ □ □ □	41
Resident present	□ □ □ □	45
Resident absent	□ □ □ □	49
Number of non-single women under age 50	□	50
Nb of residents who have left since 1966 (cards 7, 8)	□ □	52
Number of cards 9	□	53
Number of deaths between Aïd and 1 st round (card 5)	□ □ □ □	58
Number of deaths since first round (cards 6)	□ □ □ □	58
Most recent death	□ □ □ □ □ □	64
Nb of births between Aïd and first round (cards 3)	□ □ □ □ □ □	70
Nb of births since first round (cards 4)	□ □ □ □ □ □	76
Most recent birth	□ □ □ □	78

Coding	Punched cards	Verification
Date :		
N° :		

Number of coding grids :

- C2
- C3
- C4
- C5

16. - Form C1. Coding grid, Households (Card 1), white.
32 x 31 cm.

Chapter 2

TUNISIA

Tunisian National Demographic Survey (TNDS)¹

1. Goals

It was as much to meet the needs of economic planning as to guide the action of the office of family planning (created in 1964) that the Tunisian government decided in 1967 to undertake a demographic survey on a nationwide scale. While the registration of vital statistics, reorganized in 1957, has certainly made great progress, and the registration of births is officially considered to be accurate, everyone agrees that the registration of deaths remains very incomplete. During the last census, held in 1966, a birth rate of 44.5 per 1000 was recorded, a death rate of 10.6 per 1000, producing a rate of natural increase of 3.4%, clearly too low. A comparison of the last two censuses (1956 and 1966), these of rather good quality, should have given a more accurate measure of the increase. As it happened, depending on whether foreigners were or were not counted, and on the corrections that were or were not made because of under-recording, the average annual growth rate in between these two censuses has been estimated as being anywhere between 1.8% and 2.6%, this last figure the most plausible one⁽²⁾. Moreover, the average for the period 1956-1966 could not give a fair idea of the current rate of growth of the Tunisian population⁽³⁾.

The first aim⁽⁴⁾ of the National Demographic Survey, then, was to supply as accurate a means as possible of measuring the rate of natural increase by making satisfactory estimates of birth and death rates (migration abroad considered here to be of secondary importance). The second goal, no less important, was to gather data which would make it possible to draw up mortality and fertility tables of the population of Tunisia. Thirdly some measure of the extent of under-registration of births and deaths in official records was hoped for.

(1) - See Bibliography, items 2, 3 and 10.

(2) - The official rate of 2.3%, cited both by President Bourguiba in his speech of August 1966 and by the Government in its working out of the Four Year Plan 1968-1971 was, in any event, much lower than the real rate.

(3) - Mostly because of the lowering of the death rate.

(4) - See Bibliography, item 1.

There were in addition other and more ambitious goals but these were not of primary importance (a study of factors involved in fertility and mortality, a study of certain structural features of the population untouched by the census, migrations within the country, etc.).

2. Range of study

The National Demographic Survey (TNDS), as its name indicates, covers the entire country. Figure I shows the comparative distribution of people interviewed (TNDS 1967-1969) and counted in the 1966 census in the governorates.

The Tunisian population is mostly rural (60% of the population lives outside of the communes⁽¹⁾). Except for Tunis, Sfax and Sousse, the cities are mostly small (99 out of 137 communes have between 2000 and 3000 inhabitants), located generally in the coastal area. The rural population is, moreover, very widely scattered, more than 40% of the country's total population (that is nearly 70% of the rural population) living in thinly-settled settlements⁽²⁾. Small villages are rather infrequent. In most cases, rural dwellings are isolated. We should remember that the Tunisian population is mostly Moslem, even though very diverse ethnically on account of Tunisia's long history and mixing together of many civilizations. It is practically entirely Arabic speaking (only a few villages where Berber languages are spoken remain), but bilingualism (Arabic and French) is the rule in the primary schools.

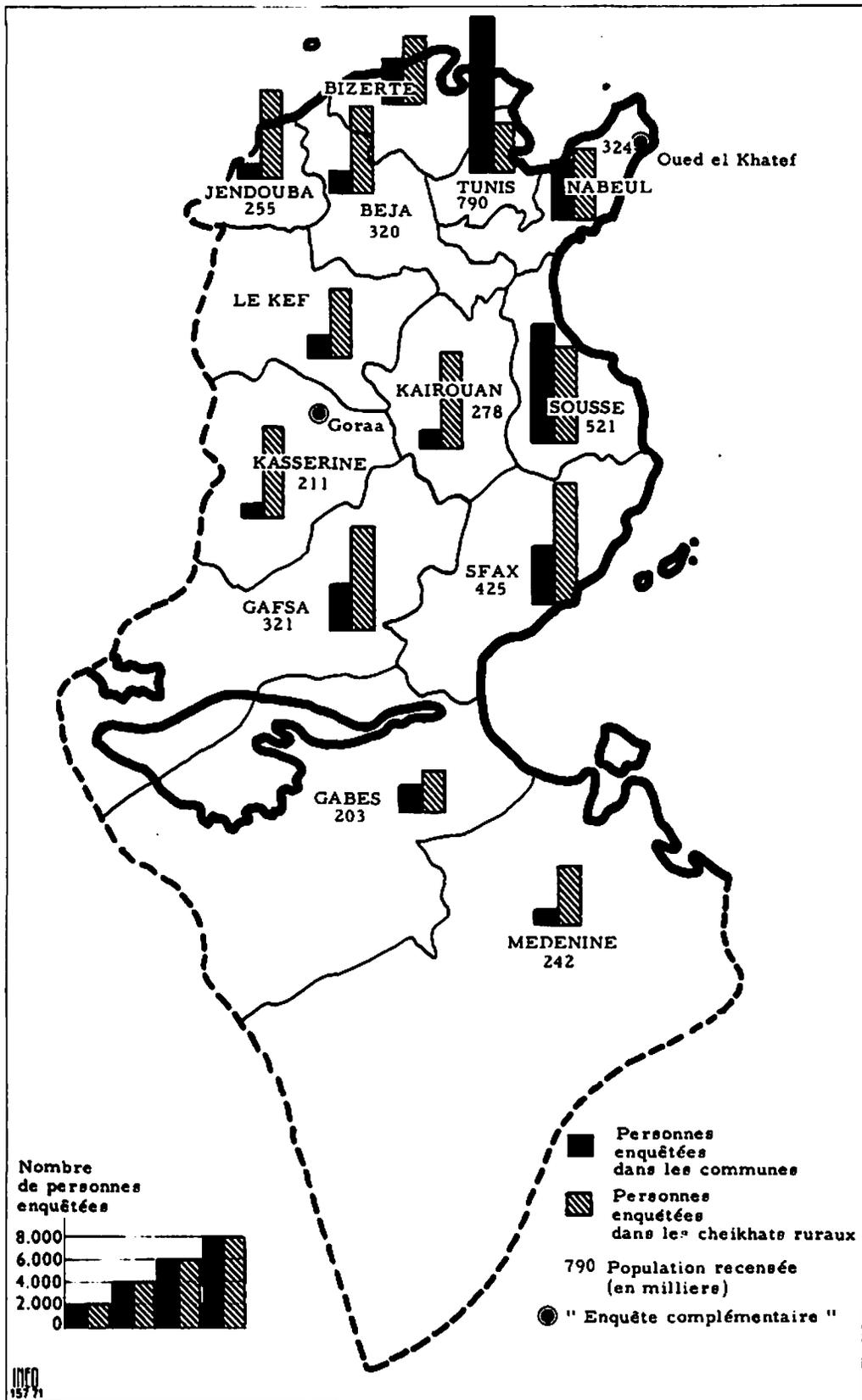
The geographic conditions for carrying out a survey are good: no high mountains; a well planned system of roads, these in good condition; small desert area, few nomads and in any event, relatively little territory to cover (164,000 sq.km.).

As we shall see later on a complementary survey was carried out as part of the main survey in two small rural sheikhdoms. The first of these is rather typical of the rural world in the coastal area, while the other shows the features of those living in the steppes of the centre and south. They have been indicated in Figure I.

(1) The basic administrative unit in 1966 was the sheikhdom. But some sheikhdoms, parts of sheikhdoms or groups of sheikhdoms, have been made into communes. In spite of the fact that there are a certain number of rural communes proper, the urban population in Tunisia is grouped together with the population.

(2) By this is meant habitations that are totally cut off from all others or groupings of less than ten dwellings.

FIGURE 1. - TUNISIE. POPULATION INTERVIEWED (T.N.D.S. 1967-69) AND COUNTED (CENSUS 1966), BY GOVERNORATES.



3. Numbers involved

The TNDS wanted to represent all of the Tunisian population, by which is meant the entire resident population in Tunisia, foreigners included (Tunisians living overseas were not included). In the 1966 census 4,533,000 people had been counted. If, however, the evident omissions of this census (officially estimated at 4%) and the growth of the population from 1966 to 1968 are considered, the total number studied can be given as approximately five million inhabitants.

The part of the sample that was actually interviewed was nearly 140,000 people, or 2,8% of the total reference number.

As for the complementary survey, it was exhaustive in the sheikhdoms of Goraa and Qued-el-Khatef and involved therefore 5200 people.

4. Method used in sample taking

The method used in the TNDS was unfortunately not designed to meet all the survey's goals. Various reasons account for this, and principally the fact that the drawing up of the survey was not done by the people who carried out the survey proper. Our brief description of the method used in sample taking will consequently be followed immediately by a short account of the problems faced and the remedies proposed.

a) - Description of the method used in sample taking.

The TNDS covered nearly 27,000 households drawn at random from the records of the 1966 census, as well as from the lists of new marriages reported by the civil registry, this carried out in the following manner :

Drawing of households included in the census: the sampling was in two steps. In the first step, drawing was done from the rural sheikhdoms (rural population) or from districts in the communes (urban population in four strata:

1. first rural stratum (rural sheikhdoms where the registration of vital statistics was very poor), drawing 1/10 with probability proportionate to size.
2. second rural stratum (rural sheikhdoms where the official registration of vital statistics was relatively good), drawing 1/15 with probability proportionate to size.

N.B. In each of the strata, the sheikhdoms whose population included less than 350 households were regrouped beforehand for the purposes of sample taking. Moreover, the drawing was done by systematically consulting geographical lists of the sheikhdoms so that all the governorates would be covered.

3. first urban stratum (communes with more than 3000 households). After regrouping census districts for the survey so that each district included 225 households, a 1/20 drawing was carried out systematically this with stable probability because the sizes were the same.
4. second urban stratum (communes with fewer than 3000 households). The same type of drawing but with a sampling fraction of 1/10.

In the second stage, whatever the stratum concerned, a random drawing was done by working from the census lists:

325 households in the sheikhdom (or groups of sheikhdoms) samples.

90 households in sectors of the test communes.

Complementary drawing from the lists of recorded marriages. The rule established was to draw at random four marriages per sector of a commune and twelve marriages per sheikhdom. As it happened, this rule could not always be followed for lack of accurate address listings. The drawing was thus not truly random.

The method used in sample taking can be summarized in the following charts (Table I and Figure II).

b). - Problems raised by methods of sample taking

These fall into two main categories:

I. Difficulties in making comparisons between the TNDS and the registry of vital statistics.

It has already been stated that one of the main aims of the TNDS was to quantify the under-registration of births and deaths in official records.

As both sources of information, the TNDS and the official registration of vital statistics, were presumed to be subject to observation errors - these in varying degrees - it was not very useful to compare their results in general terms (crude birth and death rates, nor even age specific rates). It was far more useful to compare the events observed case by case: was an event recorded by the survey also recorded by the official registry of vital statistics and vice versa? Except for the use of the method developed by Chandrasekhar⁽¹⁾, only this type of comparison

(1) - This method is explained in full in the chapter "Analysis" in Part 2.

makes it possible to detect the types of event which escape the notice either of the civil registry or the survey.

The method of sample taking of the TNDS made such a comparison difficult if not impossible. On the one hand, determining the events noted by the survey (but not recorded by the official registry of vital statistics, it would be necessary to compare the 10,000 odd births and 3500 deaths recorded by the survey with the 400,000 births and 100,000 deaths recorded at the same time by the registry of vital statistics. Moreover, it is impossible to determine what events were recorded by the official registry of vital statistics but ignored by the survey, because the populations being interviewed do not coincide with those in the registration zones of the civil registry. It is impossible to say whether an event recorded by the official registry but not appearing in the survey was simply omitted or whether it did not fall within the limits of the survey. This problem was apparent from the very beginning. One solution was designed to measure indirectly the proportion of events recorded by the civil registry but not by the survey: a number of births and deaths in the civil registry were chosen at random and the corresponding households were interviewed. This made it necessary, however, for interviewers not to know that these households were different from the others. There were "leaks", though, and this experiment failed entirely.

A second solution - which succeeded - was set up at the end of the first round of the TNDS: two small rural sheikhdoms⁽¹⁾ were chosen and they underwent the same survey as those in the main sampling (three rounds) but in such an exhaustive manner that they formed the object of what was called later the "complementary survey"⁽²⁾. At this level, a comparison case by case was no longer difficult. Of course the results were not representative of the entire country, but they are of fundamental importance because they are unique. This complementary survey was, moreover, extended later on by a "motivation survey" designed to study the reasons for the under-recording observed at the official registry of vital statistics⁽³⁾ in the two sheikhdoms in question.

III. Validity of the sampling

The sampling of the TNDS is not perfectly representative of the Tunisian population.

(1) - These are the sheikhdoms of Oued-el-Khatf (delegation of Kelibia, governorate of Nabeul) and Goraa (delegation of Sbiba, governorate of Kasserine).

(2) - See Bibliography, item 3.

(3) - See Bibliography, item 4.

TABLE 1. FEATURES OF SAMPLING

a) Tirage sur la liste du recensement de 1966

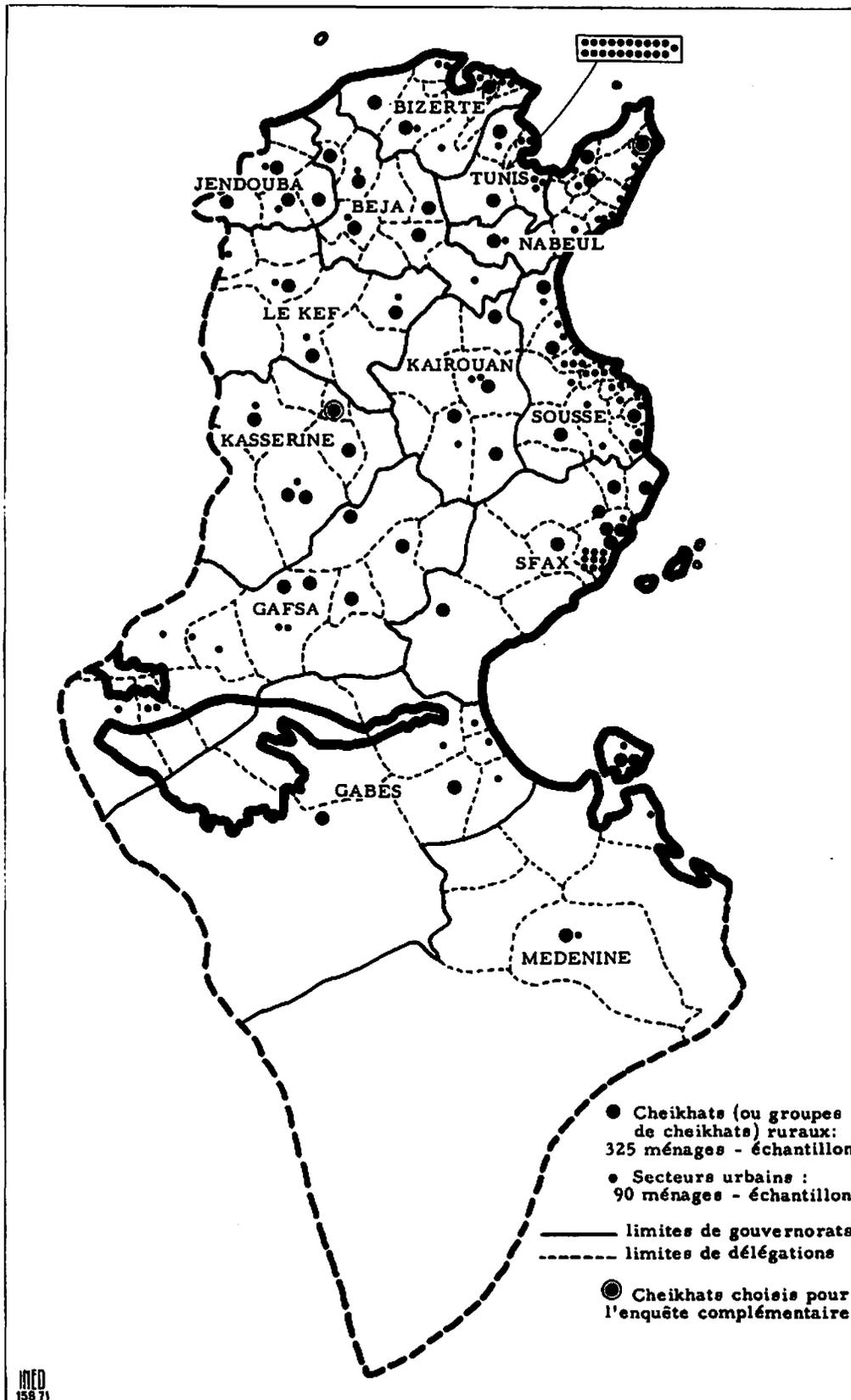
	Strate 1 rural "mauvais enregistrement"	Strate 2 rural "bon enregistrement"	Strate 3 urbain grandes communes	Strate 4 urbain petites communes	Total
1^{er} degré					
Unités Primaires (U.P.)	cheikhats ruraux (ou groupes de cheikhats pour les cheikhats inférieurs à 350 ménages)		secteurs d'enquête constitués à partir des secteurs du recensement de façon à contenir 250 ménages chacun.		
Nombre d'U.P. dans l'univers	314	359	1059	662	2394
Mode de tirage des U.P. échantillon	systématique sur la liste géographique avec probabilités de sortie proportionnelles à la taille des U.P.		systématique sur la liste géographique avec probabilités égales de sortie		
Taux de sondage des U.P. échantillon	1/10	1/15	1/20	1/10	
Nombre d'U.P. dans l'échantillon	31	17	53	66	167
2^{eme} degré					
Nombre de ménages tirés dans chaque U.P.	325	325	90	90	
Mode de tirage	systématique sur la liste du recensement				
Nombre total de ménages-échantillon	9934	6334	5228	4861	26357
Nombre arrondi de ménages dans l'univers au recensement de 1966	250000	280000	190000	150000	870000
Taux de sondage	4,0 %	2,3 %	2,7 %	3,3 %	3,0 %

b) Tirage complémentaire parmi les mariages enregistrés à l'état civil depuis le recensement

	"milieu rural"	"milieu urbain"	
Nombre théorique de ménages par U.P. échantillon	12	4	
Mode de tirage	systématique sur les listes de l'état civil après élimination des cas mal identifiés		
Nombre total(1) de ménages tirés	374	203	577

(1) non compris les ménages de ce type correspondant à des ménages déjà tirés à partir du recensement (soit 23 ménages tirés deux fois)

FIGURE 2. — TUNISIA. T.N.D.S. PRIMARY SAMPLING UNITS AND SAMPLING



The dating of the sampling frame in the two years that separated the census from the survey was due not only to the breaking up or setting up of households by death or marriage. It would have been necessary to consider the total number of moves made by the population and the modifications in households because of migrations within the country, something that could not have been done thoroughly and even then, only at the cost of "scattering" the sample, an expensive operation. Moreover, the households registered during the census were not covered so accurately as to guarantee their being retraced. Lastly, some households had disappeared since the census because of the death(s) of the individuals making them up.

A total of 17% of the test households were not able to be interviewed during the first round⁽¹⁾. The figure is even higher in the more urban governorates. The households that could not be interviewed were immediately replaced by others, according to criteria and instructions which had been very clearly defined⁽²⁾.

These instructions were followed with greater or less success. In some cases the methods used in choosing these replacements is unknown. A preliminary study made of the first rounds of the survey - and in particular of the "replacement" households as well as those "replaced" - brought into the open the doubts that some people had had about the method of substitution and thus of the representative quality of the survey⁽³⁾. After consultations with specialists in the field of sample taking⁽⁴⁾ it was decided that the sampling should be corrected by a division into strata to be made a posteriori. This was done by using as controls, on the one hand, the size of the household (this index, which is relatively stable in short term analysis proved to work very differently in the "replacement" households from the way it did in households that had been "replaced"); and on the other

(1) See Bibliography, item 5.

N.B. This was a problem during the second and third rounds. The households that migrated were followed as closely as possible.

(2) As a rule, the new occupant of the dwelling in question, or lacking a new occupant, a neighbour chosen from the census lists.

(3) See Bibliography, item 6.

(4) Karol J. Krotki, The Tunisian National Demographic Survey (T.N.D.S.) and Some Related Issues: Second and Completed Version (Tunis, 30 June 1969). See also J. Vallin, Enquête Nationale Démographique, stratification a posteriori (Tunis, August 1968); Irving Sivin, T.N.D.S.: An Appraisal of Professor Krotki's Proposal for a posteriori Stratification by Household Size and Amplification of the Proposal (10 November 1969).

hand, the governorates, which served as an index of urbanization⁽⁵⁾. The divisions of the population by household size was assumed to have remained unchanged since the census. For the divisions of the population by governorates, though, hypotheses were made as to the extent of migration within the country. This method, like the method of sample taking used, consists in putting one's faith in the count made during the census. The TNDS can therefore furnish no improved knowledge about the total population, though this should not have any effect on the real goals of the TNDS, whether it be a matter of determining population shifts or even changes in certain population structures.

5. Duration of the survey

The organization of operations in the field, including three rounds at six month intervals, respected three general rules:

- a) To make up for the absence of a pilot study a period of "breaking in", during which the interviewers would be actively supervised, was needed;
- b) Next, it was necessary to respect the reference period by keeping to the same day-by-day timetable six months later for the second round and one year later for the third round;
- c) The starting date of the first round was finally planned for 12 January 1968 (exactly one year after Aïd-es-Seghir of the preceding year). To reduce the number of slips of memory, the starting point of the reference period in the retrospective part of the survey was set on the most important holyday in the Tunisian calendar⁽⁶⁾.

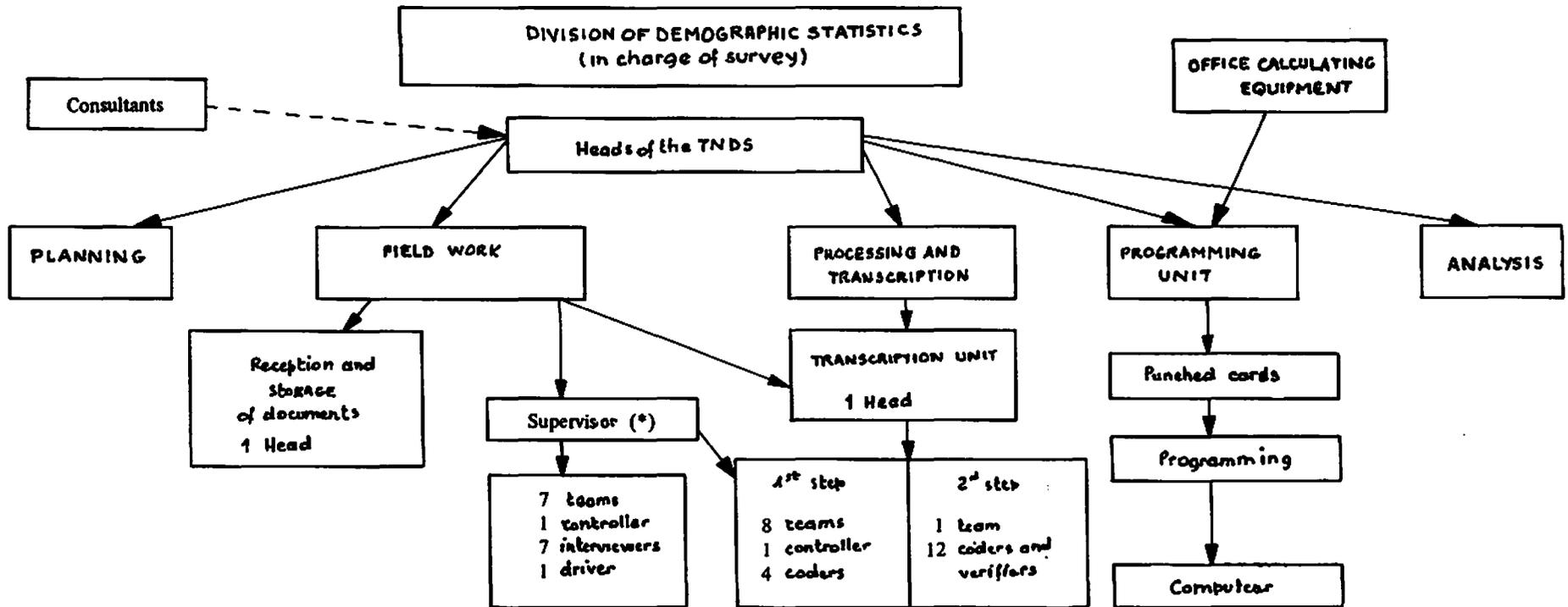
The operations were conducted in the following fashion:

12-31 January 1968: first round of survey in the governorate of Nabeul. The interviewers work in teams (thus verifying one another's work) under a

(5) It would have been desirable to study the size of the household in rural and urban milieux, but the 1966 census did not give this information and the weighting coefficient could not be calculated this way. From that time on, the governorates were used as an index of urbanization (the rate of urbanization varying greatly in the different governorates).

(6) Aïd-es-Seghir, which marks the end of Ramadan (the end of fasting) is a holyday celebrated by everybody in Tunisia. It commonly serves as a chronological landmark in relation to other events. In the year in question, coming as it did in January, Aïd-es-Seghir had the advantage of bringing the reference period closer to the beginning of the civil year.

FIGURE 3 - ORGANIZATION CHART OF THE TUNISIAN NATIONAL DEMOGRAPHIC SURVEY.



(*) on third round only

controller (one controller assigned to every three or four teams of two interviewers). Holding these operations in a governorate near Tunis made it possible for those in charge of the survey to make frequent visits.

1 February - 15 May 1968: first round of survey in the twelve remaining governorates. Each of the seven controllers were in charge of seven to ten enumerators in survey zones made up of one or two governorates.

End of May - beginning of June 1968: complementary survey in the sheikhdoms of Oued-el-Khatif and Goraa.

12 July - beginning of December 1968: same timetable for the second round.

12 January - beginning of June 1969: same timetable for the third round.

August 1969: motivation survey.

6. Conditions in which survey was carried out

a) Government service in charge of survey: the Demographic Statistics Branch, at first connected with the services of the Secretary of State for Planning and Finance, has since been made part of the National Institute of Statistics, under the Prime Minister's direct control.

The Demographic Statistics Branch has moreover received technical help from the Division of Statistical Surveys (in working out the method of sample taking used), from French technical assistance, and from the Population Council (planning and carrying out of the survey).

b) Financing and costs: the budget of the TNDS stood at approximately 150,000 Tunisian dinars⁽¹⁾, not including the costs to processing. Half of this came from the Tunisian treasury (salaries) and half from grants from the National Center of Health Statistics (N.C.H.S.) of Washington (supplies equipment and travelling expenses). One of the serious problems of the TNDS was not to have been financially independent, a very undesirable situation when a timetable of operations must be kept to closely and when unexpected difficulties must be met.

c) Staff: no special staff was hired for the TNDS. The seventy odd officials of the Demographic Statistics Branch who had previously worked on different aspects of the census were assigned to the TNDS. These people were not selected because of specialized skills proper; it was more a case of

(1) The Tunisian dinar is worth slightly more than 10 French Francs and a little less than \$2.00 (U.S.).

looking favourably on their general range of previous professional experience. Additional theoretical training was given in a two week course just before the first round and in a one week session right before the second round. Unfortunately, there was no pilot survey. The seven best "trainees" were appointed as controllers at the end of the first training course. This did not change their administrative status in the slightest, however, and in dealing with enumerators, they were unable to rely on any hierarchical authority, a situation which sometimes created problems. The organization chart in Figure III is somewhat idealized. The conscientiousness and care with which the enumerators carried out their jobs should be emphasized here, though, whatever flaws there were in organizational planning.

d) Equipment, transport: because of the lack of financial independence and not the financing itself, carrying out the TNS in the limits of the timetable that was set up must be compared to an exercise in tightrope walking. The most serious problem in this sphere was that of transport. Given the fact that habitations were so widely scattered, and that it was so difficult to get around in rural areas, it would have been desirable for each team to have at its disposition an all-purpose vehicle and a small car or van. It was not possible, though, for each team to have even the regular use of a single vehicle. Most of the time, the enumerators had to take care of their own transport, some of them hiring donkeys, some bicycles, and even more often simply walking - up to thirty kilometres a day. We should say, though, that they were helped greatly in their work by guides hired on the spot, these guides knowing both the places and inhabitants well.

e) The reception of the population: In most cases, and especially in country areas, the enumerators were very well received by the population, in spite of the fact that during each of the three rounds they came with long questionnaires. It should be noted, though, that near Sfax the enumerators encountered a welcome that was somewhat more reserved; and that their job in the big cities was slightly more difficult because of the schedules of the people being interviewed, and sometimes because of city people's more "individualistic" way of thinking. The greatest cause of trouble in the cities was the mobility of people living there. It should be said, last of all, that in the smaller towns it would have been awkward to be let into people's homes to ask questions of women of childbearing age without the

help of the social workers, who served as "passed" in getting the enumerators admitted, after which they were generally well received.

7. Survey techniques

a) Population and reference events

The TNDS was concerned with a de jure population. A household was defined as all the people regularly living under the same roof and having their meals together. "Current residents" were defined as those living in the household longer than four months, or those intending to stay longer than four months (except for visitors present for less than four months). "Absent residents" were defined as regular members of the household who had been away for more than four months (or less than four months when they did not plan to return), as well as those people who for one reason or another were in "spécial circumstances" (members of grouped households, women who returned to their mother's house before delivering, etc.).

To fall within the limits of the survey, all events (births and deaths) had to involve either a current or absent resident and must have taken place during the reference period. These were as follows (Figure IV):

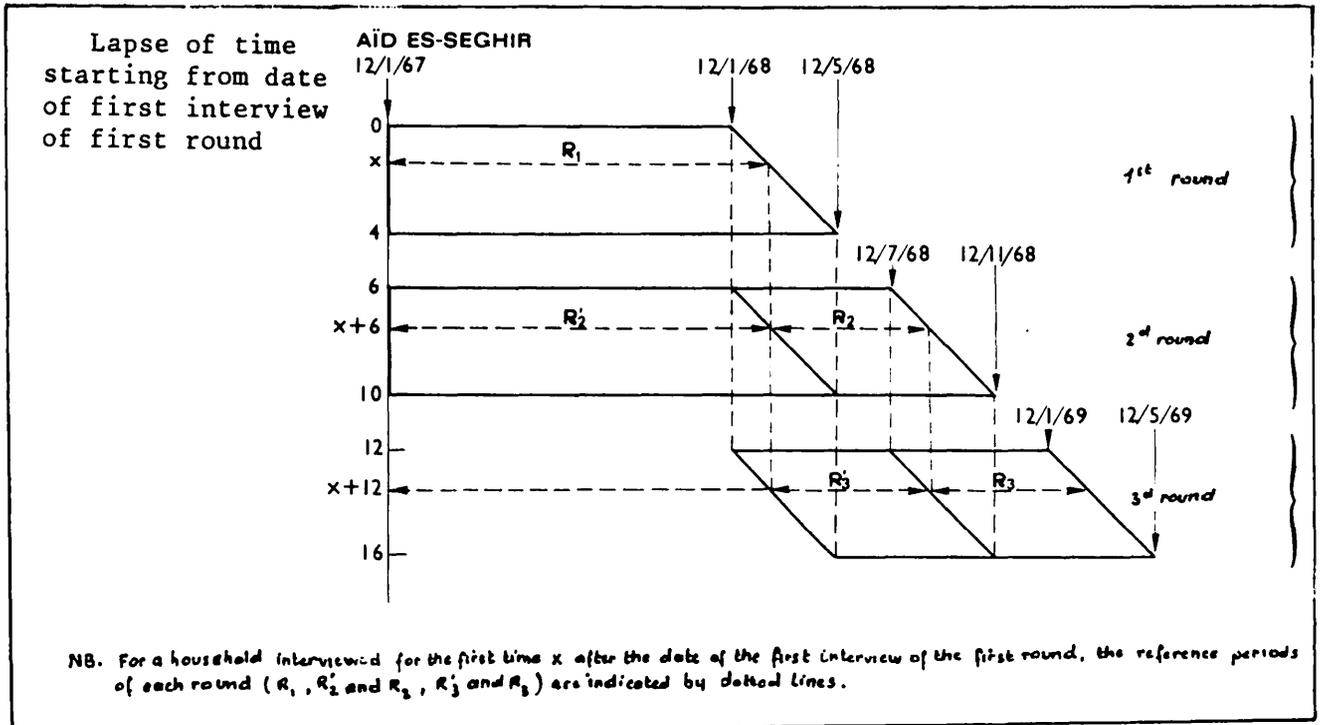
1st round	Aïd-es-Seghir 1967	Interview 1st round
2d round	a. Interview 1st round	Interview 2d round
	b. Aïd-es-Seghir 1967	Interview 1st round
3d round	a. Interview 2d round	Interview 3d round
	b. Interview 1st round	Interview 2d round

During the first and third rounds, a fertility form was used to bring together the details of the childbearing lives of women who were married, widowed, or divorced.

b) Questionnaire: The questionnaire of the TNDS, filled in for each household, included the following four parts in each round:

1. location and identification of the household (household form);
2. members of the household (household form);
3. events occurring in the household during the reference period (household form and joint fertility form during the second round);

Figure IV. Overlapping of the reference periods used in the three rounds of the TNDS



4. complete fertility records of married, widowed and divorced women (individual fertility forms). This part was not used in the second round for women who had already been questioned on the first rounds but on the third round it was used for everyone.

There was, moreover, a series of questions in the first round for cases where a household had not been located. The method used in choosing these families replacements were listed (supplement of the household form). During the second and third rounds, this supplementary form helped locate cases of migration and ot follow the households that had migrated.

Except for a few small improvements, the questionnaire remained unchanged from one survey to the next. What should be noted, however, is the abandonment of the use of individual fertility forms on the second round and the amplification of questions relating to the household in the second and third rounds, and naturally, the changing reference periods as one goes from one round to another.

Instead of treating the standard features of these questionnaires, we will concern ourselves especially with what was distinctive about them.

1. Use of answers given during preceding rounds during the second and third rounds.

For both the second and third rounds, a certain amount of information was recopied on to the blank questionnaires before the enumerator went back in the field. This naturally concerned locating people accurately and identifying them so as to make it easier to resume work on the survey afterwards. The date of the first round in a household was also noted as it was this date that determined the dates of the second and third rounds six ou twelve months later. But in addition, the list of names of people reported as residents during the preceding round(s) was also copied over. During the second and third rounds the enumerator was supposed to ask the head of the household for a new list of "residents" in the household. When the head of household neglected to mention someone already listed, the enumerator could ask for explanations, noting the reason for such an omission when a departure or death was responsible for the change. In the same manner, when the person being interviewed indicated the presence of someone not previously listed, the enumerator could note the reason for this (birth, migration, error, etc.). This system made it possible to limit the number of errors and omitted events falling within the reference period.

However, for this to work well, the enumerator himself had to have enough self-discipline to ask the person interviewed to make a list of the members of his household at the time of each round. Though it is impossible to know with certainty that this was always done as it should, it does seem that these directions were understood in general and followed. On the second and third rounds, the names of married, widowed and divorced women and the answers given to the questions on pregnancy were also copied over. This method certainly is not faultless, some women not having answered as they should, but it did enable the enumerators to catch some births that had been followed by deaths at a very young age.

2. How the reference periods functioned.

The first round of the survey was entirely retrospective and was supposed to measure very roughly the fertility and death rates of the "previous twelve months". However, in order to reduce to the absolute minimum the answers due to forgetfulness or to vagueness as to the passage of time, the starting date of the reference period was sent on the holyday Aïd-es-Seghir (12 January 1967). As a result, the reference period varied according the date of the interview. So as to be able later to go back to the events that took place in the twelve months following the holyday, the enumerator had the job in January 1968 of asking - when possible - for the precise dates of these events (getting some help from the landmark of the most recent Aïd-es-Seghir, which took place 1 January 1968). For other events, the enumerator had to have at least the month specified, though this could refer either to the Gregorian calendar or the Moslem calendar - or to important events in agricultural life.

In the second and third rounds, as we have seen, the reference periods overlapped those of the preceding round. The advantages in this were twofold. On the one hand it was possible to avoid - to a certain extent - "telescoping". (if one asks questions about a period longer than the reference period, it is possible to avoid most of the errors in dating both at the level of the interview and during processing). Moreover, an item-by-item comparison of those events noted in a reference period that had been used twice (with a six month interval between) made it possible to judge both the quality of the information received and the variations in quality over a period of time.

3. Order of questions

As the months passed this proved to be very important. The order chosen followed two principles - avoiding any psychological jolting of the person interviewed that would lessen the value of his answers in the future while including places where there was overlapping, so that the enumerator could check the consistency of the information received. The question of fertility, for example, were saved for last, something which enabled the enumerators to get the confidence of the head of the household so as to ask his permission to question the women present in his household. The questions on pregnancies of course seemed to come perfectly naturally at the end of a series of questions that had led up to this point. This was done so skilfully as not to create any psychological problems. At the same time, the head of the household was asked to list the members of the household in a particular order (starting from the youngest and going to the eldest, for the children), and to list in reverse order (eldest to youngest) the children of each married, widowed and divorced woman. The enumerator could detect inconsistencies immediately and ask the questions needed to explain them.

4. Repetition of the same questions during the three rounds.

Most of the questions were repeated on each of the three rounds. The mass of information thus gathered can be used as the basis of a system to calculate errors. Comparing the results of the three rounds makes it possible, for example, to get some idea of the approximate truthfulness of statements about ages. It is obvious that three answers which concur make the birth date in question surer than the one arrived at from three inconsistent declarations⁽¹⁾. Likewise, the comparison of the data gathered on the fertility forms during the first and third rounds makes it possible to estimate the margin of error attributable to the omissions that are generally made.

For financial and technical reasons, it was decided to process this information on a single card. But even so the repetition of the basic data useful while classifying the documents of the three rounds in a single folder, connections could be made, the most plausible answers could be discovered and the number of omissions and double entries (in the childbearing histories of women, for example) reduced.

(1) - Unless these answers come from an incorrect entry at the registry of vital statistics.

8. Processing, Analysis.

There were many hesitations before a method of processing was chosen. Was each round to be processed separately, leaving until later a comparison of the data, or were the three rounds to be processed together? It was the first solution that was decided on and put into practice as early as the first round so as to get a cross-sectional analysis as quickly as possible. As a final solution, though, because of some of the problems involved in sample taking and financial considerations, the alternative scheme was adopted, at least for the coding of "members of the household" and "children" on the fertility form. The first scheme was kept for other events.

The advantage of this procedure was mainly being able to eliminate discrepancies in the information gathered on each individual during successive rounds. This did, however, complicate the problems of coding and these problems had to be settled before going farther. A number of new methods were developed, some of which will be described below.

1) - Processing of documents and pre-transcription

a - Classification : For each household, a household form and one (or several) fertility forms were filled in on each round, with sometimes a supplement to the household form when there was a change of address. To make processing easier, all the records concerning the same household were put together in a folder with the household's number on the cover, as well as the two code numbers indicating the "method used to make replacements" and the "situation on third round" (this last reference included to make transcription later easier.

The household files were then filed in boxes of about thirty folders each, arranged by household number; these were then sorted out by sheikhdoms or survey communes within the same governorate. One room was kept aside for all these records, this under the supervision of an official who served both as archivist and coordinator. It was his job to keep records of incoming and outgoing files indicating what they had been used for.

Putting together these files made it possible to have easily at hand, in one short operation, all the information about a particular household. This classification made it easy, moreover, to verify consistency.

b - Verification of consistency

1. - Individual fertility forms : a fertility form was to be

filled in on the first and third rounds for each woman resident in the household. On these were to be listed all the children (deceased and living) declared by the woman as her since her marriage (married, divorced and separated women only were questioned). The verification of consistency on the first and third rounds consisted in :

- comparing the children listed on the fertility form of each woman on the first and third rounds to see whether all those listed on the first round appeared on third round were added to the fertility forms for this round, the colour of the ink used for such entries being different. (It goes without saying that the other possibility - the number of children on the third round being greater than that of the first round - always existed.). Only the fertility form from the third round was corrected and revised.

- rearranging the children according to their dates of birth, correcting their reference numbers when necessary.

- indicating the interval occurring between each birth (or between the date on which the marriage was consummated and the first birth) in the margin of the fertility form (during the pre-transcription of identification coding).

2. - Ages and dates of birth

Each person was asked very early in the survey for his date of birth. When the date itself was unknown, the enumerator had to make do with the age. For the transcription of identification codes of the cards "members of the household", change the ages of those people for whom no exact date of birth was available into a year of birth. To do this, we chose a method of probability that paid due consideration to the average date of the survey in the governorate. For example, on the second round, the survey of the governorate of Bizerte took place in August 1968. As a result, the checklist for the conversion of ages into years of birth in this governorate planned for the conversion of eight of the ages declared in 1968 and four in 1967. Each time that an age was converted into the year of birth, the official in charge of the operation was supposed to cross the appropriate space on the checklist to find out the reference year for his calculations.

68	68	67	68	68	67	68	68	67	68	68	67
x	x	x	x	x	x	x	x	x	x	x	x

This was done for all households and on each round.

2) Transcription of identification coding

a - Steps in transcription of identification coding

1.- Events : Births and deaths for each round were transcribed separately for observation periods which were divided as follows: Aïd 1967 (12.01.1967) - first round (retrospective part); first - second rounds; and second - third rounds. A total of six coding grids were made up (three for births and three for deaths). Because of the rather detailed analysis that was envisaged, a lot of information was asked for: 74 spaces for each birth card and 61 for each death card. Doubtless not all of these columns will be used.

2. Household members : The sheets of coding grids summarize the results of the three rounds and includes only the most useful information. It was at first planned to make them much more detailed, but the fact that the goals of the survey were called into question and because of extensive administrative changes among those in charge of the survey, many of the initial plans were cut back considerably.

The summary card "household members" has a total of 55 spaces, without the figures used in weighting, which will be transcribed at some future date, these figures taking into account most often the "situation on the second round" but also some of the observations made during the first and third rounds.

3. Fertility : This survey was rich in lessons about the offspring of married, divorced or widowed women⁽¹⁾. For each person in this category a fertility form was filled in twice (on the first and third rounds). Connections could be made and the quality of the observations was thereby improved. The offspring of a total of 30 000 married, widowed or divorced women was thus studied. A special transcription of identification codes is planned.

b. A novelty in the method of transcription: the transcription of years of birth for members of the household⁽²⁾

So as to get the greatest use of the information gathered

(1) The figures of illegitimate births, thought to be negligible, was not studied.

(2) See Bibliography, item 12.

on the three rounds, a method of transcription of identification codes by years of birth was developed. We think it of interest for other repeated-round surveys and noteworthy because of some of the possibilities it suggests. It is for this method that we explain this method here in detail.

1. Possibilities

A person's date of birth might be declared on each round; on only two of the rounds; on only one round. The code "location of residence" made it possible to see which of these possibilities applied.

2. Method of transcribing the identification codes

Only the year of birth is transcribed for the code "year of birth" proper, the last two figures of the year being used. But in order to indicate how one arrived at the year of birth that finally was transcribed from the declarations made on the three rounds, a single figure showing the "degree of accuracy" was added.

3. Code

a. A person was interviewed in each of the three rounds :

a.1. The dates of birth declared on each round were the same.

The degree of accuracy is 0, whether these dates include the year alone, the month and year; or the day, month and year.

a.2. The dates of birth declared on two of the three rounds were the same. The third date was not counted, except in special circumstances (see d). The degree of accuracy transcribed is 1.

a.3. The dates of birth declared on each round were different, the gap between the two most widely separated dates from 2, 3, 4, 5 or 6 years. The year of birth falling between the two outside dates is transcribed, the code for the degree of accuracy of a gap of two years being 2; for a gap of three years, 3; four years, 4; five years, 5; six years, 6.

For example,

Maximum difference	Years of birth declared			Transcribed	
	1st round	2d round	3d round	Year of birth	Degree of Accuracy
2 years	1936	1935	1934	35	2
5 years	1940	1945	1941	41	5
6 years	1946	1940	1941	41	6

a.4. The dates of birth on the three rounds are different with the gap between the two most widely separated dates of 7 years or more. Except in special cases (see d), the smallest gap between any two of the three years is used.

If the smallest gap is of one or two years, the year falling between the two most widely separated years is used, the code for the degree of accuracy is 7.

If the smallest gap is of three years or more, it is the average of the three years that is used (rounded off to the nearest whole number). The code for the degree of accuracy is 7.

b. A person was interviewed on two rounds only :

b.1. The same date of birth was declared on both rounds. In this case, the code for the degree of accuracy is 0.

b.2. The gap was of one year. The year chosen is half the time the earlier year, half of the time the later one - except in special circumstances (see d). The degree of accuracy is transcribed as 1.

b.3. The gap was greater than one year. In such a case, the year transcribed is the average year rounded off, the rounding off being done half of the time to the next highest number, half of the time to the next lowest number. As code for the degree of accuracy, the number corresponding to the gap between the two years declared is used : 2 for two years; 3 for three years... and for seven years and more.

c. A person was interviewed on one round only :

The year of birth transcribed is that declared on the round when the person was interviewed (theoretically the third round). The code for the degree of accuracy is 0 unless the date of birth is given in day, month, and year - in which case it is 9.

d. Exceptions to a.2. - a.3. - a.4. - b.2. - b.3. -

When the year of birth was declared on one of the rounds in day, month, and year - and only in this case - it is this year that is transcribed, with a degree of accuracy of 9.

e. Not reported :

When the date of birth is declared on none of the rounds, 700 is transcribed.

On the other hand, when the date of birth of a person interviewed on two or three rounds was given two or three times in day, month, and year, this not the same on each round, the regular instruction indicated above must be followed.

The empirical method is of course quite arbitrary and it could be improved. However, it should reveal very valuable information, and most particularly, help classify the accuracy in declarations of dates of birth according to a number of criteria (age, education, profession) and test the memories of those being interviewed. The frequent use of the method in other repeated-round surveys would make it possible to compare results and to draw up a table of degrees of accuracy to define the degree of error for each age or age group⁽¹⁾. This table could be used, for example, in analysing the results of single-round surveys and of censuses in the developing countries.

3) Analysis

a - Results of primary importance

The calculation of various rates (birth, death, growth; tables of mortality, age specific fertility tables for mothers). The fields of analysis have been used according to the reference periods established for the observation of births and deaths :

1) between 12.01.1967 (Aïd) and 12.01.1968 (retrospective survey), twelve set months;

2) in the twelve months preceding the first round (retrospective survey), twelve month period which was not fixed;

3) between the first and the third rounds (continuous surveys), two unfixed periods of six successive months, these "surrounded" by the three rounds.

(1) The code number 0 would appear to stand for diverse sorts of information, as it includes dates of birth declared once, twice or three times. Other codes can be used in conjunction with the one described in order to make such distinctions.

The population known from the summary cards "household members" are those of the first, second, and third rounds. For the first two periods, calculations must be based on the population figures of the first round (for the period between Aïd and the first round), as well as the births and deaths declared, to determine what the average population was, on the one hand, on 12.07.1967 (first period), and on the other hand, six months before the first rounds (second period).

For the third period, the denominator will be the average of the populations on the first and third rounds, from which the populations of households interviewed on only the first round, or on the first and second rounds only, will have been eliminated. (The same will be done for the events taking place in these households between the first and third passages).

b - Analysis in detail

- 1 - very detailed analysis of current birth and death rates;
- 2 - total fertility for all women;
- 3 - deaths among the offspring of all women;
- 4 - structure of households and family units;
- 5 - profession;
- 6 - migrations during the first and third rounds.

c - Under-recording in the registry of vital statistics

We have already said that the method of sample taking used did not make it possible for us to quantify under-recording in the official registry of vital statistics. This was done to a limited extent - after the survey - in two sheikhdoms (Goran and Oued-el-Khatef), covered in an exhaustively thorough fashion in three rounds, these at intervals of six months (just like the national population). The item-by-item comparison of events reported by the survey with those of the civil registry for the same period led us to make a classification with four headings :

1. events declared to the survey and recorded at the civil registry;
2. events declared to the survey but not to the civil registry;
3. events declared to the civil registry but not to the survey;
4. doubtful cases.

For categories 2 and 3, verification in the field made it possible to see whether these classifications were in fact accurate (this done by reclassifying under category 1 events recorded at the civil registry of vital statistics of another locality or by not considering those events reported to the civil registry but not falling within the spatial or temporal ranges of the survey). The doubtful cases were followed by a verification of these records (local or centralized) in the civil registry and a verification in the field.

After these checks, the fourth category having disappeared, it was possible, with categories 1, 2 and 3, to use the method of Chandrasekhar and Deming, and thus to reach an estimate of the number of events declared neither to the survey nor to the civil registry as well as an estimate of the rate of coverage of events by both sources. Quite obviously, these results cannot be extrapolated on a national level.

Following this complementary survey, a "motivation survey" was organized in the same sheikhdoms, in the households that had reported births and deaths to the survey but not to the civil registry, this so as to learn the reasons for the absence of such declarations.

4) Time needed for and the costs of processing

The processing of the Tunisian survey was particularly disturbed by the administrative changes that occurred at the beginning of 1970. The Demographic Statistics Branch - which ran the survey - was separated from the Secretariat for Planning and Economy after this had broken apart (autumn 1969) and joined up with the newly created National Institute of Statistics, reporting to the Prime Minister. The most immediate practical result was a great cut in staff, especially of those in charge of the transcription of identification codes, whose numbers were reduced from fifty to ten. Under these circumstances, the rate at which the transcriptions currently being carried out will be finished will be greatly slowed down.

At the moment this book is being written (March 1970), the transcription of events (births and deaths) for the three rounds has been completed, as well as the preparation of the corresponding punched cards. The transcription of the cards "household members" is being checked and the punched cards should be able to be finished in June 1970. Machine processing

of the results of primary importance will be done by the Population Council in New York. The time necessary for the final machine processing, to be done in Tunis, is not yet known. The most optimistic prediction has the detailed results ready at the end of 1970, except for the fertility results, for which a method of transcription is being prepared now and which will not be used until after the transcription of "household members" has been checked. All of this will be done by the ten remaining officials (there are approximately 30,000 forms awaiting transcription).

The average rate of transcription has been 25 forms a day per man for the births and deaths (a total of roughly 15,000 forms) and 17 forms for "household members" (approximately 25,000 forms).

The costliness of these operations is due essentially to the salaries of the active staff (about fifty officials from June 1969 to January 1970 and ten since February 1970) and supervisory staff (a technical assistant, a statistical operations engineer, and a civilian foreign technical specialist).

To these expenses must be added printing costs (mimeographing or offset printing of 17,000 coding forms for births and deaths, 27,000 for household members, and 32,000 for the children recorded on fertility forms).

9. Results

A - The only results now available are tentative

1. Manual processing of the first round (retrospective part): These results were published in October 1968⁽¹⁾. They are given as a matter of information only, for they are not weighted and they take up only the retrospective part of the survey.

Birth rate (for all of Tunisia)	42.1 %
Death rate (for all of Tunisia)	12.7 %
Total of age specific fertility rates	7.0

2. Under-recording at the registry for vital statistics (complementary survey) : For all of the events recorded on the first, second, and third rounds of the survey in the sheikhdoms of Goraa and Oued-el-Khatef, the rates of coverage for the survey and for the civil registry were calculated as follows :

(1) See Bibliography, item 2.

	<u>Births</u>	<u>Deaths</u>
Survey	96.9 %	87.6 %
Registry of Vital Statistics	78.4 %	60.1 %

In these two sheikhdoms, during the period from 12.01.1967 (Aïd) to May 1969, the amount of under-recording at the civil registry was therefore approximately 22 % for births and 40 % for deaths.

3. Conclusions from the motivation survey : The survey conducted in the households of these two sheikhdoms where births and deaths had not been declared to the civil registry would indicate that the main reason for under-recording is that the population was not sufficiently well informed. An educational campaign was proposed, first for the officials of the civil registry, and then - with the help and support of the press and radio - for the entire population⁽¹⁾.

B - Overall view of the main data collected in the different questionnaires of the TNDS (see Table II).

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(1) See Bibliography, items 9 and 10.

Table II. Overall summary of data gathered by the TNDS

<u>Feature</u>	<u>1st Round</u>	<u>2d Round</u>	<u>3d Round</u>
Household members			
a. For all members of the household			
- Location	x	x	x
- How related	x	x	x
- Residence	x	x	x
- Sex	x	x	x
- Date of birth	x	x	x
- Place of birth	x	x	x
- Marital status	x	x	x
- Level of education	x	x	x
- Nationality	x	x	x
b. For those people over 10 years			
- Profession		x	x
- Profession of head of household	x	x	x
- Branch		x	x
- Name of firm or organization		x	x
- Rank in profession		x	x
Events occurring within period			
1. Births			
a. For each birth occurring during reference period			
- Sex	x	x	x
- Date of birth	x	x	x
- Place of birth	x	x	x
- Assistance received at delivery	x	x	x
- was child alive at time of survey		x	
b. If no birth during reference period			
- Date of last birth occurring outside reference period		x	
2. Deaths			
a. For each death occurring during reference period			
- Sex	x	x	x
- Date of birth	x	x	x
- Date of death	x	x	x
- Place of death	x	x	x
- Care received	x	x	x
b. If there was death during reference period			
- Date of last death occurring outside reference period	x	x	x
c. In either or both cases			
- Any stillbirths			x
- Did child cry or not			x

<u>Feature</u>	<u>1st Round</u>	<u>2d Round</u>	<u>3d Round</u>
Married, divorced and widowed women ⁽¹⁾ - Date on which marriage contract drawn up for first marriage - Date on which first marriage was consummated - Number of most recent marriage - Husband polygamous or not (and number of wives) - Pregnancy	 x x x x	 x	 x x x x x
Offspring of the woman a. For each live birth - Sex - Date of birth - Place of birth - Still living at time of survey (date of death when appropriate) - Number of this marriage	 x x x x x	 	 x x x x x x
Structure of the household a. For each household - Size - Type - Relocation of household - How relocation took place - Reason for the relocation - Number of family units b. For each family unit - Size - Type - How head of family unit related to head of household	 x x x x x x	 x x x x x x x x x	 x x x x x x x x x

(1) This section completes the information concerning the woman as member of the household.

C - Various problems in the survey

5. Jacques Vallin, Rapport sur les problèmes posés par les ménages échantillons non retrouvés (et remplacés par d'autres) au cours du premier passage de l'Enquête Nationale Démographique (Tunis, 1968).
6. Claude Paulet and Jacques Vallin, E.N.D. Problèmes d'échantillonnage, structure des ménages remplacés et remplaçants (Tunis, March 1968).
7. Claude Paulet and Jacques Vallin, Collecte des données dans les pays en voie de développement : quelques enseignements de l'Enquête Nationale Démographique Tunisienne (Tunis, June 1969).
8. Jacques Vallin, "Le temps, facteur d'omission dans une enquête rétrospective". Population (1968) 548-549.
9. Claude Paulet, "Un prolongement de l'Enquête Nationale Démographique Tunisienne". Population (1969) 195-197.
10. Claude Paulet, "Les motifs du sous-enregistrement des naissances et des décès à l'état civil". Population, special issue "Maghreb" (1971).
11. Jacques Vallin, "L'Enquête Nationale Démographique Tunisienne". Population special issue "Maghreb" (1971).
12. Claude Paulet "Une méthode de chiffrage dans une enquête à passages multiples". Population (1970) 612-616.

IV. — Evénements survenus dans le Ménage depuis l'avant dernier Aid Eseghir

1. — Naissances

a) Etablir la liste de toutes les naissances qui ont lieu depuis l'avant dernier Aid Eseghir (12 janvier 1967) que l'enfant soit encore en vie ou non.

N°	NOM ET PRENOM du nouveau né (Préciser les prénoms de père et de la mère)	SEXE	DATE de naissance	LIEU DE NAISSANCE	Assistance à l'accouchement	Renseignements sur la mère	
						N° d'ordre	DATE de naissance ou Age
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1				Dél. Ch. Com.			
2				Dél. Ch. Com.			
3				Dél. Ch. Com.			
4				Dél. Ch. Com.			
5				Dél. Ch. Com.			

* Préciser : Hôpital ou Clinique (H), à domicile assisté d'un médecin (DM), à domicile assisté d'une sage-femme (DS), à domicile sans assistance (SA), autres cas à préciser.

b) S'il n'y a pas eu de naissance depuis l'avant dernier Aid Eseghir indiquer la date de la dernière naissance :

Date de la dernière naissance :

2. — Décès

a) Etablir la liste des décès survenus depuis l'avant dernier Aid Eseghir (12 janvier 1967) en commençant s'il y a lieu, par les nouveaux nés décédés.

N°	NOM ET PRENOM	SEXE	DATE de naissance	DATE de décès	LIEU DE DECES	SOINS reçus
1					Dél. Ch. Com.	
2					Dél. Ch. Com.	
3					Dél. Ch. Com.	
4					Dél. Ch. Com.	
5					Dél. Ch. Com.	

* Préciser : Hôpital ou Clinique (H), Dispensaire (D), Médecin à domicile (MD), sans assistance (SA), autres cas à préciser.

b) S'il n'y a pas eu de décès depuis l'avant dernier Aid Eseghir (12 janvier 1967), indiquer la date du dernier décès :

Date du dernier décès :

ENQUETE NATIONALE DEMOGRAPHIQUE

N° d'ordre

FEUILLE DE MENAGE

(Premier Passage)

N° du Ménage

I. — Localisation

1 — Gouvernorat de _____

2 — Délégation de _____

3 — Cheikhât de _____

a) Zone naturelle : N° _____

b) Agglomération : Nom _____

ou

4 — Commune de _____

Quartier : _____

Secteur : _____

II. — Identification

1 — Nom et Prénom du Chef _____

2 — Adresse _____

3 — Profession _____

Agent Enquêteur :

Nom et Prénom _____

Date de l'Enquête _____

Signature

Agent Contrôleur :

Nom et Prénom _____

Date de Contrôle _____

Signature

Observations : _____

III. — Composition du Ménage

Mod. 2 — Imp. Officielle — Tunis 4-68

N.° Ordre	NOM ET PRENOM (2)	LIEN de parenté (3)	Situation de résidence (4)	SEXE (5)	DATE de naissance (6)	LIEU DE NAISSANCE (7)	ETAT matrimonial (8)	DEGRE d'instruction (9)	Natio- nalité (10)
	Etablir le titre des personnes résidentes du ménage, primaires ou secondaires, ou non-membres par le Chef de ménage.	Préciser la filiation de chaque membre du ménage.	Indiquer si l'occupé est résident primaire (RP) ou résident secondaire (RA).	Masculin ou Féminin.	Préciser le jour, le mois et l'année. A défaut de date, indiquer l'âge.	Préciser : Division, Châhbi ou Commune. Pour les personnes nées à l'étranger, le Pays.	Célibataire, Marié, Veuf ou Divorcé.	Indiquer : sans instruction, Koulab, Primaire, Moyen Secondaire (I ou II), Supérieur, autres (à préciser) pour les enfants de moins de 5 ans, indiquer : sans objet.	
1					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			
2					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			
3					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			
4					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			
5					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			
6					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			
7					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			
8					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			
9					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			
10					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			
11					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			
12					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			
13					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			
14					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			
15					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			
16					Jour, Mo, Année ou Age	Dél. Ch. Com. Pays			

(11) — Nombre des femmes (M, V, D.) :

(12) — Total des membres (RP + RA) du ménage : SM : ; SF : ; Eus :

Observations :

Modèle 2 bis

Complément à la feuille de ménage

N° d'ordre

N° de ménage

Etablir un modèle 2 bis dans tous les cas où il y a changement du chef de ménage ou remplacement du ménage par un autre.

I LOCALISATION

- 1- Gouvernorat de :
- 2- Délégation de :
- 3- Cheikhat de :
 - a) Zone Naturelle N°
 - b) Agglomération
- ou
- 4- Commune de
 - c) Quartier
 - d) Secteur

II IDENTIFICATION

- A) Chef de ménage indiqué sur le Carnet de Visite
 - 1- Nom et prénom
 - 2- Prénom du fils aîné
 - 3- N° de compostage
- B) Chef de ménage actuel
 - Nom et prénom

III RAISONS DE CHANGEMENT

- 1- Changement de chef pour cause de décès du chef de ménage
- 2- Départ du ménage par suite de décès d'un des membres
- 3- Départ définitif du ménage non motivé par un décès
- 4- Changement de chef pour cause de vieillesse
- 5- Ménage inconnu
- 6- Autre cas (à préciser)
-
-
-

IV RENSEIGNEMENTS COMPLEMENTAIRES DANS LE CAS D'UN DECES

- 1- Nom et prénom du décédé :
- 2- Sexe :
- 3- Date de naissance ou âge du décédé
- 4- Date de décès
- 5- Lieu de décès
- 6- Etat matrimonial du décédé
- 7- Le décédé était-il le chef

ENQUÊTE NATIONALE DÉMOGRAPHIQUE

N° d'ordre

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FEUILLE FECONDITE

N° du Ménage

--	--	--

(Premier Passage)

Etablir un questionnaire « Modèle 3 » pour chaque femme mariée, veuve ou divorcée, inscrite en partie III du « Modèle 2 », même si elle n'a pas eu d'enfants au cours de sa vie conjugale.

I — Localisation

- 1 — Gouvernorat de
- 2 — Délégation de
- 3 — Cheikhât de a) Zone naturelle N°
ou b) Agglomération : Nom
Quartier
- 4 — Commune de Secteur N°

II — Identification

- 1 — N° d'ordre de la femme dans le ménage
- 2 — Nom et Prénom de la femme
- 3 — Date de la rédaction du contrat du 1er mariage
- 4 — Date de la consommation du premier mariage
- 5 — Votre époux a-t-il actuellement d'autres femmes ? Si oui combien ?
- Activité a) de la femme b) de l'époux
- 6 — Profession
- 7 — Branche d'activité économique

III — Fécondité

1) Indiquer dans l'ordre de leur naissance tous les enfants que vous avez mis au monde au cours de votre vie, qu'ils soient encore en vie ou non.

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N°	NOM ET PRENOM	SEXE	DATE de naissance	LIEU DE NAISSANCE	Est-il encore vivant (en vie) ou décédé (date de décès)	Vu ou non vu	N° d'ordre du mariage
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1				Dél. Ch. Com.			
2				Dél. Ch. Com.			
3				Dél. Ch. Com.			
4				Dél. Ch. Com.			

N°	NOM ET PRENOM	SEXE	DATE de naissance	LIEU DE NAISSANCE	Est-il encore vivant (en vie) ou décédé (date de décès)	Vu ou non vu	N° d'ordre du mariage
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
5				Dél. Ch. Com.			
6				Dél. Ch. Com.			
7				Dél. Ch. Com.			
8				Dél. Ch. Com.			
9				Dél. Ch. Com.			
10				Dél. Ch. Com.			
11				Dél. Ch. Com.			
12				Dél. Ch. Com.			
13				Dél. Ch. Com.			
14				Dél. Ch. Com.			

2) Grossesse : La femme est elle enceinte ? (oui, non, sans réponse)

Observations :

Enquêteur : Contrôleur :

Nom et Prénom Nom et Prénom

Date de l'enquête Date du contrôle

Signature Signature

IV. — Evénements survenus dans le Ménage depuis le 12 janvier 1967 (avant dernier Aid Essehghir)

1. — Naissances

Date de la dernière naissance dans le ménage (qu'elle ait eu lieu avant ou après le premier passage).

2. — Décès

a) Etablir la liste des décès survenus depuis le premier passage, en commençant s'il y a lieu par le nouveau-né décédé.

N°	N° Partic III	NOM ET PRENOM	Sexe	DATE de naissance	DATE de décès	LIEU DE DECES	SOINS recus
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1						Dél. Ch. Com.	
2						Dél. Ch. Com.	

b) Pouver vous nous rappeler les décès qui ont eu lieu entre le 12 janvier 1967 (avant dernier Aid es Sghir) et notre premier passage.

هل يمكن ان تذكرني بالوفيات التي وقعت فيما بين 12 جانفي 1967 (يوم عيد العشير قبل الاخير) وتاريخ زيارتي الاول ال اسرتكم.

1						Dél. Ch. Com.	
2						Dél. Ch. Com.	
3						Dél. Ch. Com.	

* Préciser : Hôpital ou Clinique (H), Dispensaire (D), Médecin à domicile (MD), Infirmier à domicile (ID), sans assistance (SA), autres cas à préciser.

c) S'il n'y a pas eu de décès dans le Ménage depuis le 12 janvier 1967 (avant dernier Aid es Sghir), date du dernier décès :

OBSERVATIONS :

ENQUETE NATIONALE DEMOGRAPHIQUE

N° d'ordre

FEUILLE DE MENAGE

(Deuxième Passage)

N° du Ménage

I. — Localisation

1 — Gouvernorat de

2 — Délégation de

3 — Cheikhat de

a) Zone naturelle : N°

b) Agglomération : Nom

ou

4 — Commune de

Quartier :

Secteur :

II. — Identification

1 — Nom et Prénom du Chef

2 — Adresse

3 — Profession

Agent Enquêteur :

Nom et Prénom

Date de l'Enquête 1er Passage : 2ème Passage :

Signature

Agent Contrôleur :

Nom et Prénom

Date de Contrôle

Signature

Mod 4 — Imp. Officielle — Table 7 204

Observations :

III. — Composition du Ménage

Mar. 2 — Imp. Officielle — Form. 1-B

N.° d'ordre	NOM ET PRENOM (2)	LIEN de parenté (3)	Situation de résidence (4)	SEXE (5)	DATE de naissance (6)	LIEU DE NAISSANCE (7)	ETAT matrimonial (8)	DEGRE d'instruction (9)	Natio- nalité (10)	Type d'activité (11)	Profession individuelle (12)	Branche d'activité économique (13)	Nom de l'employeur ou raison sociale de l'entreprise (14)	Statut Professionnel (15)
(1)	Indiquer le titre des membres relatifs du ménage, personnel ou absent, en commençant par le Chef de ménage.	Préciser la situation de résidence de chaque membre du ménage.	Indiquer si l'emploi est résidentiel (RP) ou résidentiel (RA) ou résidentiel (RA).	Mariage ou Pacs etc.	Préciser le jour, le mois et l'année, à défaut de date indiquée par l'acte.	Préciser : Département, Qualité ou Commune. Pour les personnes nées à l'étranger, le Pays.	Célibataire, Marié, Veuf ou Divorcé.	Indiquer : sans instruction, Primaire, Secondaire, (1 ^{er} à 3 ^{es} degrés), Supérieur, autres (à préciser). Préciser les années de scolarité de 5 ans. Indiquer : sans emploi.						
1					Jour, Mois, Année ou Age	Déf. Ch. Com. Pays								
2					Jour, Mois, Année ou Age	Déf. Ch. Com. Pays								
3					Jour, Mois, Année ou Age	Déf. Ch. Com. Pays								
4					Jour, Mois, Année ou Age	Déf. Ch. Com. Pays								
5					Jour, Mois, Année ou Age	Déf. Ch. Com. Pays								
6					Jour, Mois, Année ou Age	Déf. Ch. Com. Pays								
7					Jour, Mois, Année ou Age	Déf. Ch. Com. Pays								
8					Jour, Mois, Année ou Age	Déf. Ch. Com. Pays								
9					Jour, Mois, Année ou Age	Déf. Ch. Com. Pays								
10					Jour, Mois, Année ou Age	Déf. Ch. Com. Pays								
11					Jour, Mois, Année ou Age	Déf. Ch. Com. Pays								
12					Jour, Mois, Année ou Age	Déf. Ch. Com. Pays								

* Prétireur : occupé, sans travail, sans travail pour le tiers (ois, femme au foyer, étudiant, retraité, vieillard, infirme, autre cas (à préciser).

** Prétireur : patron, associé, coopérateur, travailleur indépendant, employé ouvrier, aide familial, apprenti, autre cas (à préciser).

(1) — Nombre des femmes (M., V., D.) : _____

(12) — Total des nombres (RP + RA) du ménage : SM : _____ ; SP : _____ ; Bos _____

ENQUÊTE NATIONALE DÉMOGRAPHIQUE

N° d'ordre

--	--	--

FEUILLE INDIVIDUELLE DE FECONDITE

N° du Ménage

--	--	--

(Deuxième Passage)

Etablir un questionnaire « Modèle 5 » pour chaque femme mariée, veuve ou divorcée, nouvellement inscrite en partie III du « Modèle 4 », ou nouvellement mariée même si elle n'a pas eu d'enfants au cours de sa vie conjugale.

Date de l'enquête : 1er passage 2ème passage

I - Localisation

1 - Gouvernorat de

2 - Délégation de

3 - Cheikhât de a) Zone naturelle N°

ou b) Agglomération : Nom

4 - Commune de a) Quartier

..... b) Secteur N°

II - Identification

1 - N° d'ordre de la femme dans le ménage

2 - Nom et Prénom de la femme

3 - Date de la rédaction du contrat du mariage

4 - Date de la consommation du premier mariage

5 - Votre époux a-t-il actuellement d'autres femmes ? Si oui combien ?

Activité a) de la femme b) de l'époux

6 - Profession

7 - Branche d'activité économique

8 - Date d'arrivée dans le ménage

.....

III - Fécondité

1) Indiquer dans l'ordre de leur naissance tous les enfants que vous avez mis au monde au cours de votre vie, qu'ils soient encore en vie ou non.

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N°	NOM ET PRENOM	SEXE	DATE de naissance	LIEU DE NAISSANCE	Est-il encore vivant (en vie) ou décédé (date de décès)	Vu ou non vu	N° d'ordre du mariage
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1				Dél. Ch. Com.			
2				Dél. Ch. Com.			
3				Dél. Ch. Com.			
4				Dél. Ch. Com.			

N°	NOM ET PRENOM	SEXE	DATE de naissance	LIEU DE NAISSANCE	Est-il encore vivant (en vie) ou décédé (date de décès)	Vu ou non vu	N° d'ordre du mariage
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
5				Dél. Ch. Com.			
6				Dél. Ch. Com.			
7				Dél. Ch. Com.			
8				Dél. Ch. Com.			
9				Dél. Ch. Com.			
10				Dél. Ch. Com.			
11				Dél. Ch. Com.			
12				Dél. Ch. Com.			
13				Dél. Ch. Com.			
14				Dél. Ch. Com.			

2) Grossesse : La femme est elle enceinte ? (oui, non, sans objet, sans réponse)

Observations :

Enquêteur : Contrôleur :

Nom et Prénom Nom et Prénom

Signature Date du contrôle Signature

IV. — Evénements survenus dans le Ménage depuis le 1er passage de l'enquête

1. — Naissances :

a) Etablir la liste de toutes les naissances qui ont eu lieu dans le ménage depuis le 2^e passage, que l'enfant soit encore en vie ou non.

N°	NOM ET PRENOM du nouveau né (Préciser les prénoms du père et de la mère)	SEXES	DATE de naissance	LIEU DE NAISSANCE	Assistance à l'accouchement	Renseignements sur la mère	
						N° d'ordre	DATE de naissance ou âge
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1				Dél. _____ Ch. _____ Com. _____			
2				Dél. _____ Ch. _____ Com. _____			
b) Rappeler les naissances survenues entre les deux premiers passages.							
1				Dél. _____ Ch. _____ Com. _____			
2				Dél. _____ Ch. _____ Com. _____			

* Préciser : Hôpital ou Clinique (H), à domicile assistée d'un médecin (DM), à domicile assistée d'une sage-femme (DS), à domicile sans assistance (SA), autres cas à préciser.

c) S'il n'y a pas eu de naissance depuis le 1er passage indiquer :

Date de la dernière naissance : _____

Nom et prénom de l'enfant : _____

2. — Décès :

a) Etablir la liste des décès survenus depuis le 2^e passage (enfants et adultes, parents ou non parents avec le chef).

N°	NOM ET PRENOM	SEXES	ETAT matrimonial	DATE de naissance	DATE de décès	LIEU DE NAISSANCE	SOINS reçus
1						Dél. _____ Ch. _____ Com. _____	
2						Dél. _____ Ch. _____ Com. _____	
b) Rappeler les décès survenus entre les deux premiers passages.							
1						Dél. _____ Ch. _____ Com. _____	
2						Dél. _____ Ch. _____ Com. _____	

** Préciser : Hôpital ou Clinique (H), Dispensaire (D), Médecin à domicile (MD), sans assistance (SA), autres cas à préciser.

c) S'il n'y a pas eu de décès depuis le premier passage indiquer : — Date du dernier décès : _____

— Nom et prénom du décédé : _____

— Lien de parenté du décédé avec le chef de ménage : _____

d) Y a-t-il eu un mort-né depuis le premier passage, si oui indiquer la date : _____

l'enfant a-t-il crié (oui ou non) : _____

ENQUETE NATIONALE DEMOGRAPHIQUE

N° d'ordre

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FEUILLE DE MENAGE

(Troisième Passage)

N° du Ménage

--	--	--

I. — Localisation A) au 1er passage

1 — Gouvernorat de _____

2 — Délégation de _____

3 — Cheikhate de _____

a) Zone naturelle : N° _____

b) Agglomération : Nom _____

ou

4 — Commune de _____

Quartier : _____

Secteur : _____

B) au 2ème passage

C) au 3ème passage

II. — Identification

I. — Nom et Prénom du Chef _____

2 — Adresse { au 1er passage _____

{ au 2ème passage _____

{ au 3ème passage _____

3 — Profession _____

Agent Enquêteur :

Nom et Prénom _____

Date de l'Enquête 1er Passage : _____

2ème Passage : _____

3ème Passage : _____

Signature

Agent Contrôleur :

Nom et Prénom _____

Date de Contrôle _____

Signature

Mod. 2 — Imp. Off. Ind. — Tunis 9 801

Observations : _____

III. — Composition du Ménage

N ^o d'ordre (1)	NOM ET PRENOM (2)	LIEN de parenté (3)	SITUATION DE RESIDENCE			SEXE (7)	DATE de naissance (8)	LIEU DE NAISSANCE (9)	ETAT matri- monial (10)	DEGRE d'instruction (11)	Natio- nalité (12)	Type d'activité (13)	Profession individuelle (14)	Branche d'activité économique (15)	Nom de l'employeur ou raison sociale de l'entreprise (16)	Statut Professionnel (17)
			1 ^{er} pas. (4)	2 ^e pas. (5)	3 ^e pas. (6)											
	Établir la liste des membres résidents du ménage, présents ou absents.	Préciser la filiation	Oui ou Non	Oui ou Non	Indiquer RP ou RA	Masculin ou Féminin	Préciser le Jour, le Mois et l'Année. À défaut de date indiquer l'âge.	Préciser : Dérégistré, Chetibat ou Com- mune. Pour les personnes nées à l'étran- ger, le Pays.	Célibataire, Marié, Veuf ou Divorcé	Indiquer : sans instruc- tion, Scolarisé, Primaire, Moyen, Secondaire, (1 ^{er} deg., 2 ^{deg.}), Supérieur, autre (à préciser). Pour les enfants de moins de 5 ans, indi- quer : sans objet.						
1							Jour, Mois, Année ou Age	Dét. Ch. Com. Pays								
2							Jour, Mois, Année ou Age	Dét. Ch. Com. Pays								
3							Jour, Mois, Année ou Age	Dét. Ch. Com. Pays								
4							Jour, Mois, Année ou Age	Dét. Ch. Com. Pays								
5							Jour, Mois, Année ou Age	Dét. Ch. Com. Pays								
6							Jour, Mois, Année ou Age	Dét. Ch. Com. Pays								
7							Jour, Mois, Année ou Age	Dét. Ch. Com. Pays								
8							Jour, Mois, Année ou Age	Dét. Ch. Com. Pays								
9							Jour, Mois, Année ou Age	Dét. Ch. Com. Pays								
10							Jour, Mois, Année ou Age	Dét. Ch. Com. Pays								
11							Jour, Mois, Année ou Age	Dét. Ch. Com. Pays								
12							Jour, Mois, Année ou Age	Dét. Ch. Com. Pays								

* Préciser : occupé, sans travail, sans travail pour le tiers fois, femme au foyer, étudiant, retraité, vieillard, infirme, autre cas (à préciser).

** Préciser : patron, associé, coopérateur, travailleur indépendant, employé, ouvrier, aide familial, apprenti, autre cas (à préciser).

(18) — Nombre des femmes (M. V. D.) :

(19) — Total des membres (RP + RA) du ménage : SM : ; SF : ; Ens :

Lieu du décès :

Etat matrimonial du décédé : célibataire marié
veuf divorcé

Lien de parenté avec le chef de ménage :

Soins reçus :

III PERSONNE QUI A DONNE DES RENSEIGNEMENTS

1. Est-ce le cheikh ?
le voisin ?
un parent ? (lien de parenté avec le chef :
.....)
autres cas (à préciser)

2. Indiquer :

Nom et prénom de cette personne :

Profession :

Adresse :

Nom et prénom de l'Agent enquêteur :

Date :

V -- Fécondité
 Indiquer dans l'ordre de leur naissance tous les enfants que cette femme a mis au monde au cours de sa vie, qu'ils soient encore en vie ou non.

N°	NOM ET PRENOM	SEXE	DATE de naissance	LIEU DE NAISSANCE	Est-il encore vivant (en vie) ou décédé (date de décès)	Vu ou non vu	N° d'ordre du mariage
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1				Dél. _____ Ch. _____ Com. _____			
2				Dél. _____ Ch. _____ Com. _____			
3				Dél. _____ Ch. _____ Com. _____			
4				Dél. _____ Ch. _____ Com. _____			
5				Dél. _____ Ch. _____ Com. _____			
6				Dél. _____ Ch. _____ Com. _____			
7				Dél. _____ Ch. _____ Com. _____			
8				Dél. _____ Ch. _____ Com. _____			
9				Dél. _____ Ch. _____ Com. _____			
10				Dél. _____ Ch. _____ Com. _____			
11				Dél. _____ Ch. _____ Com. _____			
12				Dél. _____ Ch. _____ Com. _____			

Enquêteur :
 Nom et Prénom _____
 Signature _____

Contrôleur :
 Nom et Prénom _____
 Date du contrôle _____
 Signature _____

REPUBLIQUE TUNISIENNE
 SECRETARIAT D'ETAT
 AU PLAN
 ET A L'ECONOMIE NATIONALE

Modèle 13

ENQUÊTE NATIONALE DÉMOGRAPHIQUE

N° d'ordre

FEUILLE FECONDITE

(Troisième Passage)

N° du Ménage

Etablir un questionnaire « Modèle 3 » pour chaque femme, mariée, veuve ou divorcée, inscrite en partie III du « Modèle 12 », même si elle n'a pas eu d'enfants au cours de sa vie conjugale.

Date de l'enquête : 1er passage _____ 2ème passage _____ 3ème passage _____

I -- Localisation au 3ème passage

- Gouvernorat de _____
- Délégation de _____
- Cheikh de _____ Zone naturelle N° _____
ou
- Commune de _____ Secteur N° _____

II -- Identification de la Femme

- N° d'ordre de la femme dans le ménage _____
- Nom et Prénom de la femme _____
- Date de la rédaction du contrat du 1er mariage _____
- Date de la consommation du premier mariage _____
- Etat matrimonial actuel _____
- Rang du dernier mariage _____
- Age ou date de naissance de la Femme _____
- La Femme était-elle enceinte au premier passage _____ au 2ème passage _____

III -- Identification du mari

- Nom et Prénom du mari actuel _____
- Age ou date de naissance du mari _____
- Le mari a-t-il actuellement plusieurs Femmes ? _____ Si oui, combien _____

IV -- Activité

- Profession _____ a) de la femme b) de l'époux
- Branche d'activité économique _____

Observations : _____

SECRETARIAT D'ETAT AU PLAN
ET A L'ECONOMIE NATIONALE

Nom du chiffreur
Nom du vérificateur.....

ENQUETE NATIONALE DEMOGRAPHIQUE

Modèle 11 III

FEUILLE DE CHIFFREMENT : NAISSANCE 3ème passage

A remplir pour chaque naissance inscrite en partie IV.1 de la feuille de ménage (M.12)

INTITULE DU CODE

CHIFFREMENT

IDENTIFICATION . LOCALISATION (code 1ère partie)

type de carte et choix	11	_____
strate et localisation (FMI)	12	_____
n° d'ordre de l'enquêteur (FMp.1)	13	_____
date de l'enquête (FNp.1)	14	_____

CARACTERISTIQUES DU MENAGE (Code II ème partie)

taux de pondération		_____
n° du ménage (FM p.1)	21	_____
profession du chef de ménage (FMII)	22	_____
taille du ménage (FMIII.1 et 2)	24	_____
type de ménage (FMIII)	25	_____
4 colonnes vierges		_____

CARACTERISTIQUES DU CHEF DE MENAGE (Code IV ème partie)

degré d'instruction du chef de ménage (FMIII, 9)	4Y	_____
--	----	-------

CARACTERISTIQUES DE LA MERE (Code IVème partie)

situation de résidence de la mère (FMIII, 4)	45	_____
année de naissance de la mère (FMIII et IV, 6)	47 bis	_____
migration de la mère (FMI et III, 7)	49	_____
état matrimonial de la mère (FMIII, 8)	4X	_____
degré d'instruction de la mère (FMIII, 9)	4Y	_____
nationalité de la mère (FMIII, 10)	4Z	_____

————— CARACTERISTIQUES DU MARIAGE (Code VIe partie) —————

année de consommation du 1er mariage (FF. II. 4)	61	_____
de la mère		
profession de la mère (FF. II. 6 et 7a)	64	_____
profession du mari (FF. II. 6 et 7b)	65	_____
nombre d'enfants survivants (FF. III. 6)	68	_____

————— CARACTERISTIQUES DU PERE (Code IVe partie) —————

situation de résidence du père (FM III. 4)	45	_____
année de naissance du père (FM III. 6)	47	_____
migration du père (FMI et III 7)	49	_____
état matrimonial du père (FM. III. 8)	4X	_____
degré d'instruction du père (FM. III. 9)	4Y	_____
nationalité du père (FM. III. 10)	4Z	_____

————— CARACTERISTIQUES DE LA NAISSANCE (Code VIIe partie) —————

catégorie d'accouchement (FM. IV. 1)	72	_____
sexe du nouveau-né (FM. IV. 1 et 3)	73	_____
date de naissance du nouveau-né (FM. IV. 1 et 4)	74	_____
assistance à l'accouchement (FM. IV. 1 et 6)	75	_____
rang de naissance (FF. III. 1)	76	_____

————— CARACTERISTIQUES DU DECES (Code VIIIe partie) —————

date de décès (éventuellement) (FM. IV. 2 et 5)	84	_____
---	----	-------

SECRETARIAT D'ETAT AU PLAN
ET A L'ECONOMIE NATIONALE

Nom du chiffreur
Nom du vérificateur.....

ENQUETE NATIONALE DEMOGRAPHIQUE

Modèle 12 III

FEUILLE DE CHIFFREMENT : DECES 3ème passage

A remplir pour chaque décès inscrit en partie IV(2) de la feuille de ménage (Modèle 12).

INTITULE DU CODE

CHIFFREMENT

— IDENTIFICATION, LOCALISATION (Code Ie partie) —

Type de carte et choix	11	_ _ _ _
strate et localisation (FM1)	12	_ _ _ _ _ _ _ _ _ _ _ _ _ _
n° d'ordre de l'Enquêteur (FMp. 1)	13	_ _ _ _
date de l'Enquête (FMp. 1)	14	_ _ _ _ _ _ _ _ _

— CARACTERISTIQUES DU MENAGE (Code Iie partie) —

taux de pondération		_ _ _ _
n° de ménage (FMp. 1)	21	_ _ _ _
profession du chef de ménage (FMIII)	22	_ _ _ _
taille du ménage (FM, III 1 et 12)	24	_ _ _ _
type de ménage (FM, III)	25	_ _ _ _

— CARACTERISTIQUES DU CHEF DE MENAGE (Code IVe partie) —

sexe du chef de ménage (FM, III, 5)	46	_ _ _ _
date de naissance du chef de ménage (FMIII, 6) et degré de précision	47	_ _ _ _ _ _ _ _ _ _ _ _ _ _
migration du chef de ménage (FMIII)	49	_ _ _ _
état matrimonial du chef de ménage (FM, II, 8)	4X	_ _ _ _
degré d'instruction du chef de ménage (FM, II, 9)	4Y	_ _ _ _
nationalité du chef de ménage (FM, II, 10)	4Z	_ _ _ _

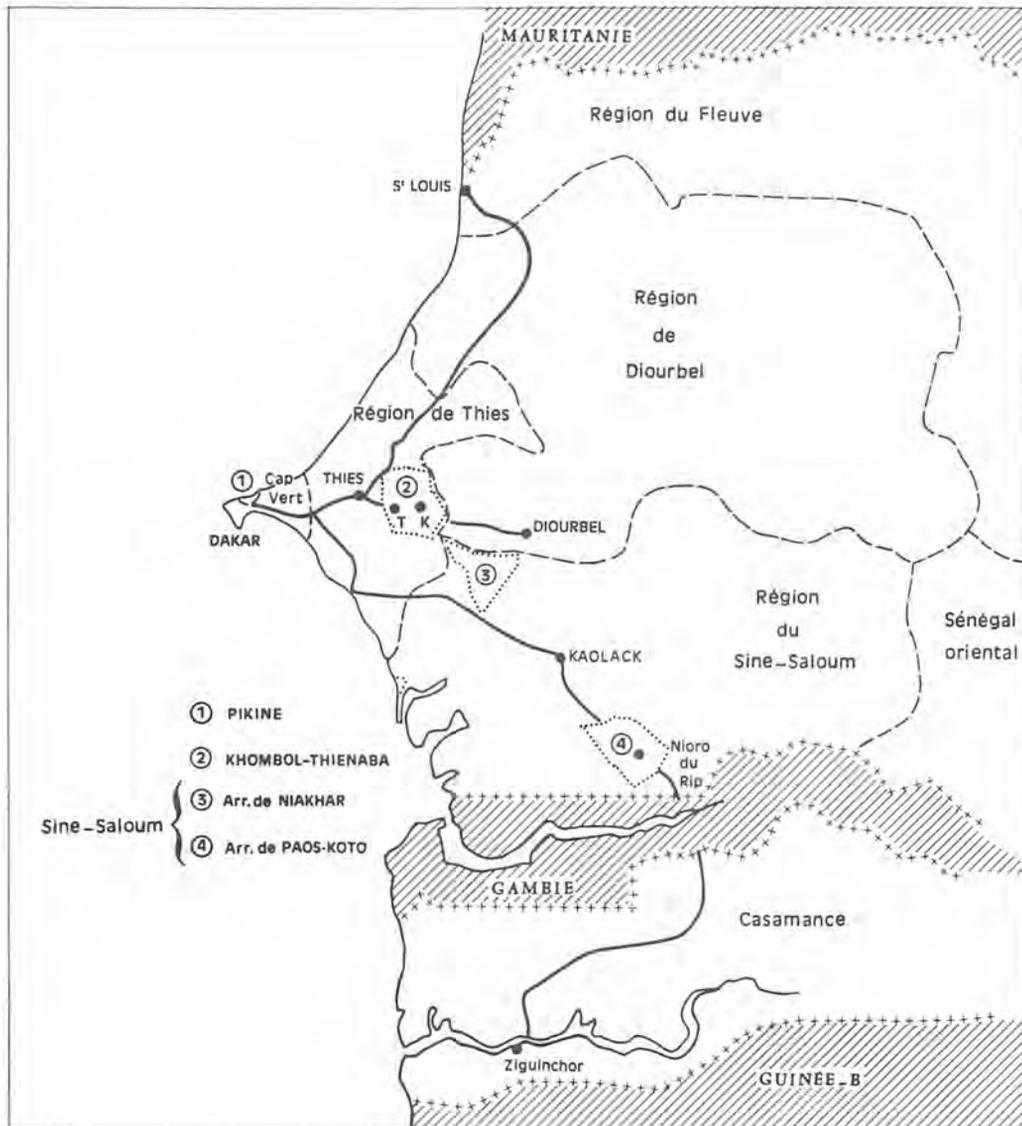
— CARACTERISTIQUES DU DECES (Code VIIIe partie) —

n° d'ordre du décès (FM, IV, 2, 1)	81	_ _ _ _
sexe du décédé (FM, IV, 2, 3)	82	_ _ _ _
date de naissance du décédé (FM, IV, 2, 4) et degré de précision	83	_ _ _ _ _ _ _ _ _ _ _ _ _ _
date de décès et degré de précision (FM, IV, 2, 5)	84	_ _ _ _ _ _ _ _ _ _ _ _ _ _
lieu de décès (FM, IV, 2, 6)	85	_ _ _ _ _ _ _ _ _ _ _ _ _ _
soins reçus (FM, IV, 2, 7)	86	_ _ _ _

Chapter 3

SENEGAL

Sine-Saloum, Khombol-Thiënaba, Pikine and National Survey



DEMOGRAPHIC SURVEYS IN SENEGAL

There have been follow-up demographic surveys going on regularly in Senegal since 1962. The first three surveys were local, and go under the names of the survey of Sine-Saloum, Khombol-Thiënaba, and Pikine. The last one, begun in 1970, involved the entire country.

These surveys are related to one another to the extent that the lessons learnt in one survey were used in the others. There is continuity in the personnel in charge of the surveys, these attached to the Division of Statistics, often closely associated with the staff of O.R.S.T.O.M.

Each of these surveys, however, had its own special characteristics.

The main goal of the first survey, that of Sine-Saloum, was to test this new method in a rural environment, in the hopes of getting more reliable information than the single-round retrospective survey had yielded, this for measuring the growth (natural and migratory) of the population, and for improving the workings of the official registry of vital statistics.

This method apparently worked out well, for it was applied later in 1964, in the region of Khombol-Thiënaba, to test (by working from the mortality rates for children) the efficaciousness of the health programmes carried out there.

Finally, starting in 1966-1967, the same experiment was tried in an urban setting (Pikine), this time by sample taking.

The three local surveys are therefore treated in the same chapter. The national survey by sample taking, which logically followed these other surveys, is taken up separately. The primary aim of this survey was to supply representative demographic data on the national and regional levels.

A - The local surveys (Sine-Saloum, Khombol-Thiënaba, Pikine)

1. Goals

In addition to the main goals spoken of earlier, one of the special aims of these surveys was to provide the basic framework of observations that could best explain the factors and tendencies of demographic change. Information on the following was accordingly gathered :

- epidemiology (especially the vaccination programmes against the measles, whose ravages in Africa had been amply demonstrated during the single-round retrospective surveys);

- fertility (weaning, an attitudinal survey of the knowledge and practice of contraceptive measures, etc.⁽¹⁾);
- economy (employment in urban environments, etc.).

2. Range of study

Sine-Saloum. There were two surveys zones in the region of Sine-Saloum, the entire arrondissement of Niakhar, in the department of Fatik (Sine); the northern half of the arrondissement of Paos-Koto in the department of Nioro du Rip (Saloum).

Khombol-Thiënaba. In the region of Thiès there were several groups of villages in the arrondissement of Thiënaba and the commune of Khombol, located in the heart of this arrondissement.

Pikine. In the region of Cap Vert, which corresponds roughly to the commune of Dakar, the settlement of Pikine is the largest part of the fifth arrondissement of this commune.

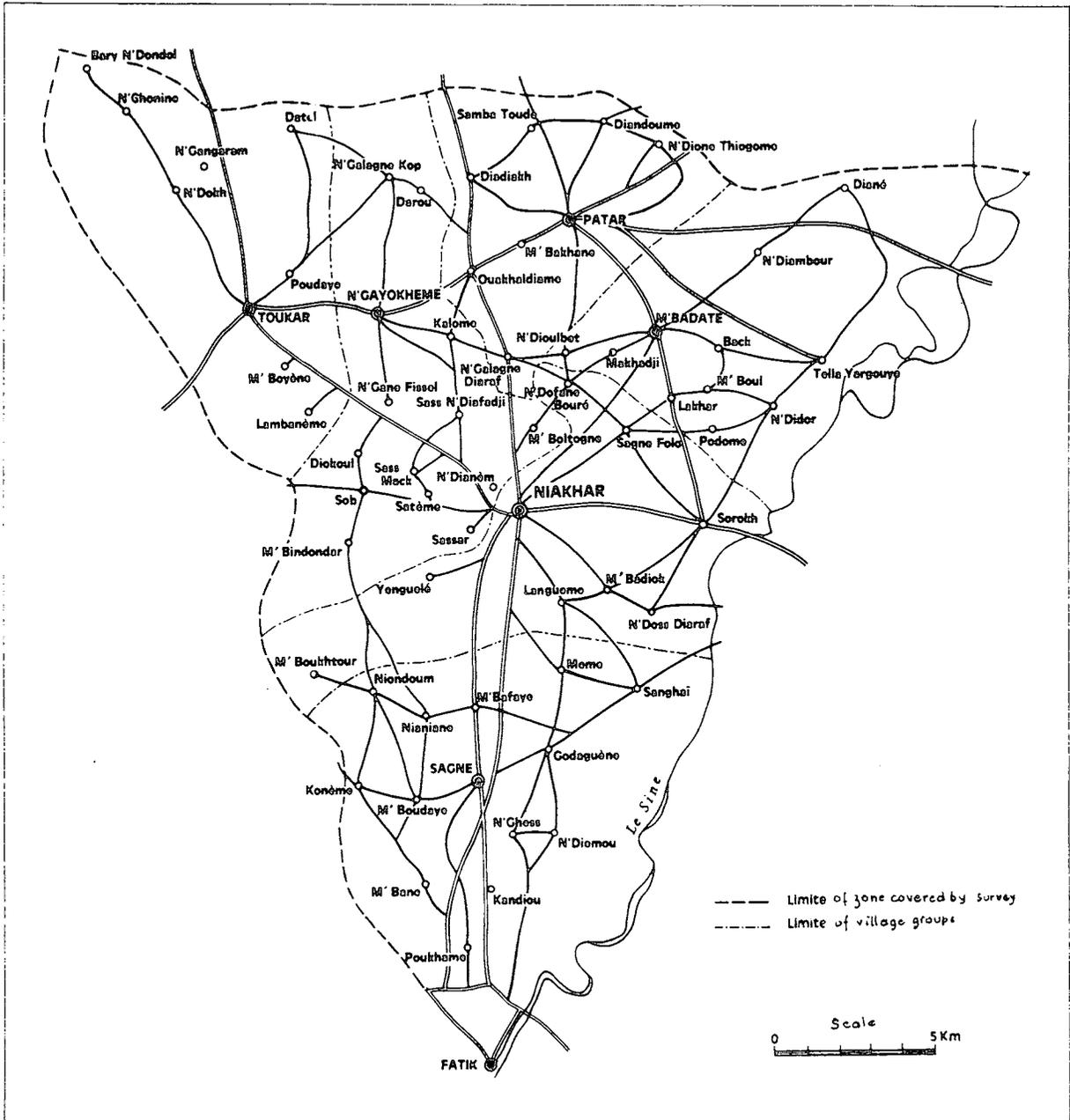
A single rainy season, from July to October, characterizes the climate but in the zones of Sine-Saloum and of Khombol, there is a dominant dry wind in the dry season, called the "harmatan" (climate of the Sudan), while in the region of Cap Vert to Pikine (maritime climate of area below the Canaries) this dry season is tempered by the east winds from December to May.

Playing a determinant role in increasing the uncertainties of agricultural production in country regions is the annual rainfall - less than 800 mm. in the areas of Khombol-Thiënaba and Niakhar, somewhat higher in Paos-Koto.

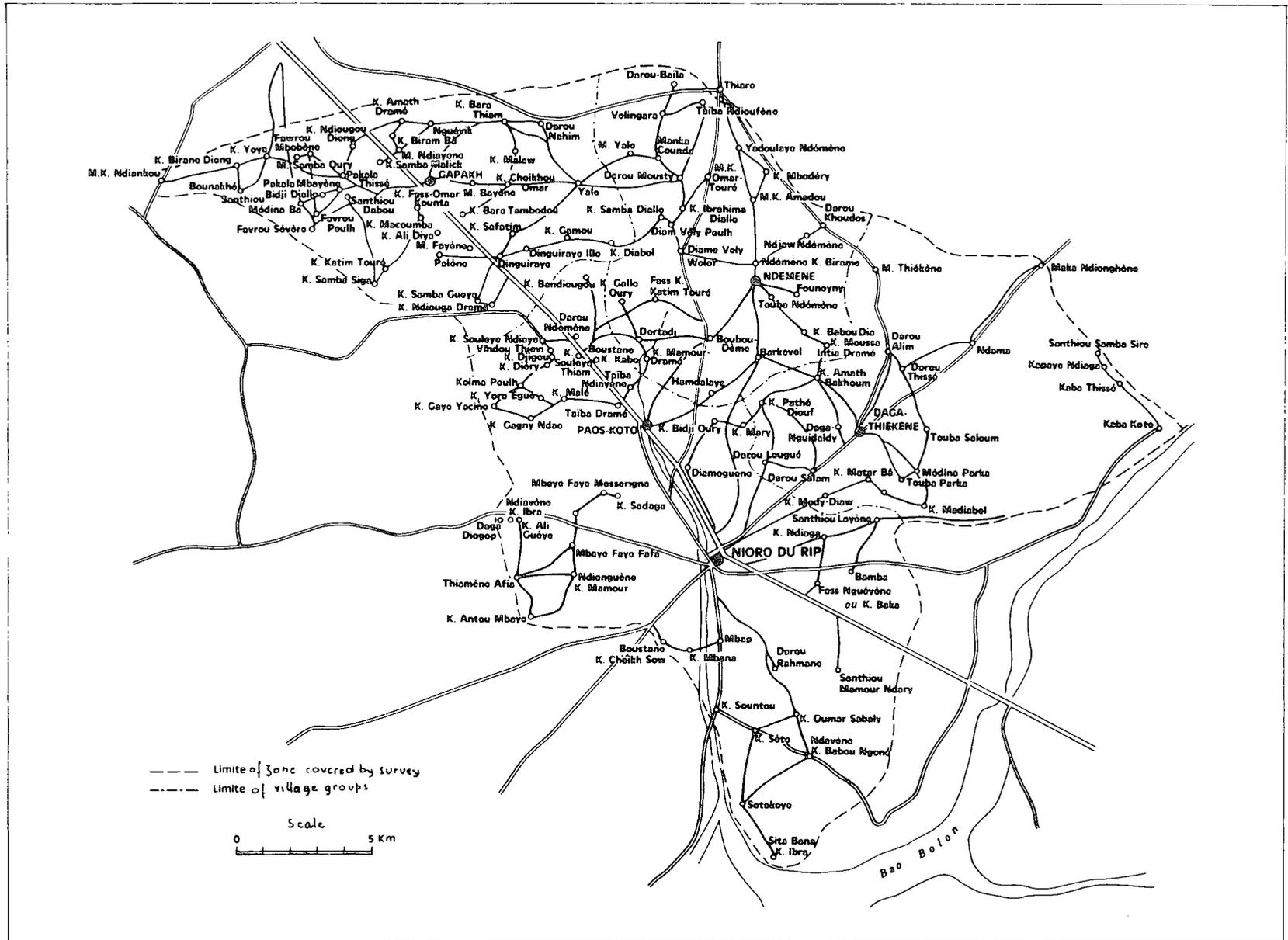
The rural zones studied are located on a plain of clay and sand composition less than fifty metres above sea level.

The principal crops are millet and peanuts. In Khombol-Thiënaba, the land is extensively cultivated, with no land lying fallow, 1 hectare (2.47 acres) per person, and a population density of 85 inhabitants/sq. km. The southern part of the arrondissement is taken up by uncultivated land with a high salt content, the population density in Khombol-Thiënaba going higher than 100. In Paos-Koto, the population density is not as great.

(1) A special fertility survey was carried out on a carefully defined sampling in trimestrial rounds in each zone. For convenience, this survey is taken up separately in one of the appendices.



SURVEY ON REGISTRATION OF VITAL STATISTICS - ARRONDISSEMENT OF NIAKHAR



SURVEY ON REGISTRATION OF VITAL STATISTICS. ARRONDISSEMENT DE PAOS-KOTO

Dwellings are grouped rather close together in Khombol-Thiënaba, with the average size of villages being 500 inhabitants. In Sine, however, the dwellings are more scattered, even though 65 villages of the arrondissement of Niakhar have similar populations (540 inhabitants). In Saloum, in the other hand, the 135 villages studied are much smaller, 140 inhabitants but these inhabitants living more closely grouped together. These lands have not been occupied as long as those of the regions spoken of above.

The surface area covered by the survey in Khombol-Thiënaba is close to 300 sq. km.; in Niakhar, 414 sq. km.; in Paos-Koto, 484 sq. km.

In Pikine settlements are more recent. Urban building plots were parcelled out there in 1952 to serve as an outlet for the growth of the city of Dakar. A small section is composed of less organized areas which have mushroomed up overnight along axes that continue those of the main thoroughfares.

There is also an area in the outskirts where expansion is still possible (though such is no longer so - theoretically - for the "unplanned" areas just spoken of).

In urban areas, the ethnic makeup is varied, with the Wolof dominating. The rural milieu is far more homogeneous.

Commune of Khombol : majority Wolof; Thiënaba, Wolof in the north, Serer in the south; Niakhar, Serer; Paos-Koto, majority Wolof, and other ethnic groups (Peul, Serer, etc.).

Numerically, the populations are Moslem, except in Niakhar, where most of the Serer believe in animism. There are minority groups of Christians in this area as well as in urban areas.

3 and 4. Numbers involved - Sampling frame

Overall view. In Sine-Saloum each zone was studied completely; in Khombol-Thiënaba selected village groups were studied; in Pikine, there was sampling of city blocks.

Methods used (these varying according to the zone studied).

Sine-Saloum. The entire population of each zone was interviewed during three yearly cycles, 1963-1965. On 1 January 1966, the region of Niakhar included 35,000 residents, that of Paos-Koto, 19,000.

Since 1966 the same survey has been carried out in only two groups of villages : in Niakhar, in the Ngayorhem group (5200 inhabitants); in Paos-Koto, in the Ndemem group (4100 inhabitants).

Moreover, special surveys were carried out in even smaller sections of the population :

a) in a random sampling made in one of every five villages on the second round, this survey for women 14-44 years of age (retrospective questions on the number of marriages, live births, and children still living);

b) among all women either married at least once or having had at least one live birth in the period 1963-1965, the observations continuing through the beginning of 1968 (approximately 6000 women at Niakhar; 3000 at Paos-Koto); questions about what happened to the children born during this period were also asked (8560 births in Niakhar; 5200 in Paos-Koto);

c) among the cohorts of children (0-14 years old) counted in the first listing, these followed through the beginning of 1968 (7735 in Niakhar; 4755 in Paos-Koto);

d) among birth cohorts reported in 1965, 1966, and 1968; questions about what happened to these cohorts were asked on the following round (1260 in Niakhar; 430 in Paos-Koto).

Khombol-Thiënaba. The villages were chosen according to the health programmes that had been carried out there. The villages all together comprise about 40 % of the rural population of the arrondissement.

The survey covered only the population from 0-14 years of age, which is slightly higher than 12,00 children.

It was possible to begin, in a limited number of villages only, educational and health programmes; there were, moreover, a limited number of doses of anti-measles vaccine available to fight against this disease whose virulence in Africa is well-known.

These programmes were carried out in different village groups; it was therefore decided to compare the death rates of village groups in the same geographic area, when these had benefitted from different medical and health programmes.

A brief description follows :

1) Khombol, where a dispensary with eight bed and a maternity have existed for many years. There are also street-fountains in the commune.

2) The villages chosen for the experiment in health training, in conjunction with a medical study of the dispensary. There are two in the north and four in the south. These will be referred to hereafter as "Maternal and Child Welfare" (= MCW).

The medical and health programmes undertaken were in the fields of :

- nutrition : advice concerning the diet of young children (starting in 1964),
- sanitation : installation of latrines,
- campaign against malaria : tablets of "Nivaquine"⁽¹⁾ were given out under the supervision of teams from MCW, as well as those of the cooperatives,
- various treatments administered to children during weekly visits.

3) In one group of four villages the children have been given an anti-measles vaccine since January 1965. These groups will be henceforth be designated as "measles vaccine".

4) In two other village groups, a male nurse was placed in charge of the health education programme; one for the north, from Touba-Toul; one for the south, from Mboulouktene; these village groups will hereafter be designated as "male nurse". The health education programmes carried out on rounds in these villages have since 1966 consisted in dietary suggestions and recommendations about measures of basic sanitation - the installation of latrines, the partial covering of wells, disposal of household wastes. Nivaquine was this distributed, under supervision, in some of the villages.

5 The other villages make up the control groups proper, and are referred to here as "control".

In the entire zone Nivaquine has been distributed by the agricultural cooperatives since August 1965 during each rainy season. During the first two years, the drug was administered under partial supervision; in 1968, the distribution of Nivaquine was supervised in only a few villages.

There are therefore seven village groups, whose numbers have been broken down in the following table.

(1) Translator's Note : Nivaquine is the French company Specia's brand name for chloroquine.

Table I. Numbers involved and populations of villages in each of the seven groups.

Group referred to	Number of villages	Births 1967	Numbers involved, 01.01.1968	
			1-4 years	0-14 years
Commune of Khombol	5 districts and 1 village	268	712	2290
MCW	6	240	559	2050
Measles vaccine	4	188	426	1534
Male nurse (north)	16	297	661	2636
Male nurse (south)	5	129	300	1317
Control (north)	7	88	235	856
Control (south)	11	267	542	2095
Total	53	1477	3502	12778

Pikine. In January 1970 the population of this settlement was estimated to be approximately 100,000 inhabitants. A sampling of one in twenty people was carried out, and this gave a sample of 5000 people.

During the first year of the survey (1966), the sampling frame chosen was the building plot (occupied on the average by ten people), this considered to be the smallest but most representative unit of habitation. On the city plans the numbers of each building plot are given. The plots were drawn from the city plans following a circular scheme. The outskirts, only partially occupied, had been thoroughly covered by the census.

Because of the difficulties due to the unit chosen (half or double plots) and organization (a loss of time in locating the plot), it was decided to change the sampling frame starting with the second yearly cycle, using instead the block - that is, a group of lots divided by roads and other such divisions. These included 100 people on the average.

The sampling frame of "blocks" was set up following the city plans for the built-up lots; by making a very approximate outline of the blocks, with lot numbers given by the enumerator in districts that were less organized (and not on the city plans).

After all the blocks were numbered, a drawing of one in twenty (10, 30, 50, etc.), starting with the oldest blocks, was carried out, with a total of forty blocks.

5. Duration of the survey

Sine-Saloum : The survey covers the entire population of each zone, in three full cycles (each cycle lasting a year).

TableII. Dates and Duration of Rounds in Niakhar and Paos-Koto

Round	Starting Date	Duration (in months)	
		Niakhar	Paos-Koto
C ₀ Quarterly round	10.1962	1 1/2	1
C ₁	12.1963	2	1 1/2
C ₂	01.1965	2	1 1/2
C ₃	01.1966	2	1 1/2

Following the same rythm, but limited to two village groups (Ngayorhem and Ndemem), the survey has continued up to now, with a total of seven complete cycles, 1963-1969. The special surveys were carried out simultaneously.

Khombol-Thiénaba : In the group MCW, observation was carried out practically continuously. The records were brought up-to-date during the weekly visits.

In the other groups, the rounds were generally made annually.

Note : The surveys of 1964, 1965, 1966, 1967, 1968, took place during the rainy season, from July to October, a period of nearly three months, not counting the baseline listing in Khombol in February 1964 and in the group "male nurse (south)" in August 1966.

There was no survey made in 1969 but there was one instead at the beginning of 1970, after an interval of eighteen months. Additional surveys were made in the group "measles vaccine" at the beginning of 1968 and 1969.

As of the writing of this book, six complete annual cycles (1964-1969) have been made in the group MCW, and five complete annual cycles (1965-1969) in the other groups.

Table III. Dates of rounds in the different groups of villages

Round	Khombol	Measles	Male Nurse		Control	
			North	South	North	South
C ₀	1964	1964	1964		1964	1964
C ₁	1965	1965	1965		1965	1965
C ₂	1966	1966	1966	1966	1966	1966
C ₃	1967	1967	1967	1967	1967	1967
C _{3a}		1968				
C ₄	1968	1968	1968	1968	1968	1968
C _{4a}		1969				
C ₅	1970	1970	1970	1970	1970	1970

Pikine : For the sampling by building plots, the baseline listing was carried out in June 1966. The building plots of the older districts were re-examined in March and July 1967. For the sampling by blocks, the baseline listing was carried out in July 1967; the surveys that followed, in July 1968 and 1969. Each survey lasted approximately three months.

During these rainy seasons, the resident population was thought to be minimal. After 1970, the survey period was shifted to January-February, at which time the population was assumed to be at its maximal point.

6. Conditions in which the survey was carried out

The conditions varied with each survey, especially the circumstances relating to responsibility for the survey and its financing. The desire of various organizations to work together made it possible to continue the observations that their cooperation had made possible in the first place.

Sine-Saloum : The Statistical Services of Senegal were in charge of the first two rounds, O.R.S.T.O.M. for the following rounds. Financing was carried out by two successive subsidies of 4,000,000 Francs CFA⁽¹⁾ from the

(1) Translator's Note : 1 Franc CFA = 0.02 French Francs (01.01.1970).

French National Fund for Aid and Cooperation and later by a subvention of the World Health Organization, the remainder of the financing done by the Statistical Services of Senegal and later O.R.S.T.O.M. Both I.N.S.E.E. and I.N.E.D. also collaborated in the processing.

Khombol-Thiënaba : Three organizations took part in the survey in addition to the first two just mentioned - the Statistical Services of Senegal and O.R.S.T.O.M., as well as the Department of Social Pediatrics of the University of Dakar. Technical guidance was provided by O.R.S.T.O.M. Financing was provided by these organizations, I.N.S.E.E. helping in the processing.

Pikine : The baseline listing of the sampling by building plots was carried out in 1966 by I.S.E.A. (Institut de Science Economique Appliquée)⁽¹⁾ thanks to the help of UNICEF.

The costs of carrying out these demographic observations were taken up after by the three organizations which had worked together on the survey of Khombol-Thiënaba through 1968, with the added help of a subsidy of the Population Council in 1967.

After 1968 the survey became part of the programme of the National Committee for Social Welfare (Ministry of Planning and Social Welfare of Senegal), and was financed by O.R.S.T.O.M.

Staff

The initial planning and technical management of the three surveys was taken care of by one demographer from O.R.S.T.O.M.⁽²⁾ The other staff are described as follows :

- Controllers :

Sine-Saloum : two from the Statistical Services, each in charge of one zone.

Khombol : one from the Statistical Services, he later replaced by a controller from O.R.S.T.O.M.

Pikine : one from the Statistical Services or from O.R.S.T.O.M., aided successively by statisticians of I.S.E.A., I.N.S.E.E., and geography students.

(1) Translator's Note : Institute of Applied Economics.

(2) Reassigned by the United Nations to the Statistical Services of Senegal in 1962-1964.

- Enumerators : from the Statistical Services or O.R.S.T.O.M.; level between that of the "C.E.P." (certificat des études primaires) and that of the "B.E." (brevet élémentaire); on-the-spot training with some of the enumerators remaining to train those that came after.

Sine-Saloum : C₀, 10 enumerators; on the following rounds, 5 to 10. Average daily output on C₀ was 70 people interviewed; on following rounds, 100.

Pikine (in 1970) : a refresher course with daily checks for the enumerators proved to be necessary.

Equipment and resources

- Housing was set up in the centre of each rural zone.
- Transport was generally by 2 CV Citroen in the country, by bus in the cities.
- Distance from the capital, Dakar :
 - Khombol = 100 km.
 - Pikine = 10 km.

Working conditions of survey

Sine-Saloum : In the early stages, the population was told of the survey by the administrative heads of the arrondissements and by religious authorities, particularly on the occasion of meetings of groups of villages that brought together the various village heads.

The survey was in general well accepted, the hesitations of a group of villages of Paos-Koto eliminated after an appeal was made by political and religious leaders. In most cases, the suspicion with which the population looked on the census (considered to be for tax purposes) disappeared on the following round, when the families saw that the survey had nothing to do with their finances.

It is the Wolof language, which is understood in all areas, that has been used. Some enumerators also speak Serer and Peular.

Khombol-Thiënaba : The population learnt of the survey from those in charge of the Centre for Rural Health.

In general the enumerators were well accepted. The population's hostility to visits of the medical staff had no effect at all on the reception given the enumerators.

Wolof is the language understood in the entire border area, which separates Wolof-speaking from Serer-speaking areas. Many Serer villages are, moreover, becoming Wolof-speaking. Some enumerators however do speak Serer.

At the beginning of the survey, checks were made once or twice a week by the director of the survey.

Pikine : At first the survey was not as well accepted here as in rural areas. The head of the household often away during the day, the enumerators switched to evening hours, working most often on half-days.

In each arrondissement, a representative of the government helped by getting in touch with the district heads, who in turn contacted the heads of building plots.

7. Survey techniques

Population and reference events : It was the de jure population which was studied in this survey.

In Sine-Saloum, during the baseline listing, visitors and residents who were absent were recorded, but because of the distorsion due to under-recording (this varying with the enumerator), visitors were no longer recorded in the counts made at later dates.

In Khombol there were forms for each person, this only to make it easier to record visitors and to help verify residences during subsequent counts.

In Pikine, on the other hand, where changes of residence were much more frequent, particular attention was paid to both de facto and de jure populations.

For the events "births", "marriages", "deaths", only the de jure populations were considered in the three surveys.

The documents used

1. General questionnaire

Different styles evolved as a result of experience that had been gained or because of special circumstances. In each case, though, it was printed on one sheet of stiff paper, so as to be handled easily in the field on successive trips and during the processing that followed.

The first survey, in Sine-Saloum, was meant in the beginning to include only two rounds. The format chosen was therefore a multiple household form (32 x 34 cm.).

The front of the form includes two parts : the listing of members of the family and the events (births, deaths, marriages, changes of residence); new members of the household - births, immigrations, omissions - are added later. The other side of the form, meant for comments of the enumerator or controller, is left blank.

As the instructions were printed in a separate brochure given to the enumerators, it was possible to simplify labelling on the form without being unclear. Different coloured inks were used on each round so as not to mix up the counts. In spite of this very necessary measure of precaution, the fact that so many modifications were made on the next two rounds made it obvious that this format was inadequate for more than three or four counts.

For the other surveys, the format of "individual" forms was used, this first tried out in the region of Khombol-Thiéna. As only children (0-14 years of age) were to be studied, the format adopted was of an even smaller size (12,5 x 7,5 cm.). There were two sections on the front : the identification on top, a space left for three successive addresses at the bottom. The reverse side was lined (one for each visit) and description of the characteristics studied.

This type of form proved to be as practical for the field work as it was for processing. It was then used for entire population - children and adults - something which made it necessary to add information about marital status. The format of the individual forms was modified as a result (13.5 x 11 cm.) and this was used in the rural survey of Sine-Saloum on two very well-defined groups of the village and in Pikine.

The special problems arising in an urban background led to the listing of information concerning, in particular, the length of residence, education, employment. A new format adapted to this additional questions was therefore devised (21 x 13.5 cm.).

It seemed, in short, that for surveys including more than three or four rounds, two types of individual forms could be used - one for the cities, the other, simpler, for rural environments.

2. Other documentary records

The following documents, also used, will be briefly discussed below :

- 1) Forms on internal migration.
- 2) Forms on births, deaths, and marriages.
- 3) Fertility forms.
- 4) Prenatal forms.
- 5) "Village ledgers".

1 - Forms on internal migration : used in Sine-Saloum to check migrations within this area at the place of destination. The same process was used in Khombol-Thiënaba, but the use of individual forms made it possible to avoid using a special form. When there was an internal migration, the individual form was simply sent to the new residence. If a new count had already been made here, a form existed for the immigrant. Comparisons were made and only the older form was kept.

In order to make manual processing easier, a control form, in a different colour, was tentatively kept in the migrant's "source" town to record the departure. This precautionary measure turned out to be unnecessary when processing punched cards.

This type of check could not be carried out in Pikine, where a sampling of the population was taken and where sampling units were relatively small (blocks of 100 people).

2 - Forms on births, deaths, and marriages : These were used only at the beginning of the survey in Sine-Saloum, one for each event. After the first yearly cycle, they were no longer used, repeating as they did information found on the general questionnaire.

3 - Fertility forms : After the third round in Sine-Saloum, they were used to help make comparisons of successive events in the life of one woman and in the lives of those of her children born during the observation period.

4 - Prenatal forms : for recording obvious pregnancies or those declared during a given round. These were followed up on later rounds.

At the beginning of the survey in Sine-Saloum, it was thought that women would react poorly to these questions of the enumerators, and for this reason such recording started only on the third round. The use of separate fertility forms was meant to make it possible to process them separately and easily.

In Khombol-Thiénaba, processing was all the simpler thanks to the individual forms. Each recorded pregnancy was registered on one of the regular forms (general questionnaire), with "pregnancy" indicated on the back. On the following round the forms could be grouped together for independent surveys and to discover why certain deaths at an early age had not been declared.

5 - "Village ledgers" : a ledger was given to the head of the village for him to record all the births and deaths that he knew about in the village. These records were kept with several different aims in mind :

a) To help record the exact dates of events occurring in between two rounds and to limit the number of omissions of deaths at a very early age.

b) To compare at some future date the information given by the village head with the data that the enumerator gathered independently. In such a case, the ledger would have been collected beforehand by the controller before the enumerator's round (this was done in Sine-Saloum).

c) To improve the official registry of vital statistics at the local level. The design of the ledger was arrived at empirically. At the time of the baseline count in Sine-Saloum, a ledger was given to the head of each village. The ledger, the same type as the copy-book used in schools, was blank, with the pages at the beginning kept for births, the pages at the end for deaths. The head of the village was asked to record the events according to whatever system he liked. Following this one year trial period, a more substantial and printed ledger was prepared with its wording inspired by the listings of the trial period.

The entries were as follows :

Births

On the date of _____
Was born _____
Son of _____ and _____
at (exact location) _____ in (locality)

Stamp of the Official Registry
of Vital Statistics

N° of this document

N°

Deaths

On the date of _____
Died _____
Son of _____ and _____
at (exact location) _____ in (locality)

Stamp of the Official Registry
of Vital Statistics

N° of this document

N°

This ledger was thirty-two pages long (twenty pages for births, twelve for deaths), each separated by stiffened paper (the cover too is in cardboard). Four events were planned for each page; the ledger book, when completed, included 80 births and 48 deaths. It could thus be used for a period of two years in villages of 1000 people. In general, a new ledger is not issued on the first day of the new year, and the ledgers are kept in the villages, unlike the official records of vital statistics. Space was left to record the numbers assigned by the official registry of vital statistics.

These records served as a sort of connection between the village and the official registry of vital statistics. The head of the village who was in charge of the ledger, either recorded directly himself (or had someone else record) - in the language and form of writing that he chose - vital events as they happened, day by day. Then, at least once a month (one month was the time limit for declaring such events in the country) the village head went to the centre where the official registry of vital statistics was kept, preferably on a weekday agreed upon in advance, the day on which official declarations were made. The ledger serves as written evidence. Official certificates were then written up by the official at the registry of vital statistics, and the appropriate birth or death certificates were given to the village head, who distributed them to the people concerned.

These ledgers were used in the areas of Sine-Saloum and then in Khombol-Thiénaba.

This scheme was in fact only partially useful, for it could be used only where there was someone who could keep the ledger. Moreover, omissions in registrations continued to be made, especially in the larger towns, where dwellings were not necessarily concentrated in one district. It was possible, though, to use the method of Chandrasekhar and Deming to verify the results.

Operations in the field

Sine-Saloum : Operations were carried out in the following order :

- Baseline count (= C_0).

- . List of plots and map of city.
- . Count made by the enumerator in each plot.

- During the very first annual cycle, the controller made his rounds quarterly but only in the villages and small settlements. Then he recorded births and deaths, each event reported on a separate form, this information obtained from the village ledgers and from whatever other sources the controller discovered.

Because numerous omissions were discovered on the following round in the information given by the families (in comparison with the information obtained by the enumerators in the plots)⁽¹⁾, these rounds by the controller were no longer made in the next two annual cycles.

- Counts that followed (C_1 , C_2 , C_3) :

- . Count of people previously recorded (residents, people who had emigrated, died).
- . Registration of the new people in the plot (births, immigrants, previous omissions).
- . Check of those who had emigrated.
- . During C_1 and C_3 , prenatal questionnaire, with a follow-up on pregnancies reported in C_3 .
- . During C_3 , a separate comparison with the village ledger.

(1) Births : Niakhar = 20 %; Paos-Koto = 10 %. Deaths : Niakhar = 7 %; Paos-Koto = 29 %.

These studies were momentarily halted in 1967 because of a lack of money.

In 1968, the final revision of the fertility forms, of lists of cohorts of children, and of follow-ups of pregnancies, was carried out. Moreover, it was at this time that the study of the entire population was limited to a group of villages in each area.

The parallel study of the efficiency of the official registry of vital statistics was continued. The efficiency of centres in areas covered by the survey was improved, and new sub-centres were set up in 1966 and 1967, so as to have a centre in each group of villages (4000-5000 people).

To set up these centres, the controller of the survey, with the approval of the local prefecture, asked for the cooperation of a local government official) a primary school teacher, a nurse, a director of the agricultural cooperative. Afterwards he arranged a meeting of the village heads in the jurisdiction of the centre. At these meetings, the controller explained the value of a necessity for these declarations, and gave an officially signed register and stamp to the head of the centre. He had this official and the village heads agree on a weekday on which declarations had to be made. Last of all, he began to record in the register the events of the previous month listed in the village ledgers that had been brought for the occasion.

During the controller's quarterly rounds and as part of the survey, he gave a small grant to the local official in charge of the centre for vital statistics, so as to learn whether this added inducement would have any effect on improving registration.

Khombol-Thiénaba : The operations in the field proper were the same as in Sine-Saloum. In addition, during the baseline count, the MCW records available were used to help list dates of birth with greater accuracy. On the following rounds, the forms written up by enumerators were compared with those forms used for prenatal medical visits in Khombol that were available, after these had been classified by village and the plots located.

Starting in 1966, prenatal forms were filled in by the enumerators, the results of the follow-up of pregnancies indicated on the following round.

Checks of changes of residence were made at both ends, not only at the destination - as in the survey of Sine-Saloum - but also in the "source" town.

Pikine : No special remarks need be added to those already given in preceding paragraphs.

8. Processing. Analysis

In general, the tallying was done manually, the transcription of data and the checks carried out by the enumerators and controllers taking part in the survey. Processing was done either manually or by using punched cards.

Manual processing was used especially in the survey of Khombol-Thiénaba. It had been designed, in fact, to serve as a convenient way of calculating death rates for nurses or social workers assigned such functions. Two forms were planned for this (see appendix) :

- tallying sheets, so as to keep up-to-date the listings of people by age;
- calculating forms, for figuring death rates (used as a gauge of the level of health and sanitary conditions).

In spite of the fact that this method of calculating was relatively simple, it turned out that the staff that had been expected to use it, could not. On the other hand, though, this same staff could undoubtedly take care of coding, which is part of the preparation of punched cards. All the data were recorded on punched cards in 1969 and 1970, that is, at the end of the survey. The punched cards were processed for various studies, depending both on what was needed for the analysis and on the financial resources of the moment.

Follow-up surveys make possible cross-sectional and longitudinal analysis. Longitudinal analysis requires that a permanent identification number be given to each person and that these be kept even when there are changes in residence, so that changes and "events" in a person's life might continue to be noted. This type of analysis, however, is hardly worthwhile unless the observation is carried out for some period of time.

At the beginning of the survey in Sine-Saloum, only one annual cycle was planned and a person's number was related to his residence (village, plot in the village, position in this plot). This made longitudinal analysis impossible when people moved, leaving open only the possibility of cross-sectional analysis by working from the inventory population on a given date and by studying the events occurring during a given period (this inventory includes listings of recent births and immigrants but does not include listings of recent deaths and emigrants).

At Khombol-Thiënaba, manual processing also made impossible a longitudinal analysis of cohorts.

Later on, a permanent identification number was given for the processing of fertility forms (mothers and children) in Sine-Saloum, for the forms on children in Khombol-Thiënaba, and for the forms in Pikine.

Two types of relationships were considered :

- relationships between individuals in the same biological family, for example;

- relationship between the events occurring to the same person during different inventories.

Relations between individuals were carried out by indicating on each person's card the numbers of the people to whom he was related and by listing the mother's number on the cards of her children. The gaps between two successive births can thus be calculated automatically. A wife is related to her husband in the same manner.

The relationships of events occurring to the same person varied as to whether the survey was open-ended, to be followed by other rounds, or closed.

The latter case posed no problem (see the model of "card file on children, Senegal", used in Sine-Saloum, for the children listed in the card file on "fertility" and "cohorts of children" and Khombol-Thiënaba).

In the case of a survey which was to continue, with the results presented after each round, it was necessary to plan the programme differently. Two types of cards were used, one for admissions and one for revisions. The admissions card were concerned with residents recorded in the baseline inventory; omissions later located; births; immigrants.

Each card includes, after the person's number, those identifying characteristics that don't change and those which can possibly change.

The revision cards include all changes in the features that are studied - some of these changes are permanent (death, weaning, tec.); others are not (marital status, residence, etc.).

This card includes three sections : the person's number; the code for the characteristic that has changed; and information on the feature in question (date, place, etc.). To better relate the individual to the members of his biological family, the following information was added for children, their mother's number; in couples, the number of the other partner, etc.

It was thus possible to add to the list of features identifying an individual those of generations preceding and following him, of his partner, etc.

Reference period : For the first annual cycle in Sine-Saloum, the first reference period used was the twelve months that followed the baseline count in each village; reference periods afterwards were of full calendar years.

The inventories of the population were obtained on 1 January of each year, the average population chosen being the arithmetic mean between the numbers at the beginning and end of the year in each age group.

In Khombol-Thiënaba, to avoid bias due to annual fluctuations and needless difficulties in calculations, the beginning of the observation period was made to correspond with the first of the year.

9. Results

The kind of data obtained

The information obtained about individuals - and most of this information can be used as variables in the analysis of the results - has been listed below in the overall summary.

To make the table easier to read, the particular uses of the data have not been specified; that is :

- the distribution of each variable;
- the relationships between variables;
- calculations (proportions, ration, etc.);
- data concerning groups (households, migrations, etc).

Table IV. Overall Summary of Data Obtained

	<u>Sine-Saloum</u>	<u>Khombol-Thiënaba</u>	<u>Pikine</u>
Date of the count (and nth round)	x	x	x
enumerator	x		
Locating the individual			
village group (or urban district)	x	x	x
village (or city block)	x	x	x
land allotment (or building plot)	x	x	x
household	x		
family name and first names	x	x	x
how related to head of household	x		
filiation (father, mother)	only in special surveys	x	x
sex	x	x	x
age	x	x	x
date birth reported to registry			
of vital statistics	x	x	x
place of birth	x	x	x
ethnic group	x		x
caste	in part		
lineage on mother's side	in part		
religion	in part		
residence (presence and absence from)	x	x	x
length of absence; location during absence	x	x	x
marital status	x		x
profession	x		x
employment			x
level of education			x
weaning	x	x	in part
measles	x	x	in part
omissions of individuals	x	x	x
Modifications			
pregnancy	x	x	
births (date and place)	x	x	x
(comparison with village ledger)	x		
(information on mother)	x		x
deaths (date and place)	x	x	x
(comparison with village ledger)	x		
(circumstances)	x	x	x
emigration (date and place)	x	x	x
immigration (date and place)	x		x
omission of one of these events	x		
marriage (
divorce) date	x	x	x
death of husband/wife (
employment			x
weaning	x	x	in part
measles	x	x	in part
vaccination	x	x	in part
retrospective questions			
marriage (
offspring) of women	in part		

Numerical results

We have listed below only selected results from Sine-Saloum and Khombol-Thiënaba. Significant results of the same sort are not yet available for Pikine.

Sine-Saloum

Table V. Selected rates in the region of Sine-Saloum

Rate (per 1000)	Niakhar				Paos-Koto			
	Total	1963	1964	1965	Total	1963	1964	1965
Birth	49.0	50.6	44.8	51.4	51.1	53.7	45.7	54.0
Fertility (15-49 years)	217	222	198	229	219	229	197	234
Death								
general	34.3	34.4	35.3	33.4	27.3	24.2	27.2	30.6
infant	170	157	197	165	129	107	156	127
1-4 years	108.9	111.7	112.2	102.3	81.1	65.1	77.6	103.7
Growth								
natural	14.7	16.2	9.5	18.0	23.8	29.5	18.5	23.4
by migrations	2.6	0.6	10.1	- 2.8	- 22.4	- 28.3	- 21.8	- 17.1
crude rate	17.2	16.8	19.6	15.2	1.4	1.1	- 3.3	6.3

The test of X^2 revealed significant differences between the death rate (1-4 years) in Niakhar (Sine) and in Paos-Koto (Saloum), this likely due to differences in economic levels.

Khombol-Thiënaba

Table VI. Death rates, 1-4 years (per 1000), in the region of Khombol-Thiënaba

	1964	1965	1966	1967	1968
Khombol (1)	(14)	31	66	48	
MCW	122	93	133	128	105
Measles vaccine		76	146	118	98
Male nurse (north)		112	149	179	
Male nurse (south)				176	
Control (north)		93	90	161	
Control (south)		95	196	127	

(1) The results of this study in Khombol in 1964 are very uncertain and they should thus be used with great caution.

There were obvious differences between the small centre of Khombol and the villages. During the entire period 1965-1967, the test of X^2 revealed significant differences between, on the one hand, the group MCW and the "measles vaccine" group, and on the other, the "male nurse" and "control" villages. For this same period, each year, there were also considerable differences in death rates for all the groups (Khombol included) but one (MCW), which would appear to have had better defences against hazards due to ecology. The great differences from year to year, it should be noted, appear to be related to agricultural production.

Table VII. Table of infant mortality (per 1000) in the region of Khombol-Thiénaba

	1964	1965	1966	1967	1968
Khombol	26	54	98	87	
MCW	139	175	204	175	170
Measles vaccine		104	132	107	88
Male nurse (north)		92	151	181	
Male nurse (south)				295	
Control (north)		118	89	182	
Control (south)		136	201	213	

The death rates listed above are not equally useful, since with annual rounds, the surveys were necessarily purely retrospective. The differences noted in one year were compared with what had happened to these pregnancies, the result of which was a follow-up observation.

Bibliography

Only the most complete works among the published reports (printed or not) on these surveys have been listed.

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P. Cantrelle, M. Diagne, N. Raybaud and B. Vignac, "Mortalité de l'enfant dans la région de Khombol-Thiénaba (Sénégal) 1964-1968 : Etude de facteurs de mortalité". Cahiers de l'ORSTOM, series "Sciences Humaines" VI⁴ (1969) 43-72.

B. Lacombe, B. Halley des Fontaines, J. Vaugelade, B. Vignac-Buttin, Résultats de l'enquête par sondage au 1/20° des parcelles de Pikine (grand-Dakar) Sénégal, 1966-1967. (Dakar : ORSTOM, January 1970).

FICHE DEMOGRAPHIQUE INDIVIDUELLE

M F

Prénoms : _____ Nom : _____

Père : _____ Mère : _____

Né le : -- -- 1 A : _____ Ethnie : _____

ADRESSES

Arr. Quartier : _____ Ilot/vill. : _____

Parcelle n° CF : _____

Arr. Quartier : _____ Ilot/vill. : _____

Parcelle n° CF : _____

Arr. Quartier : _____ Ilot/vill. : _____

Parcelle n° CF : _____

MARIAGE

Pr. Nom	N° mari	Regs.	Div. De.
Pr. Nom	N° mari	Regs.	Div. De.
Pr. Nom	N° mari	Regs.	Div. De.
Pr. Nom	N° mari	Regs.	Div. De.

I.S.P. 6815-68

DATE VISITE	PA V	ND I E	Sit. Mot.	DATE	LIEU	CAUSE OU OBS.	Ch

3. - INDIVIDUAL DEMOGRAPHIC FORM - SINE-SALOOM. WHITE - 11 x 13,5. PAGES 1 and 2

Prénom	Nom	M F
Père	Mère	
Né le	Lieu	
Arr	Dept	
	Région	
Ou Ilot Parc. CF		ETHNIE
Ou Ilot Parc. CF		Langues 1 :
Ou Ilot Parc. CF		2 :
		3 :
Mariages actuels :		Religion :
Rang :		(Socia) :
Nb. Tot. :		INSTRUCTION
Date d'Arrivée au lieu de Recensement :		Française P. L. E. Arabe : Ecole Corsan
Sit. / Logement :		Etudes et Diplômes :
Sit. / CF :		Décédé le
Sit. / C.M. :		à
		cause :

Date visite	Emploieur	P. A. V. S	Evénements nouveaux		Activité professionnelle				Observations	Chf
			N Dc Acch ¹ M D V Mg Prof	Date	Lieu	Profession	Sit. Prof	Lieu		

4. - INDIVIDUAL FORM . PIKINE . WHITE . 13,5 x 21 - PAGES 1 and 2

R. S. ENQUETE ETAT - CIVIL

FECONDITE (Femmes de 15 à 49 ans)

Prénoms : Nom : Père : Mère :
née le : à : Secco : Tim. Ethnie : Caste :

Adresses successives :

Villages : Secco : Concession n° : C. F. :

Epouse de : Nbr. ép. act. Tim/Ethnie Caste :
Résidant à : Secco : Concession n° C. F.

Remariage avec : Nbr. ép. act. Tim/Ethnie Caste :
Résidant : Secco : Concession n° C. F.

MARIAGE	Date visite	QUESTIONNAIRE RETROSPECTIF												
		DATE	NV	SV	D	M								
Célébration	DATE EVENEMENT													
Consommation														
Arrivée au foyer														
Divorce, veuvage														
Remariage														
Nom de l'enfant Sexe : Rang :	Date nais.	Lieu nais.	Date de visite :				Date de visite :				Date de visite :			
			En vie Résid.	Allait.	R.	Décès d.l.c.	En vie Résid.	Allait.	R.	Décès d.l.c.	En vie Résid.	Allait.	R.	Décès d.l.c.
Sx : Rang :														
Sx : Rang :														
Sx : Rang :														
Sx : Rang :														

d.l.c. = date, lieu, cause

Village :

Secco :

Strate :

Date de recensement :

Année étudiée :

Résidents habituels (visiteurs exclus)

Effectif au :				Age	Année de nais.	Immigrés		Emigrés		Décès	Bilan	Effectif au	Age
Initial	Omission +	Double -	Rectifié			Int. +	Ext. +	Int. -	Ext. -				
				N.D.									
				14									15
				13									14
				12									13
				11									12
				10									11
				9									10
				8									9
				7									8
				6									7
				5									6
				4									5
				3									4
				2									3
				1									2
				0									1
				X	X							C	X
Nais- sance chez :	Residente au moment de la nais- sance	Nais. Viv.	A			X	X					A + B	
	Immigrée après la naissance		X								B	0	
Ensemble A + B + C													

DECES

MOIS DE L'ANNEE

Age au décès	Ens.	J	F	M	A	M	J	J	A	S	O	N	D
0 mois													
1 mois													
3 mois													
4 mois													
5 mois													
6 mois													
7 mois													
8 mois													
9 mois													
10 mois													
11 mois													
1 an 0 m													
3 m													
6 m													
9 m													
2 ans 0 m													
3 m													
6 m													
9 m													
3 ans 0 m													
6 m													
4 ans 0 m													
6 m													
5 ans													
6 ans													
7 ans													
8 ans													
9 ans													
10 - 14													
Total													

CALCUL DES TAUX DE MORTALITE

Village :

Stratum :

Year studied :

Quotient Mortalité infantile = $\frac{\text{Décès 0 an} \times 1000}{\text{Naissances}} = \frac{\text{ } \times 1000}{\text{ }} =$						
Age (année)	Effectif au		Somme	Effectif moyen Somme/2	Décès	Taux pour mille $\frac{D \times 1000}{\text{Effectif moyen}}$
0 an						
1						
2						
3						
4						
1 - 4						
5						
6						
7						
8						
9						
5 - 9						
10 - 14						
0 - 14						

9. TALLY SHEET FOR CALCULATING THE DEATH RATE. WHITE. 24 x 27 cm.

Appendix

Special Fertility Survey

The continuous observations of the survey of Sine-Saloum yielded data on the interval between two successive normal births and the relations such has with the length of the nursing period or with the death of the child born just before or after the pregnancy in question.

A special survey was organized, its main goal being to get further details on this, by reducing the gaps between rounds to three or four months and by setting up new parameters, these related to the intervals between births : deaths in utero; resumption of sexual intercourse after delivery; duration of amenorrhea in the puerperium.

The survey was run by a demographer of O.R.S.T.O.M. and carried out with the help of a grant from WHO (Research Unit on Human Reproduction). The survey covered three samples of women (15-49 years old) in the geographic areas that had already been treated by a survey :

- Pikine : all the women in the sampling at the time this survey began (approximately 700).

- Khombol-Thiénaba : women of the commune of Khombol (roughly 700); women of the village group MCW (roughly 700).

- Sine-Saloum : women of the Peul ethnic group in some of the villages in the vicinity of Paos-Koto (about 400).

The survey was carried out by two teams of female enumerators of Senegalese nationality, one team for Khombol-Thiénaba, the other for Pikine and Paos-Koto, each team under the supervision of a sociologist.

Continuous observation was planned for three annual cycles, and got under way about January 1968. It was interrupted after one year in the Peul area of Paos-Koto because of the difficulties in hiring a female enumerator and after two years, in December 1969, due to circumstances having nothing to do with the survey.

Some retrospective questions made it possible to extend the observation period somewhat.

For this survey short questionnaires were used, one during the second round, covering the nature and extent of information, attitudes, and practices concerning fertility; the other, during the third round, covering the frequency of sexual intercourse.

Lastly, a short survey of girls aged 12-17, in the sampling of Pikine, made it possible to determine the average age of puberty (14 1/2 years).

The data were rapidly processed manually and are now being processed by a computer.

B - National Demographic Survey

1. Goals

The demographic data available on Senegal came mainly from the Demographic Survey of 1960-1961, the results of which, by extrapolations made each year, give regional and national population estimates.

The administrative censuses were not able to be used regularly by the Statistical Services. Moreover, these censuses were often incomplete and of varying value. Generally speaking, they indicated that the population had been rather regularly under-estimated. All of this is understandable when one realizes that these censuses were carried out primarily for the purposes of taxation, and that as a result, the under-estimation that was first noticed in the National Survey of 1960 and confirmed by the survey going on right now, indicates an attempt to evade taxation, especially by the rural population.

There are virtually no other sources of demographic data besides the administrative censuses. The official registry of vital statistics works well only in the cities, and even then, only more or less well (except, probably, for Dakar). There have been efforts made, in cooperation with the Ministry of Justice, which administers the official registry of vital statistics, to improve this, but much remains yet to be done.

Except for the limited data on these subjects furnished by the survey of 1960, there are no worthwhile data on migratory movements or employment. Confronted with this serious lack of data, the government of Senegal decided (during the World Population Census in 1970) to finance by a direct cash grant a national demographic survey which would make it possible to bring up to date various demographic data.

It should be noted that a survey covering several years was later proposed, so as to get more accurate information and to improve the official registry of vital statistics. The problem of financing remains, and for this, appeal must be made to outside sources.

The goals of the National Demographic Survey are naturally, above all, to yield demographic data on population structure, as well as on both natural (births and deaths) and migratory shifts.

But at the same time, when the cost of the survey was considered, it seemed desirable to take advantage of the occasion together additional information - on economic and social conditions and possibly on housing.

It was also necessary to reckon with the need to obtain information on the regional level, for the general data gathered could not satisfy the authorities, who intended to meet the needs of their administrations as well.

It was finally decided to carry out a follow-up survey. Practically speaking, this meant three rounds of six months each, this to study a sampling of about 150,000 people.

2. Range of study

The survey concerns the entire population of Senegal. On 1 January 1970, the population was estimated to be 3,822,000 people, these people living in the seven regions of Senegal.

	Population
Cap-Vert	693,000
Casamance	622,000
Diourbel	590,000
River Area	406,000
Eastern Senegal	177,000
Sine-Saloum	853,000
Thiès	<u>481,000</u>
Total	3,822,000

The population is spread over the country very unevenly. The density varies from less than 1 person/sp. km. in eastern Senegal to more than 100 people/sq. km. in the areas where peanuts are grown (Thiès, Diourbel, Sine-Saloum), and to nearly 1000 people/sq. km. in Cap-Vert.

The rural population is spread over about 12,000 villages, and the rate of urbanization has been estimated at more than 30 %.

In the River area, there is a nomadic population, the Peul, who are basically stockbreeders.

The population can be grouped under the following categories : urban population, living either in communes or in settlements of comparable size; rural population, scattered in the 12,000 villages of Senegal; semi-urban or semi-rural populations, with features intermediary between those of the groups mentioned above.

The population of Senegal includes foreigners (estimated at 47,000 people), primarily Frenchmen, the features of whom are quite obviously very different from those of the Senegalese.

3. Numbers involved

The sampling was random and included 277 clusters, that is, approximately 150,000 people (the average size of a cluster being 536 people), if the regular under-recording of the sampling frame, set up by using the data from the last administrative census, is not taken into account. One should, in effect, expect the real sampling to be at least 10 % higher than the theoretical sampling.

4. Method used in sample taking

The available sampling frame was set up by working from the information yielded by the administrative census of 1969-1970, this completed when necessary by rounds made in the heartland of Senegal and by rapid counts in some urban and semi-urban settlements for which no population estimates existed.

The entire country was split into seven strata corresponding to the seven administrative regions in order to be able to get the results by region easily, and then into urban, semi-urban, and rural strata - these defined as follows :

- Rural stratum : villages of 0 to 999 inhabitants;
- Semi-urban stratum : villages and cities of 1000 to 9999 inhabitants;
- Urban stratum : cities of 10,000 + inhabitants.

Table I. Division into strata of the population of each region

Region	Rural stratum Villages of 0- 999 inhabitants	Semi-urban stratum Villages of 1000- 9999 inhabitants	Urban stratum Communes of 10,000 + inhabitants	Total
Cap-Vert	"	"	581,000	581,000
Casamance	399,727	104,577	72,184	576,488
Diourbel	367,200	47,331	91,745	506,276
River area	180,479	97,542	81,204	359,225
Eastern Senegal	136,171	22,052	21,760	179,983
Sine-Saloum	494,571	103,693	96,330	694,594
Thiès	275,128	67,662	124,160	466,950
Total	1,853,276	442,857	1,068,383	3,364,516

It will be noted that the data indicated in this table show 12 % under-recording in comparison with the estimates finally adopted.

The total reference number was divided into clusters of about 500 inhabitants. In order to do this, the area units were made into survey districts, these bringing together the small villages of up to about 500 inhabitants (in fact, between 400-600). The villages of 500-999 inhabitants were kept as they were and divided into as many districts as necessary; communes (cities) of 1000 + inhabitants were treated as follows :

Villages of 1000 - 1249 inhabitants = 2 districts
 1250 - 1749 inhabitants = 3 districts
 1750 - 2249 inhabitants = 4 districts.

The demographers in charge wanted the choice of the number of test units to come as close to the optimum sample as possible. A number of survey districts were thus drawn proportionally to the population figures of the regions used for the sampling frame. Inside each region, the number of districts was then divided into rural, semi-urban and urban strata proportionally to the population figures of the respective strata.

Table II. Division of regional districts into strata

Region		Urban Stratum		Semi-Urban Stratum		Rural Stratum		Total Stratum	
Cap-Vert	Total number of districts	1021		0		0			
	Number of test districts		48		0		0		48
Casamance	Total number of districts	142		212		714			
	Number of test districts		10		14		22		46
Diourbel	Total number of districts	182		103		697			
	Number of test districts		12		7		23		42
River area	Total number of districts	162		192		326			
	Number of test districts		7		8		15		30
Eastern Senegal	Total number of districts	43		44		255			
	Number of test districts		3		3		9		15
Sine-Saloum	Total number of districts	198		205		885			
	Number of test districts		13		14		29		56
Thiès	Total number of districts	297		137		476			
	Number of test districts		14		6		20		40
Total	Total number of districts								
	Number of test districts		107		52		118		277

5. Duration of the survey

The survey is to include three rounds of six months each and it is so arranged that the first and third rounds will take place at the same time of year, at an interval of one year (15 May - 15 October 1970 and 1971). The households in the sample are visited approximately one year after the first round.

The first round began 15 May 1970 in the farthest regions, where winter sets in early and which are thus somewhat inaccessible.

Numerous problems, yet to be defined, will doubtless upset this timetable. It will then be necessary to solve these satisfactorily. These problems can be of various sorts. It is because of the notorious logistic problems that the success of a survey depends more on the conditions in which it is carried out than on the method used. One of these problems is the necessity to pay the survey's staff regularly (not always easy to arrange when the administration is involved). Others include bad weather, accidents, the illnesses which are difficult to avoid in the forgotten rural zones rife with numerous parasites.

6. Conditions in which survey was carried out

It was the Statistical Services (and in particular, the Division of Demography and Surveys) which was in charge of the survey. This was financed by a direct cash grant by the government of Senegal, which allotted 75 million francs to the programme, to be used over three fiscal years, from June 1969 to July 1971. The 75 million francs was divided in the following manner :

Staff	25,000,000
Equipment	30,000,000
Processing and Publications	15,000,000
Unforeseen expenses	5,000,000
Total	<u>75,000,000</u>

The staff of the survey included ten controllers and thirty Senegalese enumerators, with the running of the survey entrusted to two statistical engineers (also Senegalese), supervisors of the Division. Four foreign technical assistants helped as well.

The controllers have taken part in numerous surveys, demographic in particular, and are certainly most experienced in this area, especially in follow-up surveys. The enumerators were hired on the basis of a test equivalent to a sixth former's⁽¹⁾ level, though some of them have the "B.E.P.C."

The organizational chart that follows makes it possible to see clearly how the work was split up.

The staff finally selected had come through a series of eliminations. After the first of these, at the beginning of January, fifty applicants were trained for three days to make a count in the region of Cap-Vert, the only region, it so happens, for which there are few administrative data.

After the count, the 35 best enumerators were chosen for the training course proper. This took place from 30 April to 2 May, and consisted in theoretical training (lasting for two weeks) and written tests. Afterwards there was a test survey lasting about one week. It was after this training course and a week's rest, that the staff went into the field 10 May, the survey starting on 15 May.

There was some forgetfulness on the part of the enumerators, this attributed to the rest periods. At the beginning, the controllers found numerous mistakes in the questionnaires but rather quickly the quality of the information obtained improved.

There were in general no particular problems in interviewing, except for the usual difficulties in finding out ages, types of residence, etc. There were greater problems in finding villages, getting to them by car, finding petrol stations, etc.

There was also a big problem because of delays in the payment of the survey's temporary help, something which brought work in the field to a halt on more than one occasion. These delays came about from the inevitable slowness of administrative machinery, and it was for this reason that petty-cash funds, to meet the numerous expenses of field work, were also set up late.

It appears that in the future, thanks to a move by the ministry in charge, it will be possible to speed up these matters.

(1) Translator's note : 6th form in the French system, i.e., pupils 10-11 years old.

7. Survey techniques

The method used was that of follow-up surveys. Three rounds of six months are planned for the periods 15.05.1970 to 15.11.1970, 15.11.1970 to 15.05.1971, and 15.05.1971 to 15.11.1971.

Work in the field is supposed to be spread over the first five months of each period, the final month being used to make necessary revisions, to draft the lessons learnt during the round, and to better prepare the following round. It is also planned to give all the staff a week's rest.

So as to get as much value as possible from the survey, it was planned to add a survey on economic and social matters to the purely demographic part of the survey on the second round, and a questionnaire on housing on the third round.

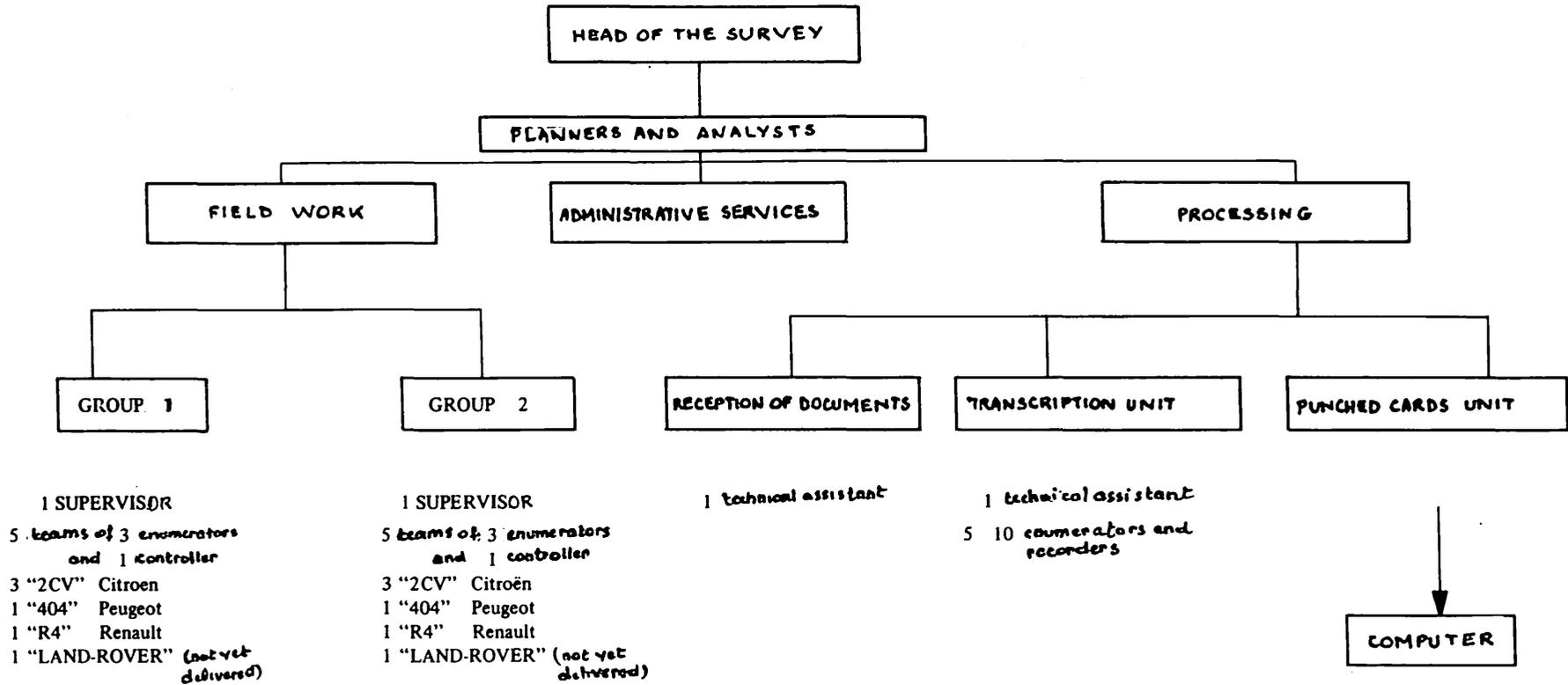
These questionnaires help break the routine of the three rounds. But it is necessary to pay attention so that the demographic part of the survey - which is most important - does not lose its central place.

The demographic survey proper includes two sorts of questionnaires : a questionnaire for households (called "DEM 1"); a questionnaire for women (called "DEM 2").

On the end paper of the questionnaire DEM 1 is given the geographic location of the household, the dates of the survey, and the names of the controllers and verifiers, with a retrospective summary of natural events occurring in the household in the preceding twelve months.

On the other pages, individual items of information about the members of the household is recorded. The information asked for is the type of information usually asked for. It should be pointed out that the first questionnaire had been intended to be used on four rounds, and not on three - as was the case finally - because of financial difficulties.

The questionnaire DEM 2 is to be filled in by all women 13 or more years of age who have been counted in the household during the first round. The demographic information to be collected concerns the marital status of the woman, and all the times she has given birth, whether or not the baby survived.



The questionnaire on economic and social matters, DEM 3, was designed for the second round; it is to be filled in for each person in the sampling; it includes information about the region, ethnic origins, languages spoken, level of schooling, economic activity, etc.

It was at first planned to carry out another round, not connected with the survey proper, this survey carried out by a different staff so as to control the information recorded by the survey's regular staff. This too expensive, it was finally decided to fall back on the information recorded in the ledgers of vital statistics which were kept by eminent figures in the villages, who received honoraria for their services.

This system might in the future form the basis of a permanent system of keeping the registers of vital statistics, something which after all is the ultimate goal of any permanently set up survey. It is obvious, though, that to extend the survey beyond the three rounds, outside financing is indispensable.

In any event, the two sources of information - the survey forms and the registers of vital statistics - should make it possible to verify the information to some extent, and to improve results considerably.

It was decided that on future rounds, different coloured inks would be used by the enumerators on each round : blue on the first round; green on the second, black on the third, etc. Verification was done with red ball-point pen. This method, which makes locating separate rounds easier, was already used during an earlier survey in Sine-Saloum.

8. Processing. Analysis

In the early stages, the three rounds will be processed by cross-sections, that is, separately. Processing of the first round should make it possible for a minimum of provisional tables to be prepared quickly, near March 1971 - something which would be very useful, as it is important to be able to give some results quickly to governmental authorities.

The events occurring in the twelve months prior to the survey and the information in the questionnaires on women, might serve as the beginning of longitudinal analysis.

As the enumerators return to work in the field with the same questionnaires (which have been transcribed in between the two rounds), the correction of mistakes noted during transcription or during the following

round will be indicated directly on the questionnaire. Correction cards will be used whenever necessary in future rounds.

The headquarters of the survey was able to use the services of card punch operators and one verifier for the processing. When these people were on holiday, the two IBM 360-40 computers of the Ministry of Finance and Economy were available.

9. Results

The first round should be completed at the end of October. The first results of the cross-sectional analysis of the first round should be ready about March.

DEM. 3RÉSERVÉ
AU BUREAU

1. NOM	PRÉNOM (S)	I. 4
2. MÉNAGE N°	3. LIGNE N°	I. 6 7
	PRÉSENT (E) <input type="checkbox"/>	M. 10
4. NATURE DE RÉSIDENCE	ABSENT (E) <input type="checkbox"/>	N. 13
	PASSAGER (E) <input type="checkbox"/>	R. 14
5. Date de naissance	(J) _____ (M) _____ (A) _____	A. 17
6. Lieu de naissance	_____	L.N. 19
7. Nationalité	_____	N. 21
8. Origine ethnique	_____	E. 23
9. Religion	_____	R. 25
10. Langue habituelle	_____	L.N. 27
11. Autre(s) langue(s) parlée(s)	_____	A.L. 31
12. Fréquentation scolaire	_____	F.S. 32
13. Niveau d'instruction	_____	N.I. 34
Personnes de 6 ans et plus	_____	
14. Type d'activité	_____	S.I. 35
Occupés et chômeurs	_____	
15. Profession	_____	P. 36
16. Situation dans la profession	_____	S.P. 39
17. Branche d'activité	_____	I. 42

 RÉPUBLIQUE DU SÉNÉGAL
 UN PEUPLE - UN BUT - UNE FOI
 MINISTÈRE DES FINANCES
 ET DES AFFAIRES ÉCONOMIQUES
 DIRECTION DE LA STATISTIQUE
DEM. 3

ENQUÊTE DÉMOGRAPHIQUE

1970 - 1971

QUESTIONNAIRE SOCIO - ÉCONOMIQUE

DISTRICT D'ENQUÊTE N° _____

MÉNAGE N° _____ LIGNE N° _____

RÉGION _____	VILLAGE _____
DÉPARTEMENT _____	QUARTIER _____
ARRONDISSEMENT OU COMMUNE } _____	RUE ET N° _____

OBSERVATIONS _____

DATE	ENQUÊTEUR	CONTROLEUR	VISA

Chapter 4

CAMEROON

Experiment in the recording of vital statistics
on a regular basis in Adamaoua

1. Goals

The follow-up survey carried out in Adamaoua from November 1965 to April 1968 did not aim to note demographic features of the populations living in this part of Cameroon, as this had already been done several years earlier by sampling⁽¹⁾.

In this pilot study, what was attempted was to gather, in a well-defined area, as much information as possible on the feasibility of follow-up surveys in an area in which regular data were lacking.

The main goals of the survey were as follows :

a) The accurate definition of the population of two cantons so as to compare the figures obtained with those given in the administration's recent census. The exact (and not estimated, as before) percentage of cases in which events were not declared in a limited area could thereby be determined.

b) The definition of births, deaths, and marriages occurring over a year, so as to calculate with perfect certainty the percentage of events recorded by the official registry.

c) The distribution of ledgers on villages, these ledgers meant to record immediately declarations of vital statistics in the aim of seeing whether the ledgers (where events could be recorded for no fee) were used more than the official registry (which was not free).

d) The gathering, by continuous observation, of as much demographic data proper as possible, some topics (marriage, divorce) never having been covered before in these areas.

e) A comparison of the traditional demographic data, collected by continuous observation, with those gathered during the baseline count(C₀) by retrospective questioning.

(1) Survey carried out by the Statistical Services of Cameroon and the technical assistance programme of I.N.S.E.E. in 1962.

f) The verification of whether such a method of regular or continuous observation enabled accurate studies of changes in migration to be made.

g) The calculation of the numbers of people intentionally not declared, or left out by mistake on the baseline count but recorded on the following rounds.

h) Making a minimum estimate of the costs of each operation.

i) Weighing the advantages and disadvantages of extending the use of such a system to areas that were even more outspread, by fixing the minimum estimated cost of such a programme. This was done with an eye to having such information available for governments that might be interested.

2. Range of study

The department of Adamaoua covers a surface of roughly 67,000 sq.km. and is on a volcanic plateau 1000-1400 metres above sea level, this in the centre of the Federal Republic of Cameroon (see Figure I). The geographic nature of the area makes it an important reservoir, and the main rivers of Cameroon have their source in these highlands. There are two clearly defined seasons (dry and rainy), these dividing the year into almost equal parts.

The average rainfall in the rainy season (which begins at the end of April) is about 1500mm., with the greatest rainfall in July, August and September. The average temperature during the year is about 23 degrees Centigrade.

In Adamaoua, the most important resource is in the herds of zebu, estimated at nearly a million head, which graze all year round in these vast natural pasturelands.

The variety of resources obtained from agriculture and from trees, because of the climate of the area, spare the inhabitants of the plateau the droughts which can hit the other areas of northern Cameroon, where the variety of crops grown is not as great.

The food supply in the region is well balanced, and needs only to be further exploited.

The 200,000 odd inhabitants that make up the population of Adamaoua are divided into the following ethnic groups :



▼

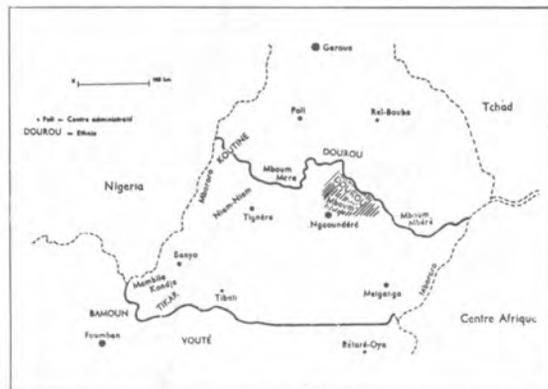


FIGURE 1 - SURVEY ZONE IN THE FEDERAL REPUBLIC OF CAMEROON

- The Foulbe, most numerous in the area, often sheperds. They have their own culture - Moslem in character - and this culture (language, way of life, religion) has growing influence in the region.

- The Mboum, the former rulers, overthrown in the nineteenth century by the Foulbe conquerors; there are only several thousand of them, spread widely over the territory. They are cultivators primarily, who in spite of social changes, remain very much attached to the chiefs of their various clans.

- The Dourou, most of whom emigrated from their lands in the Northern plain several decades ago. They are both excellent cultivators and skilled ironworkers.

- The Laka are the descendants of people captured during the last century who worked for a long time as servants in Foulbe families.

All of the populations of the plateau that have been listed above have adopted, in varying degrees, the Moslem way of life. There are, in addition, other ethnic groups (Baya, Niam-Niam, Mbororo, etc.) found in the plateau, but they are not found in the zone that was finally studied.

This zone is made up of two neighbouring cantons within the department, Mbang-Foulbe and Dourou Plateau, which cover a surface area of approximately 1000 sq.km. and include more than 15,000 people.

The two cantons include about sixty villages (three of which are administrative seats) which are located close to a carriageable dirt road. In the rectangle formed by this road there are only a few villages. Most of the land, especially that near the Bini River, which splits the region in two, is natural grazing land (see Figure II).

The two cantons were chosen for several reasons : the population density is greater here than it is elsewhere : the dirt road can be used in all seasons; different ethnic groups are represented; the official registry of vital statistics is practically nonexistent (because of this, the survey could test the use of the village ledgers without seeming to question the existing system); the possibility of working in well-defined cantons, as these might be the units used in future additions to the survey, if such a system is adopted.

3. Numbers involved

In addition to the entire population (15,303 people during the baseline count) spoken of, some samples of different populations (these of different levels of schooling) were formed primarily to test the use of the "village ledgers".

We will not take up here the work done in these complementary samplings (which do, however, appear in the total cost of the operations), some of which - the Dourou Plain, the Voko, the Kolbila - have also been studied in a follow-up survey.

The 15,303 people making up the main sampling (two cantons) fall into the following categories :

6924	Dourou (Plateau)
4329	Foulbe
1194	Mboum
666	Laka
2140	persons of mixed ethnic group (husband/wife of different ethnic groups),

as well as members of other ethnic groups who make up the remainder.

4. Method used in sample taking

No special method of sample taking was required as the two cantons had been thoroughly studied before.

5. Duration of the survey

The total amount of time spent in the field was thirty months, twenty-seven of which were devoted to the actual observation work, thereby bringing the reference period up to two full years. The rounds took place exactly six months apart in each of the villages that had been in the first count. A total of five semi-annual rounds were thus carried out : C_0 , the baseline count, followed by C_1 , C_2 , C_3 and C_4 .

A set of retrospective questions on events occurring in the twelve months preceding the survey was included in the baseline count, something which provided retrospective information for an additional period.

The timetable was as follows :

- C₀ - mid January to mid April 1966 (with retrospective questioning)
- C₁ - mid July to mid October 1966
- C₂ - mid January to mid April 1967
- C₃ - mid July to mid October 1967
- C₄ - mid January to mid April 1968.

6. Conditions in which survey was carried out

In charge of this pilot-survey was O.R.S.T.O.M., which was represented by a research worker from the Demography section of the Behavioural Sciences Unit. It was O.R.S.T.O.M., too, that financed the operation.

a) Costs

It had earlier been planned to cover more of the population, and if enough money had been allotted, all of the rural cantons of the arrondissement of Ngaoundéré (about 60,000 people) would have been studied.

After some hesitation, it was clear that the money allotted to the survey would make it possible for only two cantons to be studied.

Besides the main sampling, which has been described above, additional samplings were prepared for other purposes. The budget shown below covers all of the surveys.

Main sampling : 15,000 people included in C₀ and later C₁, C₂, C₃, C₄
(15,000 people x 5 rounds = 75,000)

Additional samplings	Number of people	Number of rounds	Total no. of individual observations
Dourou (Plain)	4500	2	9000
Voko	1000	2	2000
Kolbila	1000	2	2000
Niam-Niam	1000	1	1000
Mbororo	1000	1	1000
Mboum	1500	1	1500
Baya emigrants (Moslem)	1000	1	1000
Laka	1000	1	1000
Miscellaneous (not processed)	1500		1500
Total			95000

The number of individual observations is therefore about 95,000, and the money allotted should be taken to refer to this figure.

The expenditure of about 1,700,000 Francs (CFA), or 34,000 French Francs, in thirty months does not include the salary and lodgings of the demographer in charge of operations. (All other expenses - without exception - are included in this figure).

During the survey an extra long Land Rover was put at our disposal, this necessary in order to get about on the small local roads in all seasons. The total distance covered was about 35,000 km. If we add the depreciation of the vehicle (which for such a distance is about one quarter of the price), we come to a general total of about two million Francs (CFA), or 40,000 French Francs.

When divided by the 95,00 people covered in the visits, this budget comes out to 20 Francs (CFA) per person (= 0.40 French Francs).

Besides the equipment necessary for the enumerators' work (clipboards, forms, medicine, etc.), after the baseline count, each enumerator was supplied with a bicycle.

On the whole the operations were deliberately carried out economically, so as to yield estimates for future operational budgets that could be handled by African countries.

Table I. Breakdown of operational budget

Year	Staff	Petrol and lubricants	Maintenance repairs of vehicles	Miscellaneous camping equipment	Stationery stamps	Purchase of bicycles	Total
1965 (15.11 to 31.12)	27,500	13,055	19,158	28,170	20,555	-	108,438
1966	442,165	172,858	62,636	30,330	28,582	40,550	777,121
1967	326,490	179,372	84,481	37,550	22,500	-	650,393
1968 (01.01 to 18.04)	125,419	45,592	6,730	18,112	5,368	-	201,221
Total	921,574	410,877	173,005	114,162	77,005	40,550	1,737,173

Cost of two different expanded programmes

1 - Expansion of programme to the entire arrondissement, both rural cantons and urban settlements :

- For example, the arrondissement of Ngaoundéré :
 - rural sectors, approximately 60,000 inhabitants (official data),
 - urban sectors, approximately 20,000 inhabitants (official data),
 - Total (arrondissement) : 80,000 inhabitants.
- Duration : 2 1/2 years, with rounds every six months after C₀ (i.e., a total of five counts).
- Number of people interviewed : 80,000 x 5 rounds = 400,000 people.
- Estimated cost : 400,000 x 25 = 10 million Francs (CFA).
(The salaries and lodgings of two demographers are not included).

It would be good to allow for an additional six months of service by the staff after this period, to help the census-takers of the first administrative census (approximate cost, one million Francs CFA).

This would produce, finally, a total of eleven million Francs (CFA) (our figure based on the purchasing power and salaries of 1967).

2 - Expansion of the programme to fifteen cantons or parts of cantons (each including about 5000 people, thus a total of approximately 75,000) :

- Duration : 2 1/2 years, with rounds every six months after C₀ (i.e., a total of five counts).
- Number of people interviewed : 75,000 x 5 rounds = 375,000 people.
- Estimated cost : (Travelling expenses higher because of the greater distances between cantons. To provide some sort of check for this programme, it is necessary to count about thirty Francs more per person interviewed in the costs of such an extension) : 375,000 x 30 = 11,250,000.

To this figure, as in the programme just spoken of just above, one million Francs should be added to cover the salaries of the enumerators who would help carry out the census in the field.

Total : 12 million Francs (CAF).

With this programme, however, the supervision of two or three trained demographers would be absolutely necessary.

The costs of the two expanded programmes are very similar, amounting to eleven to twelve million Francs (CFA), (the salaries and lodgings of the people in charge not included.

b) Staff

It is necessary to consider separately the staff used in these operations during the baseline count and during successive counts.

During the baseline count, the investigator in charge had the help of team heads (who had already worked on surveys for four years) and seven enumerators.

For the later counts, besides the official of O.R.S.T.O.M., only one head of an interviewing team and two enumerators were used.

c) Hiring and training

During the period in which the amount of money to be allotted was not known, the following measures were taken so as not to delay the start of operations :

1 - Public notice of a month's training course to fifteen "students" who had sat a small preliminary test, this on the four basic arithmetical operations and on the description of traditional customs of the student's ethnic group in particularly "demographic" spheres (births, deaths, marriage; having a child, etc.).

During this training period, the students received 100 Francs (CFA) (- 2 French Francs), which could - depending on the local way of life - pay for their daily costs.

2 - The training period, which lasted roughly three weeks, was made up of three different parts :

- Basic demographic matters and the usefulness of surveys in rural and/or little known areas.

- Training the students to use the questionnaire of the baseline count (the longest to learn); practice in the use of symbols; practice filling in questionnaires.

- The way in which introductions to village heads, heads of districts, heads of households, should be made. Moral issues in the survey : intellectual honesty and honesty in other matters.

At the end of this training programme, after details on the amount of money available had been learnt, a final exam was used to find the seven best students, who were then signed up for the survey.

3 - Preliminary pilot experiment. Before going into the working zone proper, the new enumerators went through a dry-run in an urban section where they lived.

4 - A small second training period took place before the first round after the baseline count, in order to teach the enumerators how to fill in properly the parts of the forms that covered events taken place after the preceding round.

d) Reception of the population

The survey began in the administrative seat of the first canton studied, so that the head of the canton, also head of his people, could witness the operations for himself and see that the population was not at all troubled by them.

It was strongly emphasized that this survey was purely demographic, and was not to be confused with the usual censuses for purposes of taxation.

Village ledgers were distributed for demographic events to be recorded in the future. This too helped convince the population of the true goals of the survey.

With the help of the traditional chiefs it was possible to eliminate the reluctance of rural populations that is generally perceptible during censuses.

The mistrust felt when dealing with someone unknown was also reduced by the use of members of different ethnic groups. On the whole, in spite of the restraint of people in a few villages, the population was not too uncooperative during the baseline count, always the most ticklish moment of a survey.

On the following rounds, the reception of the population changed from one of restraint to one of general cordiality when it became clear that the survey had not done any harm - all the more cordial as we had distributed whenever possible seeds, seedlings of fruit trees, and had gone so far as to brighten up evenings spent in the villages in the bush country by showing how much young children enjoyed whipped egg whites (in quite a few traditional ethnic groups eggs are rarely eaten).

The obliging help of traditional authorities eliminated all sorts of problems, for people had been sent into the various villages to speak about and comment on what was going on in the administrative seats, and to say that the survey would later pass in these villages as well, where ledgers for vital statistics would be left off.

Near the borders separating cantons, it sometimes happened that villages of a neighbouring canton wanted to be included in the survey and ledgers to be set up there too.

7 - Survey techniques

A - Questionnaires and ledgers

Three types of documents were used to carry out this continuous study :

- A questionnaire connected with the baseline count (C_0), which included space in which the births and deaths of the preceding twelve months (retrospective questioning) were to be included. During this baseline count, a special questionnaire (for married women or women who had been married) was included to record the offspring of the women, marriage by marriage, as well as the names of those children still living.

It should be stated, too, that before the survey lists of the various districts of the village, and the heads of families in these districts, had been prepared.

- A questionnaire concerning the "new events", those that had taken place since the preceding round, used therefore in C₁, C₂, C₃ and C₄.

- A set of ledgers for the villages in which were to be noted the births, deaths, marriages, arrivals and departures taking place in the village throughout the entire period of the survey.

a) Questionnaires used in the baseline count (C₀)

* Family form (Appendix 1).

On this questionnaire, which follows the regular format in such cases, the enumerator was to record the names of all people regularly living in the "sare" (family dwelling) or having passed the preceding night in its limits.

This family form was given the same number as that appearing on the list of family heads in each district.

Afterwards, the different members of the family were recorded following a fixed order : the head of the family, his first wife, followed by her unmarried offspring, his second wife, followed by her unmarried offspring, then those of the married offspring who had remained in the family compound with their children, any older generations not yet listed, and other relatives, servants or employees, and lastly, visitors.

For each person the following information was listed :

- . family name and first name;
- . how related to head of family;
- . whether absent, present, or visiting during the enumerator's round;
- . ethnic group, sex, age, place of birth, marital status, profession, and as a marginal note next to the reference number, religion;
- . for people who were absent or visitors, the dates of departure or arrival were also listed, as were the place of destination or "source" village.

It was possible to list fourteen people on each family form, and when there were more entries than spaces free, a second family form was used for the same compound, the numbering of the family (15, 16, 17, etc.) continued on the second form.

At the bottom of the form were listed the births and deaths that had taken place during the preceding twelve months (this retrospective questioning forming part of the survey).

For each live birth was given the mother's number as listed on the family form; the baby's first name, sex; date of death, when appropriate; place of delivery (village or maternity clinic).

For each death, the name of the person was recorded and his relation to the head of the compound, his sex and age.

* Form used for married, widowed or divorced women (Appendix 2). On these were listed not only the information needed to identify the woman (village, district, number of sare, number on family form), but the total number of children still alive, marriage by marriage; the listing of children still alive and those having died, each sex listed separately; notice of stillbirths and miscarriages, each sex listed separately; lastly, when appropriate, the reason for the ending of marriage (death or separation).

Between each marriage a line was left for recording the lapse of time between the date on which the previous marriage had ended and the new marriage took place.

b) Questionnaire used on rounds following the baseline count - the follow-up observation proper (Appendix 3)

Separate sheets were placed alongside the right side of each family form (by a clip or rubber band around the clipboard) made it possible to record the changes occurring in a family after the baseline count.

This sheet could be used for three rounds (and if necessary, for three others, which would be printed on the other side).

It included two parts : on top (besides the usual references - village, district, etc.) were noted whether the situation of such and such a person on the family form (which could be found on the left) had changed or not since the last round.

The changes might have been due to a person's being listed as present when absent; being listed as absent when present; having died; having left the compound (temporarily or permanently). In all such cases, the date of the change was recorded as well as the appropriate place name (origin, place of death.)

When there have been deaths or permanent departures, the person concerned is crossed off the family form with a single stroke.

At the bottom of the form were recorded the names of new members of the compound, those who had settled in the compound since the last round, with a marginal note on the round on which they were first recorded, and indications as to the person's being either a new baby or a new adult arrival. Also noted were :

- . his relations to the head of the compound in the case of a new arrival, or the number of the mother for a new birth;
- . the sex, age of the new arrival;
- . the date of birth or arrival;
- . place of birth or "source" village;
- . a note indicating whether the new member had been seen by the enumerator or not (absence, departure, death).

It is here that could be located the child born or dead in between two rounds; in the case of absences, departures or deaths, the place where the person then was (or the place of death) was noted, as well as the date of departure, of absence, or of death.

Whether the new arrival was present or absent, a line on the family form was devoted to him so as to give the total number of people within a compound after each count.

To locate people more easily and to tell at a glance which additions have been made to what count, different coloured pencils might be used during the first three or four counts. It is obvious that the two questionnaires used (family form and "new events") make it possible to see at any time, and with accuracy, the precise makeup of the compound (a permanent census).

c) Village ledgers of vital statistics (Appendix 4)

These were formed of five different ledgers relating to the births, deaths, marriages, arrivals, departures, in the village since the baseline count (C₀). They were left off in all the villages studied. The ledgers consisted of numbered sheets on which the appropriate events were to be recorded. Copies of the forms "births", "deaths", and "marriages" can be found in the Appendix. It appears that information on the relatives (of the deceased, of the husband or wife) should be eliminated from the forms "death"

and "marriage", for experience has shown that this information was not regularly given by those making the declarations.

After each count, the head of the team compared the entry in the village ledgers with the events observed during the count just completed; he made additions to the ledgers when necessary.

During the pilot experiment, declarations for the ledgers were made freely, by either the person concerned or the head of the district. No receipt was given out after such declarations, and the entry was naturally free.

These two features clearly set off the village ledgers from the official registers of vital statistics, for which a stamp tax had to be paid before or at the time a receipt was issued for births and marriages (death certificates are issued by the authorities of Cameroon free of charge).

The village ledgers were entrusted to an unpaid "scribe" who was appointed by the head of the village. They were generally kept in French, except in one of the Foulbé villages where the village chief had made entries there in Arabic characters (no one in this village could write in French).

B - How the operations were carried out

After the enumerators had been trained, an operational timetable was set up :

- meeting of the official in charge of the survey with the head of the canton;
- enumerators were sent to the administrative seat;
- the first family counted was that of the head of the canton;
- each evening, for the duration of the survey, daily summaries were made to establish in what families new demographic events had been noted (the numbers of the compounds had been listed in a notebook);
- once the survey in this village was over, these summaries made it possible to see how often the village ledgers were used without going through all the forms. Additions could be made when necessary;
- each evening, the head of the team collected the forms used that day, and made whatever comments were necessary;
- on the following day, the head of the team checked the results reported for a given dwelling of his choice, after having given the enumerators the lists of sares to be covered that day.

- the official in charge of the survey stayed in the village for two or three days. The staff met each evening and checked the forms one by one. Ways of feeding the staff were worked out (and this problem is not always easy to settle);

- when everyone had been counted, the team moved on to another village, always following a timetable made in advance. For the baseline count, short distances were covered by foot, longer distances by car. During the rounds that followed, each enumerator had a bicycle to use and was free to get around as he chose after being taken to the area where he was to work.

- the village being interviewed and the official in charge of the survey kept in touch regularly. The official had the forms sent to him as soon as a village was finished to avoid loss or damage (from rain) and in order to be able to get on with the initial breakdowns necessary for the process of verification.

C - Difficulties encountered

a) In filling in the questionnaires proper

Those enumerators whose basic training courses were adequate were able to go about their duties the very first day.

It is a good idea, however, while the enumerators are being broken in, to watch over the quality of their written work. In the evening, poorly written forms should be recopied; families in which events cannot be explained normally should be revisited. During the first few days of the baseline count, explanations should be given regularly by the person in charge of the survey, either to the heads of the teams and to the enumerators, or to the population in general. It is also good to examine closely the accuracy of the daily summaries. The volunteer "scribe" should also be taught to keep the village ledgers accurately. Replacements for enumerators who are ill or whose work is unsatisfactory must also be ready at hand.

In general, most of the technical problems involved in filling in the forms were settled in the first fortnight, but there always remained some repeated errors which could be righted only by breaking down the questionnaires one by one and then making the necessary comments.

b) Difficulties due to local habits and customs

The greatest were :

- Determining ages and the period really meant by the last twelve months (in the retrospective questioning of the baseline count). Drawing up and distributing agricultural calendars or calendars of historical events did not enable one to hope for absolute accuracy in this area, even though making up such calendars was indispensable in some regions. Enumerators of the ethnic group in question should be used, as they are best acquainted with the tempo of local life and various social considerations that make it possible to determine ages with the greatest possible accuracy. Whatever measures were taken, there always were some mistakes about some out-of-the-way populations (though in the savannah, some Moslem groups knew their ages accurately). The importance of this matter must be emphasized often to the enumerators. Regrouping can be done quickly because of the average age of the mothers in a given year (generally close to 27-28 years in these parts of Black Africa, as elsewhere in the world).

If the average age is found to be 22 or 32 years, for example, after a thousand people have been tallied, you can be sure that the ages were reckoned very poorly and that it is necessary to start again. If you get 27 years as the result - as generally is the case - one can assume that the ages given are reasonably plausible, give or take a year. It is better, and sometimes essential, to do the processing by groups of five or ten years of age. There is, moreover, a specific case which shows that the use of groups of ten years of age was valid. In almost all the rural pyramids of Black Africa, there is a considerable amount of under-recording among females 10-19 years old, and this is not a coincidence. Rather, it comes about from the regular habit of the parents of omitting fiancées and girls of marriageable age.

- The residence of young mothers who go home to their parents before delivering and who stay there to nurse (during which time sexual relations are forbidden). The mother and child should be counted only in the compound they come from.

- Problems in contracting cultivators at certain times of the year, because of crops raised in rotation on burnt-out land, they live in the fields for at least a month, these in a radius of 30 km. from the village. The authority of a helpful chief can sometimes be all that is necessary to have them come back to their families for one or two days, for the sake of the survey

- The period of Ramadan can also account for delays in the tempo of work, as the Moslem staff are not supposed to eat or drink so long as a white thread can be made out from a black thread. With Moslems, a break must be planned in the afternoon, and work must be picked up again at night, when storm lamps can be used for light.

c) Material problems

Feeding enumerators and relations with populations : it was necessary to allow for some compensation to be paid to the families that provided the enumerators with their food (this is one of the most awkward matters to settle). Moreover, drinking water is often very dangerous. To avoid delays due to illness, water-purifiers must be given to enumerators.

Interference from other administrative operations : during the third count, the operations of the survey were somewhat disrupted by the territorial administration, which arrived in the same area the survey was working in, at the same time, this for the general census. Happily, after covering the first few villages, they ran out of questionnaires - for a month !

Dangers in the bush : there were serpents but the length of time that the survey was in the bush made it impossible to store the serum, which had to be re-grigerated. The "black stone", which absorbs the venom, could in such cases be very useful to the enumerators. This is popular among missionaries in the bush, who use it regularly when they cannot afford the expense of the serums.

Language used for the survey : four languages were used : Dourou, Foulfoudé (the language of the Foulbé, in general the lingua franca spoken with varying fluency) and French (used very little in the rural areas). The existence of these numerous languages made it necessary to have enumerators of all the ethnic groups studied.

Keeping the village ledgers : when they have been entrusted to a schoolteacher during the year, it is advisable to give them to the son of a local personality during the summer holiday (about four months). It should be kept in the chief's cottage so that an assistant secretary (and this must be thought of) can fill them in when the secretary is ill.

d) Changes made during the survey

Only one change was made in the original working plans. During the survey, two of the five village ledgers were eliminated. After C_2 , it was discovered that the ledgers of migrations (arrivals and departures) had very few entries. Rather than discourage the volunteer secretary by repeated complaints, it was decided to eliminate these ledgers, keeping only these which could be used in comparison with the official registry of vital statistics (births, marriages, deaths).

8 - Processing. Analysis

A - Tallying the questionnaires

The tallying was done manually by the research worker in charge of the survey, this for the purposes of verification and accuracy.

An experiment in coding was made with the local staff (level of schooling of the "C.E.P.") in order to set up at some future date processing by office calculators. This was finally given up because of the numerous mistakes this coding was responsible for.

It was only the manual tallying of the 15,500 people of the baseline count that was very tedious. This was done between C_0 and C_1 , with the result that all the forms were checked and tallied before the beginning of the observation period proper. The sars where questions arose were accordingly revisited and the interviewers saw that their forms were carefully checked. This took about three months to do, at the rate of two or three hours a day.

The tallying of the following round was also done by the official in charge of the survey. Such took a very short time to do. For a village of about 300 people, about thirty minutes were needed to record the demographic events that had taken place between two rounds, these six months apart. This could be done at the same time as collecting the relatively complex data about marital status, which was to be put in a table containing 1500 entries.

A system of tallying by punched cards was suggested in one of the reference works (see Bibliography).

B - Tallying the village ledgers

This was done by the head of the team. The tallying consists of recording every six months the number of events listed in the ledgers, after verification as to whether the events were indeed recorded by the survey.

At the end of the year, these were compared with the registers of the official registry (which were used for about 1-10 % of the cases in the two cantons in the experiment).

C - Analysis

1 - Besides the traditional demographic data analysed by the official in charge of the survey, some other interesting relationships were shown by the analysis :

- between the number of 0-14 years old and women married one time only;
- between the average number of inhabitants in a saré and the numbers of women married one time only;
- between the average number of marriages per married woman and the average number of inhabitants per saré;
- between the fertility indicator P_{0-4}/W_{15-49} and the index of relative polygamy;
- between the average number of children per woman and the fertility indicator P_{0-4}/W_{15-49} .

2 - A more detailed analysis of infant mortality was undertaken, including a biometric analysis of infant mortality, this confirming the alignment of Mr. BOURGEOIS-PICHAT; a definition of endogenous and exogenous mortality by graphs and mathematical calculations.

3 - Lastly, the analysis has shown most of all that series of indices move in parallel fashion in geographically homogeneous zones.

This information would make it possible to deduce from one index alone the basic demographic data (excluding death rates) of a given ethnic group.

The existence of similar relationships had been brought out by studies carried out by retrospective questioning between 1960 and 1965, these studies including fifteen different ethnic groups.

To give a better idea of this, we have shown below the features of four groups of populations that develop in distinctly different ways. All of these groups are found in the plateau of Adamaoua and they were studied either by follow-ups or by more standard procedure : 1st group, Dourou-Plateau, Mbororo, Niam-Niam; 2d group, Mboum, Foulbé, Dourou-Plain; 3d group, "mixed" groups (populations where the head of the compound and his first wife were of different ethnic groups); 4th group, Laka, formerly the servants of the Foulbé, displaced by the conquest at the beginning of the nineteenth century, subjugated ever since then (Table II).

Table II. Demographic features of four ethnic groupings in Adamaoua

Ethnic groups	Population structure				Marriage system		Fertility	
	Proportion under 14 years %	Proport. under 60 years %	$\frac{P_{0-4}}{W_{15-19}}$	N° of men per 100 women	Average N° of marriages per woman	N° of consec. wives per man	Average N° of children per woman	Index of relative fertility
Dourou-Plateau	44	4	0.81	103	1.43	1.96	5.4	0.14
Mbororo	48	5	0.85	117	1.48	1.91	5.1	0.15
Niam-Niam	46	5	0.80	113	1.48	2.07	4.9	0.15
Mboum	37	10	0.52	99	1.8	2.67	3.5	0.25
Dourou-Plain	36	11	0.55	99	1.6	2.23	3.9	0.27
Foulbé	37	10	0.51	39	1.8	2.58	3.5	0.29
Mixed groups	25	12	0.38	85	2	2.7	3.2	0.34
Laka	12	21	0.12	78	2.2	3	2	0.50

We can see here that the chains of indices for each ethnic group all change at the same time, this in such a way as to make it possible to approximate the indices of all the other groups by working from the figures obtained for one group. It appears that this type of linking exists only within homogeneous geographic zones, where climate and natural resources are similar. It should be noted that no index of mortality appears in the chains of indices presented here, mortality functioning independently.

In surveys involving more than one round, it is better not to begin analysis before having carried out the next two rounds, which reveal the people forgotten or undeclared during the baseline count (in the sampling here in question, 4 % of the total numbers involved were thus "retrived" within one year, 7 % of them Foulb ). It is this possible to avoid making the analyses a second time, as has appened to us.

9 - Results

It was stated at the beginning of this chapter that one of the goals of this pilot experiment was to collect as much demographic data as possible, as well as data that would make it possible both to improve the registration of vital statistics, and to estimate minimum costs of possible future extensions of the survey.

The overall summary below (Table III) presents the type of data gathered in these different areas, with indications as to whether the data came from retrospective questioning, from the baseline count, or from follow-up rounds. After this chart, we have listed some numerical results which concern only the groups here studied.

Table III. Overall summary of data gathered

	Results from			Results by ethnic groups
	Retrospective questioning	Baseline count (C ₀)	Regular observations	
Age pyramid and major groups of ages		x		x
Sex ratio		x		x
Miscellaneous sociological features (av. N° of residents per saré, profession, religion and schooling)		x		x
Marriage system				
N° of husband's wives living		x		x
N° of marriages of the women	x			x
Index of relative polygamy	x	x		x
Marriage rate			x	x
Husbands by age groups			x	x
Wives by age groups			x	x
Husbands by the N° of marriages			x	x
Wives by the N° of their marriages			x	x
Various indicators			x	x
Marriages by months of the year			x	
Divorce			x	x
Births - Fertility				
Index of relative sterility	x			x
Crude birth rates	x		x	x
Average age at motherhood	x		x	x
Fertility rates by age	x		x	x
Av. N° of children per woman	x		x	x
Variations in births by months			x	
Deaths				
Crude death rate	x		x	x
Death rates by age	x		x	x
Biometric analysis of infant mortality			x	
Survivorship ratio	x		x	x
Life-expectancy at 0-5 years			x	x
Variations in death rates by seasons			x	
Natural growth				
Crude rate of natural growth			x	x
Net rate of reproduction			x	x
Migrations				
N° of arrivals by place of origin and ethnic group			x	x
N° of departures by destination and ethnic group			x	x
Pyramid of ages of arrivals			x	x
Pyramid of ages of departures			x	x
Comparison of total mobility			x	x
Use of village ledgers				
Use of ledgers of births			x	
Use of ledgers of deaths			x	
Use of ledgers of marriages			x	
Comparison with the official registry of vital statistics			x	

a) Majors groups of ages (%)

0-14 years	36
15-59 years	58
60 + years	<u>8</u>
	100

b) Crude rates of marriage and divorce (per 1000), this following two years of regular observation

	<u>1st year</u>	<u>2d year</u>
marriages	22	23
divorce	9	10

c) Births, fertility (average over two years of observation)

Crude birth rate 29 per 1000
 Average age of women at motherhood 26 years 1 month

Age specific fertility rates (per 1000)

<u>14-19</u>	<u>20-24</u>	<u>25-29</u>	<u>30-34</u>	<u>35-39</u>	<u>40-44</u>	<u>45-49</u>
165	191	136	98	61	29	13

N° of children born per 1000 women 14-49 years old 363

d) Deaths

General crude death rate (per 1000)

	<u>1st year</u>	<u>2d year</u>
Total	22	21.5
Men	23	23
Women	22	20

Rate of infant mortality (average over two years) 161 per 1000

Age specific death rates for the last two years of real observation (per 1000)

	<u>1st year</u>	<u>2d year</u>
1-4 years	24	28
5-9 years	7	6
10-19 years	5	7
20-29 years	8	6
30-39 years	11	13
40-49 years	16	13
50-59 years	21	16
60-69 years	37	39

Survivorship ratios

	<u>1st year</u>	<u>2d year</u>
Average life span	49 years	45 years
Life expectancy at birth	43 years	40 years
Life expectancy at 5 years	50 years	49 years

e) Growth

Rate of natural growth	8 per 1000
Net rate of reproduction	1.174
Real rate of natural growth (rate of Lotka)	6 per 1000

f) Migration (per 1000 residents)

Outgoing population	20
Incoming population	18
Total mobility	38

g) Use of village ledgers compared to that of the official registry of vital Statistics (for events actually observed; average over two years)

	Official registry of Vital statistics (1965)	Village ledgers
Births	2 %	52 %
Deaths	11 %	43 %
Marriages	1 %	27 %

Bibliography

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FICHE FAMILIALE du saré N°

(y inscrire toute personne vivant habituellement dans le saré, ou ayant couché la nuit précédente dans le saré)

Village :
Quartier :

INVENTAIRE DE BASE I₀

Enquêteur :
Date :

N°	Nom. prénoms	Relation avec C, S	Pr Ab Vi	Ethnie	Sexe	Age	Lieu naiss	Sit Mat.	Profes.	Si Ab. Date	ou Vi Lieu
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											

NAISSANCES ET DECES survenus
durant les 12 derniers mois

NAISSANCES VIVANTES (enfants ayant crié)					
N° mère	Prénom BB	Age BB en mois	Sexe	si dce date	Lieu acc

DECES		
Nom	Rel. avec CS	Sexe Age

POUR CHAQUE FEMME (mariée, divorcée ou veuve) DE 14 ANS ET PLUS

Village :
 Quartier :

Saré N° :
 N° familial de la femme :

	Age	Enfants nés Viv		Actuellement				Morts-nés (pas crié)		F. C.		Cause dissolut mariage
		M	F	Surv.		Dcd		M	F	OUI	NON	
				M	F	M	F					
1er mariage												
Intervalle..... 2ème mariage												
Intervalle..... 3ème mariage												
Intervalle..... 4ème mariage												
Intervalle..... 5ème mariage												
Intervalle..... 6ème mariage												
Intervalle..... 7ème mariage												
Intervalle..... 8ème mariage												
Intervalle..... 9ème mariage												
Intervalle..... 10ème mariage												
Total général												

Observations particulières

2. - FORM FOR WOMEN MARRIED, DIVORCED, OR WIDDED. 14 YEARS OLD OR MORE.
 WHITE. MIMOGRAPHED. 21x27 cm.

NAISSANCE N°.....

Village de, le 19.....
EST NE VIVANT AU VILLAGE DE, le 19....., à H

L'enfant dénommé :

NOM : Prénoms :
du sexe :

dont le père est :

Nom et prénoms :
Ethnie ou race :
Date de naissance ou âge :
Lieu de naissance :
Profession :
Domicile :

et la mère est :

Nom et prénoms :
Ethnie ou race :
Date de naissance ou âge :
Lieu de naissance :
Profession :
Domicile :

Date et heure de la déclaration : le 19 à heures

Nom, prénoms et domicile du déclarant :
.....

Nom du secrétaire :

DECES N°

Village de, le 19

EST DECEDE (E) au village de, le 19 à H

Nom :

Prénoms :

Sexe :

Ethnie ou race :

Date de naissance ou âge :

Lieu de naissance :

Profession :

Domicile :

Cause déclarée du décès :

Parents de la personne décédée :

Père : Nom et prénoms :

Date de naissance ou âge :

Lieu de naissance :

Profession :

Domicile :

Mère : Nom et prénoms :

Ethnie ou race :

Date de naissance ou âge :

Lieu de naissance :

Profession :

Domicile :

Date et heure de la déclaration : le 19 à Heures

Nom, prénoms, âge et domicile du déclarant :

Nom du secrétaire :

MARIAGE N°

Village de :, le 19

SE SONT MARIÉS le 19, au village de

EPOUX : Nom et prénoms :
Ethnie ou race :
Date de naissance ou âge :
Lieu de naissance :
Profession :
Domicile :
Nombre d'épouses actuelles (y compris l'épouse ici désignée) :

<u>Parents de l'époux :</u>	<u>Père</u>	<u>Mère</u>
Nom et prénoms :
Ethnie ou race :
Date de naissance :
Lieu de naissance :
Profession :
Domicile :

EPOUSE :Nom et prénoms :
Ethnie ou race :
Date de naissance ou âge :
Lieu de naissance :
Profession :
Domicile avant le mariage :

S'il y a lieu :
- Nom, prénoms et domicile du précédent mari :
- Date du précédent mariage :
- Cause de dissolution : Divorce ou décès du conjoint

<u>Parents de l'épouse</u>	<u>Père</u>	<u>Mère</u>
Nom et prénoms :
Ethnie ou race :
Date de naissance :
Lieu de naissance :
Profession :
Domicile :

Date et heure de la déclaration : le 19 à Heures

Noms, prénoms, âge et domicile des témoins du mariage :
1.....
2.....
Nom du secrétaire :

Chapter 5

MADAGASCAR

The experiments in Ambinanitelo and Ankazoabe

1. Goals

Data concerning population shifts in Madagascar come from several sources :

- the official registry of vital statistics;
- the demographic survey of 1966 (traditional survey by sampling, with a retrospective questionnaire);
- the administrative censuses, which made it possible to follow population shifts from one year to the next. These were carried out both on the national and regional levels (province or sub-prefecture) or in the various urban centres.

A critical analysis of these sources has revealed their inadequacies, and even the data of the 1966 survey, which appear to be most accurate, must also be verified and added to. Moreover, knowledge of migratory shifts is still sketchy. Lastly, according to the cross-checks of the official registry of vital statistics that have been made, the registry functions more or less as it should, 80 % of the births reported, 50 % of the deaths. However, these general figures have to be made more specific and persistent gaps discovered so that ways to improve registration can be found.

It was these findings that made clear the need for a survey that would give in detail the levels of births and deaths, and the general tendencies regulating these phenomena; migratory shifts; the causes and extent of under-recording at the official registry of vital statistics.

The scheme most suitable for reaching these three goals appeared to be a follow-up survey carried out over one or several years on a national sampling that included several communes in their entirety, where the results obtained could be compared with those of the official registry.

Before launching the survey itself, the methodology was to be worked out in the light of the experiments carried out along with the two censuses, one of these by the Institut National de la Statistique et de la

Recherche Economique (I.N.S.E.E.)⁽¹⁾, this in Ambinanitelo in 1967-1968, the other, by the same group in Ankazoabo in 1969-1970. These are the two experiments described here. The lessons of these experiments should help set up later a national survey of the same type.

The experiment in Ambinanitelo was very quickly organized, without having received the fullest consideration beforehand. It was carried out with little financial help. It is being analysed in this work primarily because the lessons learnt in this experiment were very useful in planning the experiment in Ankazoabo (where the second experiment differs from the first, it was the criticisms of the first survey that explain the changes made). Moreover, some of the studies carried out in Ambinanitelo were thought to be very interesting and worth developing in Ankazoabo, where processing will not begin until early 1971.

2. Range of study

1 - On 1 January 1970 Madagascar is supposed to have had 6.7 million inhabitants, spread over a territory of 586,000 sq. km., this divided into six provinces, including eighteen prefectures, 93 sub-prefectures, 780 communes and 25,000 villages.

The general features of the sub-prefectures, communes and villages are as follows :

	<u>Sub-Prefecture</u>	<u>Commune</u>	<u>Village</u>
Average population (inhabitants)	72,000	8600	265
Average area (sq.km.)	6,300	750	-
Average number of villages	272	31	-
Average number of communes	8.4	-	-

2 - The two experiments covered, firstly, the commune of Ambinanitelo, in the sub-prefecture of Maroantsetra (province of Tamatave), on the eastern coast of the island; secondly, the sub-prefecture of Ankazoabo, in the province of Tuléar, in the southwestern part of the island (Figures I and II). The features of these tow areas are the following.

(1) Translator's Note : = National Institute of Statistical and Economic Research.

	<u>Commune of Ambinanitelo</u>	<u>Sub-Prefecture of Ankazoabo</u>
Population (inhabitants)	14,396	24,313
Area (sq.km.)	1,400	7,436
Number of villages	28	200
Number of communes	1	4

A comparison of the two tables reveals that the commune of Ambinanitelo is rather important, both in size and population, with a population density slightly lower than average on the island (10.3 people/sq.km. rather than 11.4), and that it is made up of big villages (average size of villages 514 people). The sub-prefecture of Ankazoabo has a smaller population but its area is larger than average; its population density is low (3.3 inhabitants/sq.km.) and it is made up of small villages (average size, 122 people).

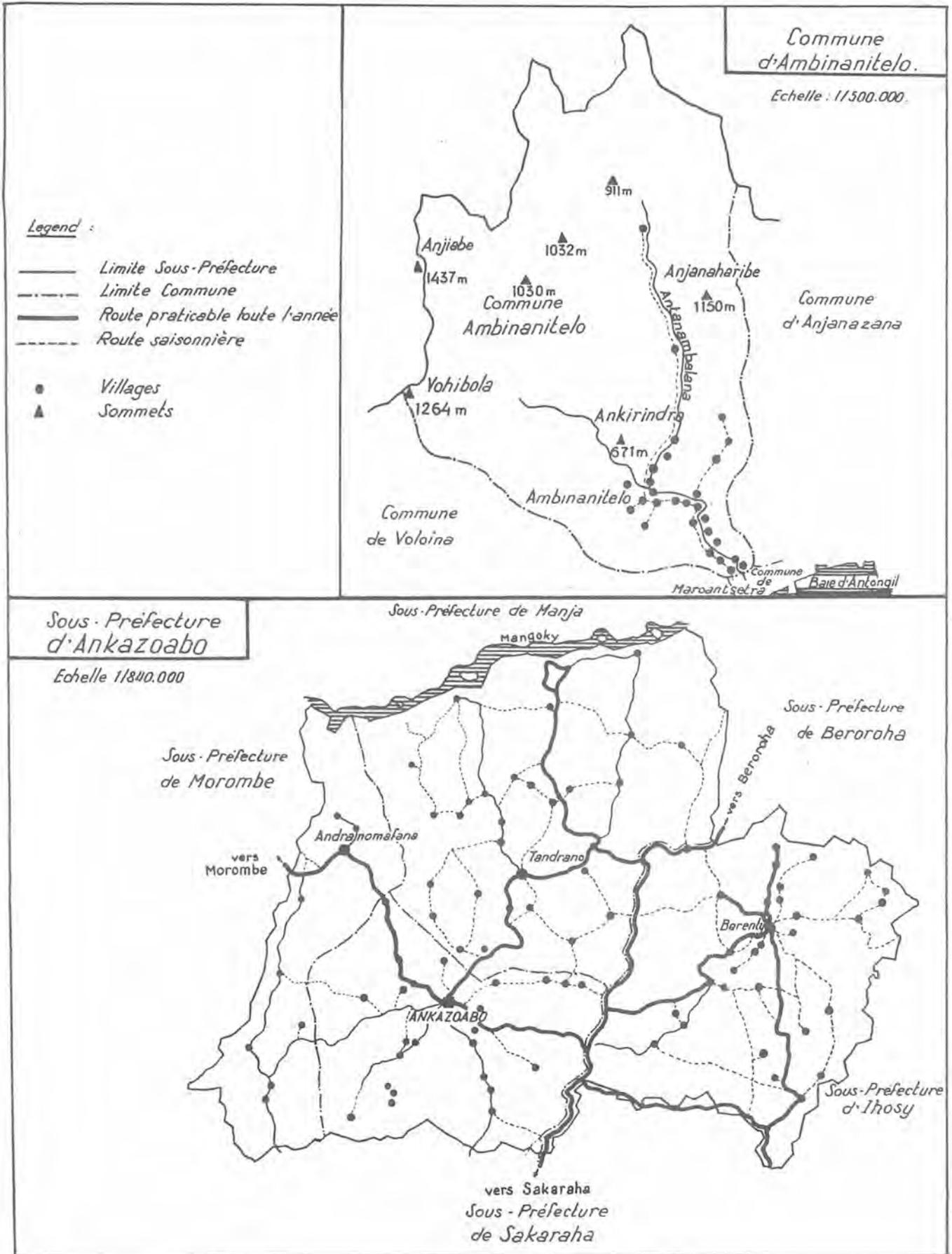
3 - a) The commune of Ambinanitelo is located on the eastern coast of Madagascar, at the end of the Bay of Antongil. It is the wettest area of the island, with 3,850 mm. of rain per year, this on 262 days of the year. The hot and wet climate prevalent most of the year is responsible for the lushness of the vegetation. Practically the entire commune is covered by dense forests. It is, moreover, a region which is very isolated, living apart from the others and accessible to Tananarive only by a difficult dirt road.

The population lives mostly in the valleys, where the alluvial soil is very rich. The main crops are rice, cloves, coffee and vanilla. There is little breeding.

The majority of the population are Betsimisaraka (88 %) or Tsimihety (10 %). The Betsimisaraka is an ethnic group that populates the entire eastern coast of the island. They live in thatched houses built on piles. The population of the commune is very young, 49 % younger than 15 years. The rate of schooling is relatively high (54 %).

b) The sub-prefecture of Ankazoabo is located in the southwestern part of the island, and is part of a plateau generally sloping in a north-south direction. Its altitude is between 200 and 600 metres above sea level. This region is very dry (840 mm. and 61 days of rain per year).

Most of the sub-prefecture is covered with pasturelands where there is a lot of livestock. Crops grown are cassava, rice, peanuts, sweet potatoes. Cotton is starting to be grown.



CARTE 2 - MAP OF INTERVIEWED ZONES

The population is made up of the Bara (64 %), the Antandroy (11 %), the Betsileo (8 %), the Sakalava (5 %), and the Mahafaly (4 %). The huts are generally made of puddled clay, except in Antandray, where they are made of thatch.

The population is somewhat elderly, as only 34 % is under 15 years. The rate of schooling is relatively low (33 %).

3. Numbers involved

Both surveys covered the populations of the two zones in their entirety, that is, 14,396 inhabitants in Ambinanitelo, and 24,313 inhabitants in Ankazoabo (population at baseline count in both cases).

4. Method used in sample taking

Does not apply.

5. Duration of the survey

The baseline count in the commune of Ambinanitelo was carried out 1 September 1967. The experiment in permanent observation continued for a year, with monthly rounds in all the villages.

The census in the sub-prefecture of Ankazoaba was carried out 1 October 1969. The experimental follow-up survey which is going on as this book is being written (March 1970) is supposed to continue for at least a year (and perhaps longer), with rounds made every four months.

6. Conditions in which the survey was carried out

The Ambinanitelo Bureau of Agricultural Production had asked I.N.S.R.E. to carry out the first census in Ambinanitelo; the Ministry of Agriculture and Rural Development was the requesting agency in Ankazoabo.

Resources available

It is not easy to give exact figures for Ambinanitelo, as they take in the census of the entire sub-prefecture of Maroantsetra, for which (with its 68,768 inhabitants) the operation was conducted by 130 enumerators, and was directed by three specialists, one technical assistant and twelve controllers. The means of transport used were one Land Rover, two Jeeps, and one motor boat. The total budget came to 2,600,000 FMG⁽¹⁾ (the salaries

(1) Translator's Note : FMG (Malagasy Franc) = 0.02 French Francs (01.01.1970).

of the specialists, technical assistant and controllers not included). This was divided as follows :

Salaries	1,800,000
Petrol and upkeep of vehicles	300,000
Transport expenses (staff and equipment)	400,000
Printing of questionnaires, miscellaneous supplies	100,000

In comparison, the survey of the commune of Ambinanitelo was carried out by about 27 enumerators and cost 550,FMG. The tallying included a first phase done manually (in the villages) and then processing by office calculators.

The census in Ankazoabo was carried out by 70 enumerators, and was administered by three specialists, two technical assistants and ten controllers. Two Jeeps were used. The operations cost 700,000 FMG (the salaries of the specialists, technical assistants, and of seven of the ten controllers not included).

Salaries	410,000
Petrol and upkeep of vehicles	200,000
Transport expenses (staff and materiel)	20,000
Printing of questionnaires, miscellaneous supplies	70,000

The tallying was done entirely manually by twelve officials.

How the survey was carried out

In Ambinanitelo, the permanent observation that followed was conducted by an enumerator who went about the commune regularly, making his monthly visits to all the villages on foot or by canoe. He had been introduced to the various notables of the commune (mayors, heads of villages, etc.) and his work was verified by the controller of a "household budget" survey, which was going on at the same time in the sub-prefecture of Maroantsetra. The controller had been hired for the survey and was given additional training for this new job. For lack of money, the commune could be covered by only one enumerator, who had been taught to ask the village notables for information about the events which took place since his last round and to record the nature of the events after the households concerned had been covered by retrospective questioning. For births and deaths this system was almost

satisfactory, but it was much less so for migrations. The most obvious expense in this permanent observation was thus the salary of this sole enumerator, that is, about 180,000 FMG.

In Ankazoabo, the follow-up survey was conceived of very differently, for the rounds were reduced to one every four months, and the enumerators in charge of operations did not remain in the field all the time, but instead went to Ankazoabo every four months for about a month of survey taking. These enumerators had been chosen from the regular staff of I.N.S.R.E. For the census, the sub-prefecture had been split into nine zones (8 rural zones, which included 1700 to 4600 inhabitants, and 17 to 31 villages, and one urban zone, the urban centre of Ankazoabo, 1800 inhabitants), an enumerator assigned to each zone, the tenth enumerator kept in reserve. The work of the enumerators was verified by three controllers (specialists or technical assistants) who had two all-purpose vehicles at their disposal. Most of the staff had already taken part in the census and already knew the region. Their training, carried out in Tananarive, lasted eight days. The cost of the survey, which was included in the general budget of I.N.S.R.E., can be estimated at 100,000 FMG for salaries, and 100,000 FMG for petrol and vehicle upkeep, not counting the cost of the questionnaires.

The operations (census and then survey) had been the object of a publicity campaign among the notables and in the population at large, especially in Ankazoabo. The welcome extended the enumerators was warm, the people apparently delighted that someone was taking an interest in them.

7. Survey techniques

a) During the censuses in the two zones, de facto and de jure populations were counted.

b) In Ambinanitelo, the permanent observation concerned only de facto events, that is, those related to the population actually living there. Those residents who left the zones of the survey when it was being carried out were considered to have left the range of the survey as of the day of their departure; newly arrived residents entered its range as of the day they arrived. The events recorded were births, deaths, arrivals, departures, marriages, divorces. It was more difficult to study these last two

phenomena because of the vagueness of the terms "marriage" and "divorce" (especially because of the distinction between legal marriage, traditional marriage, and free marriage). Among the Betsimisaraka, there was in addition an idea of great "mobility" attached to the concept of marriage.

In Ankazoabo, the permanent observation concerned both de jure and de facto events (that is, those taking place in the sub-prefecture). The observations of de facto events was carried out in this experiment to harmonize things with the official registry of vital statistics.

The events recorded were births, deaths, arrivals, departures. Moreover, pregnant women were counted on each round in order to cross-check birth registrations.

c) Questionnaires used (see Appendix).

In Ambinanitelo, the following method was used. The questionnaires used in the census had been designed for the permanent observation work; the right-hand side of the questionnaire was left blank during the census itself, and was to be filled in only later by the enumerator of the permanent observation study. This enumerator had at his disposition the questionnaires of the villages stapled together. He was supposed to record in a communal ledger all the events he had recorded, and in addition, summary memoranda that he sent to I.N.S.R.E. every month, these making it possible to follow the operations roughly from Tananarive. Trips in the field enabled him to keep closer track of the work being done.

In Ankazoabo, the enumerators recorded the events occurring in a household on an "event form" for this household. They also had available the questionnaires filled in during the census (two types of questionnaires had been used, one for rural areas, the other for the city of Ankazoabo). They also had to fill in a "job sheet", which could be used to trace their movements.

The information the questionnaires asked for on each person was as follows :

Feature	Ambinanitelo	Ankazoabo	
		Rural	Urban
Family name and first name	x	x	x
How related	x	x	x
Location of residence	x	x	x
a) For residents			
Date of arrival	x		x
Previous residence	x		x
Reason present			x
b) For absent residents			
Date of departure	x		x
Where located	x		x
Reason absent			x
c) For visitors			
Date of arrival	x		x
Regular residence	x		x
Reason for visit			x
Sex	x	x	x
Date of birth	x	x	x
Place of birth		x	x
Nationality		x	x
Ethnic group		x	x
Marital status	x		
Level of education	x	x	x
Principal activity			
Type of activity		x	
Profession	x	x	x
Professionnal rank	x	x	x
Branch of activity		x	x
Other activities	x		
Disabilities	x	x	x

This information had been gathered during the census and a different coloured ink for the various types of information was to be used in recording them during the enumerator's rounds : the newborn, new residents, and visitors.

Moreover, for each type of event, the following information was asked for :

Type of event	Features noted	Ambinanitelo	Ankazoabo
Births	Date	x	x
	Place		x
	Conditions (health training or not)		x
	Live birth or stillbirth		x
	Twins		x
	Sex	x	x
Deaths	Date	x	x
	Place		x
	Conditions (health training or not)		x
	Cause of death	x	x
Arrivals and Departures	Date	x	x
	"Source" village	x	x
	Place of destination	x	x
	Reason for move	x	x
Marriages	Date	x	x
Divorces	Date	x	x
Pregnancies			x

8. Processing. Analysis

It is the experiment in Ambinanitelo which is treated here, that in Ankazoabo still being carried out in the field.

1) Ambinanitelo

The results of the experiment were tallied manually in three stages :

a) The processing of events recorded by permanent observation was done in tables on which each line was given over to a village of the commune. The following information was obtained :

- births : by month
by sex
by the mother's age
by the mother's marital status
- deaths : by month
by sex and age
by cause
- marriages : by month
by the ages of the couple
by the place(s) of origin of the couple
- divorce : by month
by the ages of the couple
- departures : by place of destination
- arrivals : by "source" village

b) Processing the results of the registration of vital statistics : births and deaths must be registered officially in the commune where they occur, and they are recorded on statistical forms that are sent to I.N.S.R.E. for processing.

To investigate the findings of the official registry during the period in question, the statistical forms of events in the population studied that had occurred in the twelve months following the census were sorted through. In order that this processing cover the same scope as that of the permanent observation study, it was necessary to :

1 - Firstly, consult the forms of the registry of the commune of Ambinanitelo and to eliminate those events which did not take place during the time of the survey, and then to eliminate the events concerning people whose residence was not in Ambinanitelo.

2 - Secondly, to retrace events concerning the commune of Ambinanitelo which had been reported in neighbouring communes. This was easy in the commune of Maroantsetra, where there were, in effect, births and deaths on record of people from Ambinanitelo. The forms of other communes in the sub-prefecture of Maroantsetra, were likewise also studied, but these yielded only one relevant death, this reported in the commune of Mahalevona. It of course was impossible to repeat this in the 780 communes of Madagascar; thus it is possible that some events were not studied in this investigation. There are probably few cases like that.

Eighty-five per cent of the births and deaths concerning the population of Ambinanitelo took place within the commune.

These results were processed exactly like those of the permanent observation study :

- births : by month and place where registered
by month and place of delivery⁽¹⁾
by sex and place of delivery
by the mother's age and place of delivery
by whether or not father had been registered
by time and place of delivery
by the interval between the date of birth and the date of registration, and the place of delivery
- deaths : by month and place where registered
by sex and age
by the interval between the date of death and the date the death was declared
- stillbirths : by the place of delivery.

c) Comparison of the events coming from two sources : it was possible to make a comparison by recording the births and deaths of the permanent observation study on the forms of the official registry, comparing thereafter, for each form, the events as recorded by each source. It was possible to classify them in three groups : events occurring in both, events noted only during the permanent observation study, events recorded only at the official registry. The formula of Chandrasekhar and Deming⁽²⁾ was applied

(1) That is, whether or not this was in a maternity.

(2) C. Chandrasekhar and W. Edwards Deming, "On a Method of Estimating Birth and Death Rates and the Extent of Registration". Journ. of Am. Statist. Assn. CXLIV (March 1949), 101-115.

after those events occurring in health care facilities, which were regularly recorded, were momentarily left to the side. Figures were made up first for all the events in question (that is, all the births and all the deaths), and later for the categories found in both tallies :

- births and deaths, by village
- births and deaths, by month
- births by sex
- births by age of the mother
- deaths by sex and age

It was essential to rearrange several groupings (major age groups for the deaths in particular) so as to avoid the risks due to small numbers. There were difficulties in identifying shared events because of different ways of reporting names, dates, or ages, in the two sources. The registrations of sex and residence were generally in agreement.

d) The processing was done in four months by the enumerator who had done the field work. The survey continued for four months after that.

2) Ankazoabo

The processing of the experiment in Ankazoabo is supposed to take place in three stages.

a) The mistakes (omissions and double entries) made during the census and later observed during the first two rounds are corrected. These mistakes are analysed.

b) The events noted are recorded on forms (these appearing in an appendix). There are forms for births, deaths, migrations, and for each migrant. The forms for births and deaths are similar to those used by the registry of vital statistics in order to facilitate the identification of events listed by both sources. The forms on migrations and migrants will permit, in the case of the former, the study of moves (date, place come from, gone to, reason, how made up) and, in the case of the latter, the study of successive migrations of individuals who have migrated several times. Moreover, for the migrations within the sub-prefecture, the comparison of the arrival and departure forms will make it possible to better check the quality of the observation, so that this can be revised and added to when necessary.

c) Lastly, as was the case in Ambinanitelo, the forms are processed independently of those of the registry of vital statistics. Afterwards, the births and deaths recorded by both sources are compared.

9. Results

For the moment, only the experiment in Ambinanitelo can be taken up.

A) Tally charts

These charts, mentioned just above, served as the basis of the published results. The main charts were :

- Total number of births and deaths in health care facilities, according to the observation on a permanent basis, the registry of vital statistics, extrapolation.

- Births and deaths by village, according to the permanent observation study, the registry of vital statistics, extrapolation; significance of the size and isolation of villages.

- Births and deaths by village, according to the permanent observation study, the registry of vital statistics, extrapolation; relation between dates reported by enumerator and by official registry; role of the rainy season.

- Births by the age of mother, according to the permanent observation study, the registry of vital statistics, extrapolation.

- Births by sex, according to permanent observation study, the registry of vital statistics, extrapolation; death rates by sex and age.

- Features recorded only by the permanent observation study :

- . births according to mother's marital status
- . deaths by cause of death
- . marriages and divorces
- . migrations

- Features recorded only by the official registry of vital statistics :

- . births, by whether or not father had been registered
- . births by time of birth

- . stillbirths
- . births and deaths by the interval between the date of the event and the date it was declared.

B) The main numerical results

They are given as a matter of information only, as the primary concern was the methodology used.

- % of events reported to enumerator : 81 % (births), 72 % (deaths).

- % of events reported to the official registry of vital statistics : 77 % (births), 74 % (deaths).

(and for events taking place outside health care facilities, 50 % (births, 71 % deaths).

- Estimated correlation of the two sources : if the presence of the enumerators had not improved the percentage of events reported to the official registry of vital statistics, the percentages would have been only 75 % (births), 66 % (deaths).

- Birth rate (extrapolated) : 55 %.

- Death rate (extrapolated) : 18 %.

C) Main conclusions drawn from the experiment

1) The workings of the official registry of vital statistics

a) The registry of vital statistics appears to run more or less as it should. The main lessons taught by the survey were :

- That births were declared more regularly than deaths, but this because of the large numbers of births in maternities, where they are automatically declared.

- That the isolation of a village does not seem to be an important factor in explaining why events are not registered. It should be said, though, that the region of Maroantsetra, where it is rainy all year round, did not lend itself very well to the study of this point.

- That fewer births of girls than of boys were declared.

- That the births of children by women who were very young or very old were not as regularly declared.

- That the deaths of women were not declared as regularly as those of men.

- That the events reported to the official registry of vital statistics were always registered within the legal time limit, though sometimes at the price of falsified declaration dates.

b) It is not easy to judge how the population regards the legal obligation to make declarations to the official registry of vital statistics. Ignorance of the law is recognized, however, as one element of the problem by the Mayor of Ambinanitelo, especially for births and all the more so for stillbirths. It was reported that fees were illegally charged for making declarations at the registry of vital statistics, but it was not possible to verify this.

2) The use of maternities

a) Was one of the factors explaining the improvements made in declaring births (and stillbirths).

b) But this depended on :

- the remoteness of the villages
- the amount of rainfall
- the ages of the woman.

c) It followed naturally that the assessments of births taking place in maternities could not be regarded as valid for all births.

3) Method of survey taking

The survey in Ambinanitelo was experimental and necessarily was not as good as it might have been. In analysing the results, it was apparent that some of the difficulties met up with came directly from these weaknesses. But the general principle of the operations was shown to be valid. The main lessons learnt in this experiments, which were applied when the experiment of Ankazoabo was set up, were the following :

a) The training of the enumerators should be developed further. For the survey in Ankazoabo, there was a week's training course at Tananarive before each round.

b) It is absolutely essential for there to be supervision of the enumerators throughout the observation period. Because of this, at Ankazoabo there were three controllers (statistical engineers or technical assistants).

c) A census count at the end of the operations seemed necessary, and this was to serve as a final check.

d) The enumerators must be shown the necessity for noting carefully names, dates, and full descriptions of events. All of this is indispensable when making comparisons with the official registry of vital statistics.

e) Additional instructions should be given the enumerators on how to treat the special cases that can occur :

- Stillbirths should be recorded exactly like normal births, with an attempt made to estimate the length of the pregnancy.

- Record should be kept of the mistakes noted on questionnaires from the baseline count so as to avoid such mistakes during later census counts.

- It is difficult to observe accurately marriages and divorces, and they are less important for the survey than births, deaths, and migrations. They were no longer studied in Ankazoabo.

- One problem in the observation of migrations is the distinction one makes a priori between the terms "temporary" and "permanent". It would not be desirable to ignore or forget this ambiguity, but rather to draw up a list of reasons that should be taken into account to explain migrations (looking for a job, assignment, long visit, etc.) and to consider the question of the long-term intentions of a person when taking up residence somewhere.

f) The monthly rounds doubtless added to the accuracy of the dates of events. But it appears that it would be better to sacrifice this accuracy (which could be obtained by giving the enumerators better training and by working up certain new division of the population for study) to covering the villages more thoroughly less frequently. A better system seems to be that of rounds every three or four months, and there appears to be few ill effects on the dates that are so reported.

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- On the experiment in Ankazoabo : to be published.

VI RENSEIGNEMENTS SUR L'ACTIVITE AGRICOLE DU MENAGE

Le ménage élève t-il des boeufs des porcs des volailles

Quels sont les produits cultivés par le ménage : -----

VII OBSERVATIONS

VIII

Qualité des agents	Date	Nom et Prénoms	Signature
Agent recenseur			
Chef de zone			
Responsable			
Chiffreur			
Chef d'atelier de chiffrement			

IX INSTRUCTIONS AUX AGENTS RECENSEURS.

1^o Vous devez remplir les diverses parties du questionnaire dans l'ordre où elles sont numérotées de I à VIII, sauf la partie IV qui est à remplir une fois l'interrogatoire terminé.

2^o Vous ne devez rien inscrire dans les parties réservées au chiffrement, c'est-à-dire dans la colonne de droite de la première page, et dans la partie supérieure des lignes consacrées à chaque individu du ménage.

3^o Si le ménage comporte au plus 10 personnes, (quelle que soit leur situation de résidence) un questionnaire vous suffit. Dans ce cas vous rayez le "Suite du" de la première page et le "A suivre" du bas de la deuxième page (s'il y a exactement 10 personnes, vous mettez un "1" devant le "0" de la dixième ligne pour faire 10). S'il y a plus de 10 personnes, vous utiliserez deux questionnaires; pour le premier, vous rayez le "Suite du" de la première page, et le "Fin" du bas de la deuxième page; pour le deuxième, vous ne remplissez pas les parties II, III, IV et V, vous ne rayez pas le "Suite du" de la première page, vous rayez le "A suivre" du bas de la deuxième page et vous mettez un "1" devant les numéros des lignes utilisées de façon à faire "11" "12"... Il est entendu que les renseignements inscrits sur le premier questionnaire dans les parties II, III, IV et V concernent l'ensemble du ménage, c'est à dire l'ensemble des personnes inscrites sur les deux questionnaires.

4^o Vous devez faire extrêmement attention à porter sur les questionnaires toutes les personnes qui doivent y figurer, et seulement elles, pour éviter les omissions et les doubles comptes. Aussi vous devez apporter beaucoup de soin à la question sur la situation de résidence, et ne pas hésiter à vous reporter aux instructions pour les cas difficiles.



REPUBLIKA MALAGASY
Fahafahana Tanindrazana Fandrosoana

COMITÉ DE COORDINATION ET DE DÉVELOPPEMENT
POUR L'INFORMATION STATISTIQUE ET ÉCONOMIQUE

RECENSEMENT GENERAL 19
HABITATION - POPULATION
QUESTIONNAIRE MENAGE QR1

MILIEU RURAL

LOCALISATION

Province : ----- Zone rurale n° : -----
Sous-Préfecture : ----- Village : -----
Commune : ----- Hameau : -----
N° du ménage : -----

AGRICULTURE ET ELEVAGE.

Le ménage pratique t-il l'agriculture ? Oui ou non

Si oui, indiquer la nature des cultures : -----
Exemple : riz, maïs, pommes de terre, banane, carotte, café etc.

Le ménage pratique t-il l'élevage ? Oui ou non

Si oui, indiquer la nature du cheptel : -----
Exemple : boeufs, porcs, moutons, chèvres, chevaux, oies, canards, dindons etc.

OCCUPATIONS OCCASIONNELLES Travaux manuels, pêche.

Pratique t-on le travail manuel en dehors des occupations principales ? Oui ou non

Si oui, indiquer la nature : -----
Exemple : Lissage, filature, menuiserie, sculpture etc.

Le produit ou une partie du produit est-il destiné à la vente ? Oui ou non

Pratique t-on la pêche dans le ménage en dehors des occupations principales ? Oui ou non

Si oui, le produit ou une partie du produit est-il destiné à la vente ? Oui ou non

BIENS DURABLES.

Le ménage a-t-il les petits équipements suivants ?

Radio Oui ou non Charrette oui ou non Machine à coudre Oui ou non Bicyclette oui ou non Lit Oui ou non

LOGEMENT.

Nombre de cases occupées par le ménage Ne pas compter les greniers, les dépôts de marchandises, les cuisines, les étables, les porcheres, les poulaillers, les W.C., les bureaux ou ateliers

Nombre de pièces occupées par le ménage Ne pas compter les pièces destinées à servir de dépôt de récoltes ou de marchandises, de cuisine, de bureau, d'atelier, de W.C. ainsi que les pièces des étables, des porcheres, des poulaillers.

REPOBLIKA MALAGASY
Fahafahana - Tanindrazana - Fandrosoana
COMITÉ DE COORDINATION ET DE DÉVELOPPEMENT
POUR L'INFORMATION STATISTIQUE ET ÉCONOMIQUE

ENQUETE SUIVIE
dans la sous-préfecture
d'ANKAZOABO
FICHE D'ÉVÉNEMENTS.

I IDENTIFICATION		Village :	Date : 1970
Commune de :		Hameau :	Nom de l'enquêteur :
Zone n° <input type="text"/>		Ménage n° <input type="text"/>	

II NAISSANCES *Tout enfant né vivant doit être inscrit à la suite des autres membres du ménage sur la feuille de ménage.*

Numéro de la mère	Date de naissance	Lieu de naissance	Sexe	F.S.	N.V. M.N.	Gemel Lité.	N° affecté	Observations.

III DÉCÈS

Numéro du décès	Date du décès	Lieu du décès	F.S.	Cause du décès	Observations.

IV ARRIVÉES *Tout arrivant doit être inscrit à la suite des autres membres du ménage sur la feuille de ménage. Compléter ensuite les renseignements suivants.*

Numéro affecté	Date d'arrivée	Dernière résidence	Date prévue de départ	Motif de la venue.	Observations.

V DEPARTS

Numéro du partant	Date de départ.	Destination.	Date prévue de retour.	Motif du départ.	Observations.

VI FEMMES ENCEINTEES

Numéro de la femme.	Notée enceinte au passage précédent	Actuellement enceinte.	Date prévue de l'accouchement.	Observations.

REPOBLIKA MALAGASY
Fahafahana - Tanindrazana - Fandrosoana

ENQUETE SUIVIE
DANS LA SOUS-PREFECTURE
D'ANKAZOABO

COMITÉ DE COORDINATION ET DE DÉVELOPPEMENT
POUR L'INFORMATION STATISTIQUE ET ÉCONOMIQUE

FICHE D'ÉVÉNEMENTS.

I IDENTIFICATION		Village :	Date : 1970
Commune de :		Hameau :	Nom de l'enquêteur :
Zone n° <input type="text"/>		Ménage n° <input type="text"/>	

II NAISSANCES *Tout enfant né vivant, doit être inscrit à la suite des autres membres du ménage sur la feuille de ménage.*

Numéro de la mère	Date de naissance	Lieu de naissance	Sexe	F.S.	N.V. M.N.	Gemel Lité.	N° affecté	Observations

III DÉCÈS

Numéro du décès	Date du décès	Lieu du décès	F.S.	Cause du décès	Observations

IV ARRIVÉES

Tout arrivant doit être inscrit à la suite des autres membres du ménage sur la feuille de ménage ensuite les renseignements suivants:

Numéro affecté	Date d'arrivée	Dernière résidence	Date prévue de départ	Motif de la venue	Observations

V DEPARTS

Numéro du partant	Date de départ	Destination	Date prévue de retour	Motif du départ	Observations

VI FEMMES ENCEINTEES

Numéro de la femme.	Notée enceinte au passage précédent	Actuellement enceinte.	Date prévue de l'accouchement.	Observations.

REPOBLIKA MALAGASY
Fahafahana - Tanindrazana - Fandrosoana

COMITÉ DE COORDINATION ET DE DÉVELOPPEMENT
POUR L'INFORMATION STATISTIQUE ET ÉCONOMIQUE

ENQUETE SUIVIE
dans la sous-préfecture
d'ANKAZOABO
FICHE DE NAISSANCE.

Evénement	Date: -----	OBSERVATIONS	
	Lieu { Sous-Préfecture: ----- Commune: ----- Village: -----		
	Nom: -----		
	Sexe: masculin - féminin		
Enfant	Né dans une formation sanitaire: oui - non		
	Né vivant - Mort-né.		
	Naissance: simple - double - triple.		
Parents	Nom: -----	Père	Mère
	Date de naissance: -----		
	District de naissance: -----		
	Profession: -----		
	Domicile { Sous-Préfecture: ----- Commune: ----- Village: ----- Ménage n°: -----		
	Ethnie: -----		

4. - LINKED SURVEY. ANKAZOABO.
BIRTH FORM. 13,5 x 21 cm.

REPOBLIKA MALAGASY
Fahafahana - Tanindrazana - Fandrosoana

COMITÉ DE COORDINATION ET DE DÉVELOPPEMENT
POUR L'INFORMATION STATISTIQUE ET ÉCONOMIQUE

ENQUETE SUIVIE
dans la sous-préfecture
d'ANKAZOABO
FICHE DE DECES

Evénement	Date: -----	OBSERVATIONS
	Lieu { Sous-Préfecture: ----- Commune: ----- Village: -----	
	Cause: -----	
	Nom: -----	
Décédé	Sexe: masculin - féminin	
	Décédé dans une formation sanitaire: oui - non.	
	Date de naissance: -----	
	District de naissance: -----	
	Profession: -----	
	Domicile { Sous-Préfecture: ----- Commune: ----- Village: ----- Ménage n°: -----	
Ethnie: -----		
Père	Nom: -----	
Mère	Nom: -----	
Conjoint	Nom: -----	

5. - LINKED SURVEY. ANKAZOABO.
DEATH FORM. 13,5 x 21 cm.

COMITÉ DE COORDINATION ET DE DÉVELOPPEMENT
POUR L'INFORMATION STATISTIQUE ET ÉCONOMIQUE

ENQUETE SUIVIE
dans la sous-préfecture
d'ANKAZOABO
FICHE D'ARRIVEE.

Date -----

Lieu { Commune -----
Village -----
Ménage -----
Sous-Préfecture -----

Origine { Commune -----
Village -----
Ménage -----

Motif -----

Nombre de personnes -----

N O M	Lien de parenté	Sexe	Date de naissance	Ethnie	Profession	Date de départ

OBSERVATIONS

6. - LINKED SURVEY - ANKAZOABO
ARRIVAL FORM. 13,5 x 21 cm.

COMITÉ DE COORDINATION ET DE DÉVELOPPEMENT
POUR L'INFORMATION STATISTIQUE ET ÉCONOMIQUE

ENQUETE SUIVIE
dans la sous-préfecture
d'ANKAZOABO
FICHE DE DEPART.

Date -----

Lieu { Commune -----
Village -----
Ménage -----
Sous-Préfecture -----

Destination { Commune -----
Village -----
Ménage -----

Motif -----

Nombre de personnes -----

N O M	Lien de parenté	Sexe	Date de naissance	Ethnie	Profession	Date de retour

OBSERVATIONS

7. - LINKED SURVEY - ANKAZOABO.
DEPARTURE FORM. 13,5 x 21 cm.

COMITÉ DE COORDINATION ET DE DÉVELOPPEMENT
POUR L'INFORMATION STATISTIQUE ET ÉCONOMIQUE

ENQUETE SUIVIE
dans la sous-préfecture
d'ANKAZOABO
FICHE DE MIGRANT.

Nom: -----

Sexe: masculin-féminin -----

Date de naissance -----

District de naissance -----

Nationalité -----

Ethnie -----

Profession -----

Domicile habituel { Sous-Préfecture -----
Commune -----
Village -----
Ménage -----

Date -----

Date	L I E U			Motif
	Sous-Préfecture	Commune	Village	
Recensé le 1 ^{er} Octobre 1969				
Migrations successives (départs le, à, pour)				

OBSERVATIONS

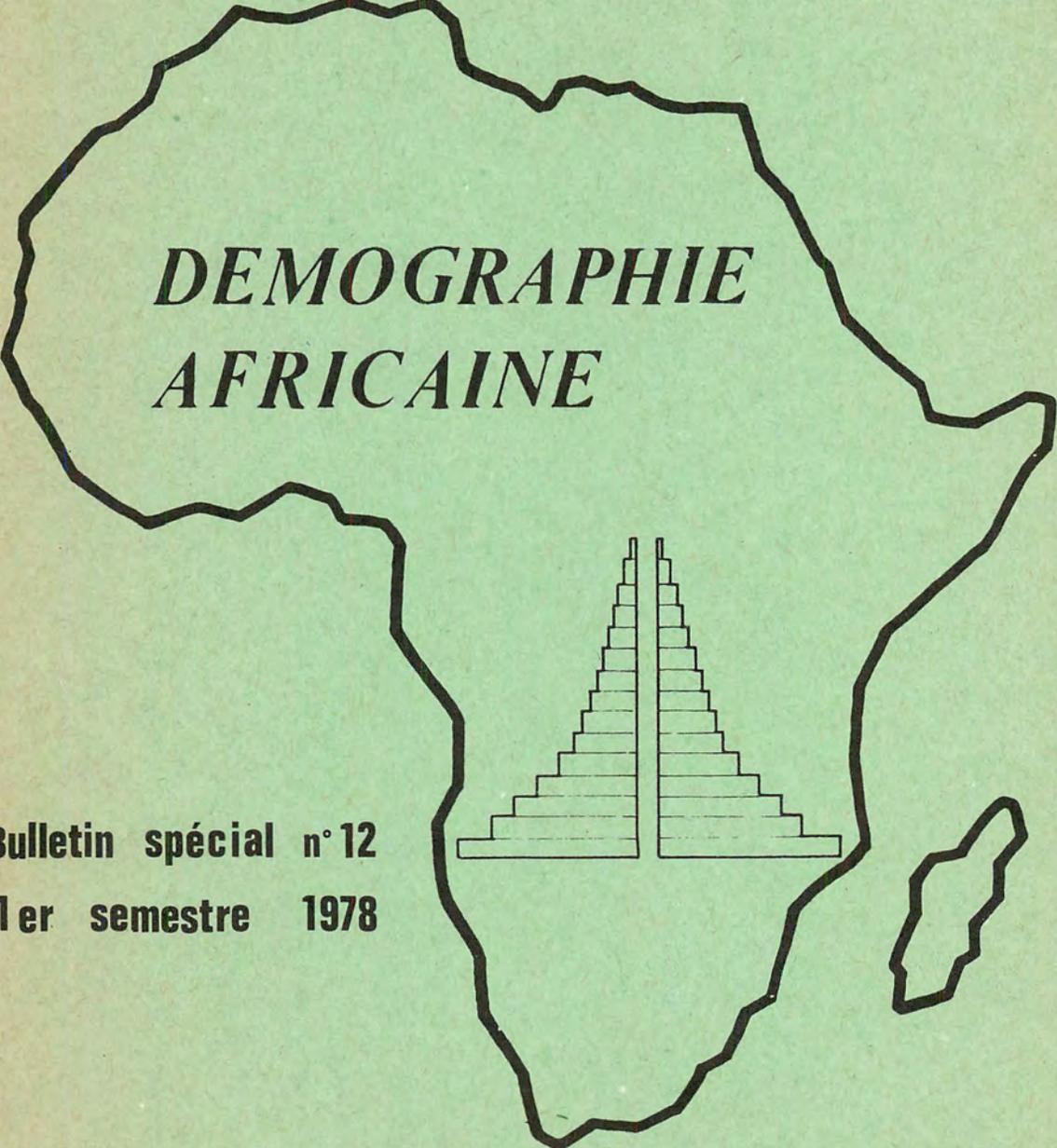
8. - LINKED SURVEY - ANKAZOABO.
FORM FOR MIGRANTS. 13,5 x 21 cm.

GRUPE DE DEMOGRAPHIE AFRICAINE
(IDP, INED, INSEE, MICOOP, ORSTOM)
REGIONAL INSTITUTE FOR POPULATION STUDIES

FOLLOW-UP SURVEYS IN DEMOGRAPHIC STUDIES

traduction de l'ouvrage du groupe
«Les enquêtes démographiques à passages répétés», publié en 1971

PART TWO



***DEMOGRAPHIE
AFRICAINA***

Bulletin spécial n° 12
1er semestre 1978

BULLETIN DE LIAISON

The African Demography Working Group IDP - INED - INSEE - MICOOP - ORSTOM

Is an informal body intended to facilitate communication between statisticians, demographers and other specialists concerned with population problems in developing countries.

It deals with methodology of data collection and the techniques appropriate for synthesis of findings in the countries ; it reviews work of more general demographic interest and seeks to inform interested persons on all aspects of African demography. This newsletter is the principal vehicle for achieving these ends.

Publications du groupe

- «Afrique Noire, Madagascar, Comores. Démographie comparée» tomes I et II, INSEE, INED, DGRST, Paris 1967.
- «Les enquêtes démographiques à passages répétés», Application à l'Afrique d'expression française et à Madagascar. Méthodologie. ORSTOM, INSEE, INED, Paris 1971
- «Sources et analyse des données démographiques», Application à l'Afrique d'expression française et à Madagascar. INED, INSEE, MICOOP, ORSTOM, Paris 1973-1977.
 - Première partie : Sources des données
 - Deuxième partie : Ajustement de données imparfaites
 - Troisième partie : Analyse
- Bulletins de liaison
 - Edition française «Démographie africaine»
 - Numéros ordinaires : 0 à 26 édités à Paris -
 - Numéros spéciaux : 1 à 12 édités à Paris ainsi que les futurs numéros
 - Edition anglaise «African Demography»
 - Numéros 0 à 4 : édités à Paris
 - Numéros 5 et 6 : édités par le RIPS (Accra), ainsi que les numéros ultérieurs.

FOLLOW-UP SURVEYS IN DEMOGRAPHIC STUDIES

Their Use in French-Speaking Africa and Madagascar

Translated by Alan D. HORSNTEIN

**Office de la Recherche Scientifique et Technique d'Outre-Mer
Institut National de la Statistique et des Etudes Economiques
Institut National d'Etudes Démographiques**

1971

SYNOPSIS

PART II

DISCUSSION OF METHODOLOGY

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INTRODUCTION

In Part One of the book, the actual workings of some follow-up surveys in five African countries were described. In Part Two, an attempt will be made to get some overall idea of the effects that these surveys might have on methodology, by considering the problems arising at each stage in the carrying out of such surveys.

The following table (1) will serve as a useful item of referendium throughout the second part of this book.

(1) The table also includes surveys not taken up fully in this work.

SUMMARY OF DATA GATHERED IN RECENT FOLLOW-UP SURVEYS IN FRENCH-SPEAKING COUNTRIES (1)

1 - METHOD USED IN SAMPLE TAKING

Country	Part covered by survey	Sampling frame	Strata	Units	Drawing	Fraction
Morocco	Rural zone	List of villages (1960 census)	- geographic: 11 - village size: 4 (substrata)	village	systematic (proportionate to the size by substrata)	1st round: 1/25 other rounds: 1/12
Algeria	Entire country	Districts (1966 census)	- 4 regional metropolises 0 - urban communes 1 - densely populated areas - districts with grouped settlements 2 - districts with scattered settlements 3 - sparsely populated areas - districts with grouped settlements 4 - districts with scattered settlements 5 - Sahara 6	district 1st step: commune 2nd step: district	systematic (within each stratum) 1st step: proportionate to size 2nd step: fixed number (varying with the stratum: high for low densities) sampling by quota	1/33
Tunisia	Entire country	a) 1966 census b) marriages recorded since the census	- rural : - registry of vital statistics functions poorly 1 - registry of vital statistics functions well 2 - urban - large communes 3 - small communes 4 - rural - urban	1st step: village (sheikdom) 2nd step: household 1st step: sector (250 households) 2nd step: household 1st step: see above 2nd step: rural (12 households) urban (4 households)	1st step: proportionate to size 2nd step: fixed number 1st step: unvarying proportion 2nd step: fixed number	1/25 1/43 1/37 1/30 " "
Senegal	Pikine	Cadastral maps	form of construction	1966: building plot 1967: block	systematic systematic	1/20 1/20
Ivory Coast	Abidjan	List of dwellings	form of construction	dwellings	systematic dwelling or cluster	1st round: 1/5 1/10 2 following rounds: 1/20 last round: 1/10
Cameroon	Yaounde	Aerial photographs	type of district (4) and activity (8)	block	1st step: absolutely thorough or systematic 2nd step: decreasing size	1/5 x 1/8 (on the average)

(1) for dates, type, and scope of survey, see the general introduction.

2 - SURVEY TECHNIQUES

Country	Surveys	How the rounds were carried out				Population Event	
		N°	Frequency	Duration		referred to	
Morocco	Rural zone	3	6 months	3 months	1st round: - list of heads of household - questionnaire 2nd round: - new questionnaire - questionnaire on age - questionnaire on deaths	de jure and de facto	de jure and de facto
Algeria	Entire country	3	6 months	5 months	4 parts - census count - migrations - deaths - births	de jure	de jure
Tunisia	Entire country	3	6 months	3½ months + supplement. survey	4 parts - locating households - comparison of households - events - fertility	de jure	de jure
Senegal	Sine-Saloum	4 later 3 later 3 for fertility	3 months 1 year 1 year	2½ months 3½ months	5 types - general questionnaire - domestic migrations - fertility - prenatal study - village ledgers	de jure and later de facto	de jure and later de facto
	Khombol-Thienaba	5 or 6	1 year	3 months	2 types - general questionnaire - prenatal study	de jure	de jure
	Pikine	4	1 year	3 months	multiple questionnaires and later individual questionnaires	de jure	de jure
Ivory Coast	Abidjan	4	4 months	2 months	1 questionnaire per round	de jure and de facto	de jure and de facto
Cameroon	Yaounde	2	6 months	6 months	a single questionnaire	de jure and de facto	de jure
	Adamaoua	5	6 months	3 months	3 types - general questionnaire - new events - registers of vital statistics	de jure	de jure
Madagascar	Ambinanitelo	12	1 month	1 month	3 types - general questionnaire - commune ledger - summarised specification	de jure	de jure
	Ankazoabo	4	4 months	1 month	2 types - general questionnaire - event forms	de jure and de facto	de jure and de facto

De jure population: $RP + RA$ (RA = V1 population and events)

De facto population: $RP + V$

: De jure events: concerning the de jure population: within and outside zone

: De facto events: concerning the de facto population: within the zone

3 - RESOURCES AVAILABLE

Country	Survey	Organization in charge	Budget (French Francs)	Staff (in the field)	Equipment (in field)	Processing
Morocco	Rural zone	Statistical Services	5 000 000	2 directors 2 specialists 40 controllers 40 heads of teams 200 enumerators	40 2CV Citroen	1st round: standard off. calculators other rounds: manual processing
Algeria	Entire country	Statistical Services	8 000 000(1) = 0,67 francs per person covered = 23,0 francs per person polled	1 head 3 regional directors 9 verifiers 28 teams, each includ. 1 controller 3 or 4 enumerators 1 driver + administrative svc. + Sahara survey + survey for fertility questionnaire	28 Renault R.4	Transcription: 1 head 10 controllers 15 verifiers 45 recorders Punch cards Programming 1 head 3 programmers Computer
Tunisia	Entire country	Statistical Services	1 500 000(1) = 0,33 francs per person covered = 11 francs per person polled	7 controllers 63 enumerators		Manual processing later: Transcription: 3 supervisors 50 agents, later only 10 Processing by off. calculators (Tunis and New York)
Senegal	Sine-Saloum	O.R.S.T.O.M.	160 000 + W.H.O. grant + aid of Statis. Services	1 head 2 controllers 10 enumerators (later only 5 or 6)	1 2CV Citroen	Transcription by survey staff Tabulation using standard material Manual calculations and later computer processing
	Khombol-Thienabn	O.R.S.T.O.M. + University + Statistical Services		1 head 1 controller 3 enumerators	1 vehicle	Manual tallying Computer processing
	Pikine	O.R.S.T.O.M.		1 head 1 controller enumerator		Manual tallying Processing by off. calculators
Ivory Coast	Abidjan	S.E.M.A.		40 enumerators (6 teams)		Manual tallying and processing by off. calculators
Cameroon	Yaounde	Statistical Svc. + S.E.D.E.S	Multi-purpose survey 1 000 000 40 000 = 2,7 francs per person polled(2)	1 head 1 head of team 7 enumerators (later only 2)	1 Land Rover	Tallying by computer
	Adamoua	O.R.S.T.O.M.				Manual tallying by head of survey
Madagascar	Ambinanitelo	Statistical Svc. + O.R.S.T.O.M.	- baseline census: 11 000	27 enumerators	1 jeep 1 amphibious vehicle	Manual tallying and later processing by off. calculators
	Ankazoabo	Statistical Svc.	- following rounds: 3 000	1 enumerator	1 amphibious vehicle	Manual tallying (1 enumerator + 1 head)
			- baseline census: 14 000	1 70 enumerators	2 jeeps	Manual tallying (12 enumerators)
			- following rounds: 32 000	3 controllers 10 enumerators	2 jeeps	Manual tallying (4 enumerators)

(1) not including processing.

(2) related surveys covering a sample of 15 000 people were also carried out on the same budget; this lowered the cost per person polled to about 1,3 francs.

4 - DATA COLLECTED

Feature	Morocco	Algeria	Tunisia	Senegal			Ivory Coast Abidjan	Cameroon		Madagascar	
				Sine-Saloum	Khombol-Thienaba	Pikine		Yaounda	Adamaoua	Ambinanitelo	Ankazoabo
Family name and first name	x	x	x	x	x	x	x	x	x	x	x
How related	x	x	x	x	x	x	x	x	x	x	x
Type of resident	x	x	x	x	x	x	x	x	x	x	x
Date of arrival	-	x	-	-	-	x	x	city & housing	-	-	-
Previous residence	-	-	-	-	-	x	-		x	-	x
Reason for change	-	-	-	-	-	-	-	-	-	-	-
Date of departure	x	-	-	-	-	-	-	objective crit.in residence	x	x	x
Location	x	-	-	-	-	-	-		x	x	x
Reason for absence	-	-	-	-	-	-	-		-	x	x
Date of arrival	x	-	-	-	-	-	-	determin. residence	x	x	x
Usual residence	x	-	-	-	-	-	-		x	x	x
Reason for visit	x	-	-	-	-	-	-		-	-	x
Sex	x	x	x	x	x	x	x	x	x	x	x
Age (date of birth)	x	x	x	x	x	x	x	x	x	x	x
Place of birth	x	x	x	x	x	x	x	x	x	-	x
Nationality	-	x	x	-	-	-	x	-	-	-	x
Ethnic group	-	-	-	x	x	x	x	x	x	-	x
Marital status	x	x	x	x	-	x	x	x	x	x	-
Education	x	x	x	-	-	x	x	x	-	x	x
Activity	x	x	head of household	x	-	x	x	x	x	x	x
Miscellaneous	-	schooling	-	lineage measles	measles	-	-	-	-	secondary activity disability	disability
Births	date	x	x	x	x	x	x	x	x	x	x
	place	x	x	x	x	x	x	x	x	-	x
	sex	x	x	x	x	x	x	x	x	x	x
	miscellaneous	-	-	assistance mother age vitality	-	-	-	-	-	-	HCF vitality twins
Deaths	date	x	x	x	x	x	x	x	x	x	x
	place	x	x	x	x	x	x	x	-	-	x
	sex	x	x	x	x	x	x	x	x	-	-
	age (date of birth)	x	x	x	x	x	x	x	x	-	-
miscellaneous	-	-	care received	circumstances	circumstances	circumstances	-	-	-	cause	cause HCF
Arrivals and Departures	date	-	x	departure of head of household	domest. migration	x	x	x	x	x	x
	place	-	x			x	x	x	x	x	x
	cause	-	x			x	x	x	-	x	x
	miscellaneous							previous housing in city			
Miscellaneous	residence employment	-	fertility form	fertil. form prenat. condtns	prenat. form	employ-ment	-	-	fertil. form	marriage divorce (date)	pregnant women

CHAPTER I

GOALS

Both in North Africa (Algeria, Tunisia) and in Black Africa (Cameroon, Senegal) and Madagascar, follow-up surveys achieve goals analogous to those of retrospective surveys, but they go about them differently - more thoroughly in such a way as to become natural replacements of retrospective surveys.

They attempt to measure population growth from natural growth and from migrations, such information generally necessary for planning. At the same time, follow-up surveys aim to test their worth against other methods of collecting data (retrospective surveys, registries of vital statistics). With regard to these goals, it is possible to distinguish, in the forms they have since taken, two types of survey, both of them connected with the underlying strategy spoken of above - local surveys and nationwide surveys.

Local surveys are essentially experimental and are not meant to be representative of regional or national characteristics. In starting them, though, their future broad expansion was taken for granted. Such has come to be the case in Senegal and this is planned for in Cameroon.

The nationwide surveys (Algeria and Tunisia) are directed to measuring the national growth of these countries. Their goals might be compared to those of the PGE (Population Growth Estimations) carried out in Pakistan and Liberia, for example. These surveys have not been tried out beforehand.

The Algerian survey is an integral part of demographic studies in which a follow-up survey and a census count are to be used alternatively over a ten-year period. The Tunisian survey is primarily to verify the accuracy of the registry of vital statistics, and especially the reporting of deaths.

Follow-up surveys quite naturally have led to the use of new tactics, the basic idea of which is continuity.

Setting up permanent observation studies should yield - at least in the samples under study here - more accurate data than those obtained from the registry of vital statistics and the census. Follow-up surveys so used provide an automatic system of verification.

Along with the demographic and methodological goals proper, there are other complementary goals which can be reached precisely through the gathering of data likely to explain the elements and tendencies of demographic growth.

The Tunisian survey should thus make it possible to orientate better family planning services and studies of factors relating to fertility. The survey of Khombol-Thienaba should help to compare and check the efficiency of health programmes that have been set up by using the information about mortality revealed by the survey. The surveys in Algeria and Tunisia should be used to estimate more accurately the migratory shifts that affect these countries.

The basic goal of follow-up surveys remains, however, the study of demographic growth, and to a certain extent, the study of the factors explaining this growth. It is likely, as some of the surveys have already shown, that the goals of some of the various experiments in methodology will be progressively dropped as experience corroborates the method. But, it is also possible that this type of survey will be used as a means of getting indicators in other areas, particular in economic fields.

CHAPTER II

THE RANGE OF STUDY

Characteristics of the ranges of the surveys is the diversity of the environments studied. This heterogeneity is evident both in the scope of the surveys as well as in the geographic and human environments that they study.

A - Range

With its range very variable, the surveys of Algeria and Tunisia cover the totality of each country respectively.

In the other countries, the range was more limited, going from the area of a sub-prefecture to that of a commune, these administrative divisions corresponding to areas which varied greatly in size (Table I).

Table I - Range of the surveys

Country	Zone covered	Area covered (in 1000s of square kilometers)
Algeria	entire country	2 382
Tunisia	entire country	164
Senegal	1 semi-urban arrondissement (Khombol-Thienaba)	0,3
	1 rural arrondissement (Sine: Niakhar)	0,4
	1 half of a rural arrondt. (Saloum: Paos Koto)	0,5
	1 district of Dakar (Pikine)	-
Cameroon	2 northern cantons (Mbang Foulbe and Dourou Plateau)	1
Madagascar	1 northern commune (Ambinanitelo)	1,4
	1 southern sub-prefecture (Ankazoabo)	7,3

B - Geographic environment:

Because they were nationwide, the surveys of Algeria and Tunisia covered vastly different areas, ranging from the coastal region of Tell to the Sahara.

In Senegal, the surveys were carried out in a country of plains where there is very little rainfall (approximately 800 mm.). The principal crops are millet and peanuts.

The department of Adamaoua is also rather uniform. The department covers a plateau at 1000 metres above sea level where the heavy rainfall (1500 mm.) makes it possible to grow numerous crops.

In Madagascar, the regions studied offer many contrasts. The commune of Ambinanitelo, in the Bay of Antongil in the northern part of the island, has a very wet climate (3850 mm.), luxuriant plant life (with thick forests) and is isolated from the rest of the country. In the southwest, the sub-prefecture of Ankazoabo stretches over a low-lying plain with little rainfall (840 mm.), this covered with broad expanses of grazing land.

C - The human environment

Table II - Main characteristics of population interviewed

Zone covered	Inhabitants	Density	Number of villages	Rural of urban	Type of habitation	Dominant ethnic group
Algeria	13 000 000	5 ⁽¹⁾	676 communes		mixed	Arab and Berber
Tunisia	4 600 000	28			mixed	Arab
Senegal						
Niakhar	35 000	85	65	R	scattered	Serer
Paos Koto	19 000	39	135	R	grouped	Wolof, Foulbe
Khombol	30 000	100		R	grouped	Wolof, Serer
Pikine	100 000			U	grouped	Wolof
Cameroon						
Mbang Foulbe						
Dourou Plateau	15 000	15	60	R	grouped	Dourou, Foulbe
Madagascar						
Ambinanitelo	15 000	10	28	R	grouped	Betsimisaraka
Ankazoabo	25 000	3	200	R	scattered	Bara

(1) The Sahara not included.

Zone covered	Size of households	Rate of schooling 6-13 years %	Children under 15 years (%)	Polygamy rate	Cumulative total fertility ⁽³⁾	Birth rate (per 1000)	Death rate (per 1000)
Algeria	6	47	47		7	47,5	12,1
Tunisia	5	73 ⁽¹⁾	47		7	42,1	12,7
Senegal							
Niakhar	12	15	45	1,31	6,8	49,0	34,3
Paos Koto	12	5	45	1,63	6,6	51,1	27,3
Khombol							
Pikine	9,5	75	50			(39)	(11)
Cameroon							
Mbang Foulbe							
Dourou Plateau	5,7	30 ⁽²⁾	37	1,40	3,63	29	22
Madagascar							
Ambinanitelo		54	49				
Ankazoabo		33	34				

(1) 6-14 years. Republic of Tunisia, Division of Planning "Teaching Statistics" 1965-1966

(2) 10% of this schooling in the Koran.

(3) Total offspring according to fertility rates observed in schooling in the Koran. Figures in brackets are provisional estimates.

CHAPTER III

NUMBERS INVOLVED

Overall summary tables

Table I makes it possible to divide the surveys studied in this book into two categories: nationwide surveys and local surveys (in most cases experimental). The surveys in Tunisia and Algeria, and one of the surveys in Senegal (Pikine) were the only ones to use the techniques of sample taking. It is therefore these surveys that are richest in lessons and information learnt (see Chapter IV, "Method of Sample Taking"). Table II gives in outline the way these three representative samplings were made up.

Table I - Numbers of people interviewed

Country	Total population (in millions) where survey was carried out	Population (in millions)		Means of sample taking
		of total ref. no.	polled	
Algeria	13,0	13 000,0	400,0	random drawing by strata of "census districts" to be covered thoroughly by survey
Tunisia (TNDS)	5,0	5 000,0	140,0	random drawing by strata in two steps of households on census lists
Cameroon (survey in Adamaoua)	5,6	15,3	15,3	exhaustive survey made of two cantons chosen empirically
Senegal Survey in Sine-Saloum baseline count	3,6	54,0	54,0	exhaustive survey made of two cantons a group of villages in each canton
linked survey		9,3	9,3	
Survey in Khombol- Thienaba		12,8	12,8	seven groups of villages systematic drawing of 1/20 of the blocks
Survey in Pikine		100,0	5,0	
Madagascar Survey in Ambinanitelo	6,7	14,4	14,4	exhaustive survey of two communes chosen empirically

Table II - Overall outline of methods of sample taking

Survey	Sampling frame	Strata	No. of steps	PSU	Method of drawing PSUs	Sec. Sampling Units (SSU)	Method of drawing SSUs	Fraction
Algeria 1969-1971	geographic division of population by cebsys districts	"metropolises"	0	1	district	systematic		
		Urban communes Densely populated communes	1	2	commune	systematic proportional to size	district	fixed No. of districts accord. to stratum
		Grouped districts	2					
		Scattered districts	3					
		Sparsely populated communes	4					
		Grouped districts	5					
Scattered districts	6	Sahara	6					
Tunisia 1968-1969	a) list of households from 1966 census	Rural		sheikhdoms (or groups of sheikhdoms when fewer than 350 households	systematic proportional to size	household	systematic with a const. No. of house- holds per PSU (strata 1 and 2: 300; strata 3 and 4: 90)	1/25
		poor off. regis.	1					
		good off. regis.	2					
		Urban		"sectors" ⁽¹⁾ of communes of 250 households	systematic ordinary			
		big cities	3				1/30	
		small cities	4					
	b) marriages recorded since last census	Drawing of 12 households in each rural test sheikhdom and of 4 households in each sector of test communes.						
Pikine (Senegal)	cadastral map		1	1966: bldg. plots 1967: blockd	systematic			1/20

(1) Sectors in the census had been redivided for this survey (the survey sectors were to include each about 250 households).

CHAPTER IV

METHOD OF SAMPLE TAKING

1 - Summary of the principal methods of sample taking.

Different methods of sample taking might be used depending on the goals of the survey in question. We will go through them rapidly, emphasizing their advantages and disadvantages especially in third world countries.

a) The exhaustive survey

Although this method does not really involve sample taking, it is the only one that can be used in countries where there are very few people, for in order to know a sampling, the total number involved must be sufficiently large (1).

This method was used for some of the experimental surveys (Madagascar, pilot survey in Algeria). In most cases, it was used in conjunction with other types of sample taking, and involved the study of some zones in their entirety: two cantons in Cameroon, a few villages in Senegal, several districts in Algeria, two sheikhdoms in Tunisia.

This method has obvious advantages: since all people in a given area are to be interviewed, all that is necessary is simply to cover the area thoroughly. There are, however, some sizable disadvantages (though these exist as well in the surveys made by sample taking). The area to be covered by the survey must be well defined and covered very systematically. This makes it necessary to do what is sometimes a lot of mapping beforehand, and this is often done especially for the survey. Moreover, the meaning of "all people found in a given area" must be made clear. Migratory shifts can be a great obstacle for the enumerators.

(1) When a small population is studied exhaustively, the results obtained can rarely be used as acceptable durable statistics. These exhaustive surveys are thus often thought of as samplings drawn from a limitless number of cases and when this is so, one speaks of the "confidence interval", just as if a real instance of sample taking were involved. This mental manoeuvre should not be confused with that in which the results gathered for one sampling are said to cover a well-defined total, even though the confidence intervals will be calculated in practically the same way.

b) Empirical methods

These methods, which assume that a "planned choice" is possible, are not the best to use in third world countries. Let us run through them quickly.

- Standard units: in this case, either individuals (or perhaps "clusters of individuals") sharing the average features of the population in question must be determined. It is therefore necessary to know beforehand - at least roughly - what the basic features are. As this is not usually possible, this method very quickly becomes arbitrary.

This method can, however, be used for some special cases: pilot surveys (in which the study of the questionnaire rather than the survey's representativeness is important), verification surveys, and in cases where clearly defined local phenomena are being measured in experimental surveys, etc...

- Quotas: though the basic idea in this system resembles the approach just mentioned, the method is based on statistical knowledge of the population to be studied, not empirical conclusions. The sample covered by the survey is similar when it come to describing some features (sex, age) that are well-known by the entire population. There are two big dangers in this, though: in most cases, quota figures for the study being planned are not available, and the enumerators in all good faith might distort the sample, it not being easy to verify the results.

Even though these empirical methods, with some important improvements made, have yielded excellent results in countries where good basic statistics are available and where the enumerators are well organized, it seems preferable that they should not be used in third world countries. In any event, they should only be used to study some well-defined parts of the population (urban populations, "built up" areas, etc...)

c) Methods based on probability

As the aim of these surveys is most often to describe entire populations, the results of studies based on samples should be extended only very carefully. The bid disadvantage of empirical methods of sample taking is that a true measure of the representativeness of the sub-population under study cannot be established. The method based on probability, on the contrary, makes it possible to measure accurately the sampling error, and this with as much accuracy as one chooses.

In our opinion, this advantage is compelling, and we recommend that the method based on probability be used whenever the population under study makes this possible (and all the more so when the population is large). It is of course not always easy to make a random drawing in the sampling, especially because of the necessity to have a sampling-frame beforehand, but there are methods of drawing flexible enough to be adapted to most cases.

2 - Random drawing and how to carry it out.

Strictly speaking, a sample should be drawn as follows: after all the individuals making up the population have been listed, a number of individuals on this list are chosen at random, the number corresponding to the sampling-frame chosen (for example, 1 in 100 or 1000 individuals chosen at random from a list of one million inhabitants). In this procedure, the probability of a person's being included in the sample is known (and equals the sampling-fraction). The standard results of the calculation of probability can be applied.

This method cannot generally be used because, for one, the individuals chosen would be much too scattered geographically to permit this to be done economically; secondly, a complete list of the individuals in the population studied, with no repetitions, is necessary. Lacking this list, one can however replace it by another which is generally easier to obtain: a list of households or buildings (each individual clearly "assigned" to a household in such cases), lists of well-defined geographical areas, lists of tribes, clans, etc...

Before the drawing of the sample, the sampling unit must be defined very clearly. This unit can include the individual or a cluster of individuals. Once this is defined, it is essential to draw up a list of the sampling units. The choice made often depends on practical considerations.

When one has a sampling-frame - not always the case - it is necessary to bring it up-to-date before going ahead with the drawing. The ease with which this revision can be carried out depends on the method of sample taking chosen. When the sampling units are areas - most often defined geographically or by their populations - one need only verify that the population has not varied too much, especially in critical zones (near cities, recently constructed zones, etc...). When there have been modifications, the boundaries of the area must be recalculated so that they come out to be more or less equal. When the sampling units are households - or all the more so individuals - one must try

to draw up, before the survey begins, a list of households that have arrived since the time the sampling-frame (generally the census count) was set up. Obviously this is much simpler if the sample taking involves several steps and if the primary sampling units are, say, villages where the local authorities can provide essential information (i.e., the households or individuals which "no longer exist" pose fewer problems, as they are eliminated automatically at the time of the survey).

A particular sampling unit may be chosen over others because of the problems under study. In demographic surveys, for example, there is no doubt that a list of clusters (households or individuals) is to be preferred to a list of individuals, even in the very rare cases where such is possible. For the study of births and deaths, it is necessary to have a reference group to refer to.

The sampling units chosen should include the following features:

- they should be able to be defined very easily,
- they should remain relatively stable over a period of time,
- they should be able to be located easily,
- they should cover the entire population (each person should be covered by one unit and one unit only) (1),
- they should be able to be listed (a list need not necessarily exist before the survey, it simply must be possible to draw one up). Sample taking in several steps makes it possible to use relatively limited lists.

In the Tunisian survey, the household was chosen as sampling unit. This was possible because of a survey which had been carried out earlier, and in which an inventory of all the households had been made. However, besides the problems encountered in defining the households, the mobility of households created some difficulties, it not being always easy to locate or look for some households (problems of homonyms, those that disappeared, etc...). For the Algerian survey, geographical areas (census districts) were chosen instead.

(1) Assigning an individual to a sample unit can often pose some problems over a period of time. It sometimes happens that individuals join and leave a unit in a relatively short space of time (for example, a birth followed by a death several days later). This problem can be settled in part by asking the enumerators to take special care to note these cases carefully, at the risk of having to make a decision before processing begins as to whether or not a person belongs to the sample. Individuals who are very mobile might thus be left out or counted several times. The omissions and double entries probably balance one another out (see the chapters "Length of Survey" and "Survey Techniques").

Inventories could be traced and located far more easily. The population shifts within these areas did pose some important problems, though, especially in zones where there were many migrations.

For follow-up surveys, geographical units appear to be better than household units. The use of the individual as sampling unit is to be avoided at all costs. The disadvantage of using geographical areas as sampling units comes in part from the fact that the population figures can vary greatly between two rounds; in part from the importance that some "cluster effects" can have, especially when migrations are involved. The same drawbacks exist for households, or for any other groups of individuals.

In surveys based on area units, at the end of several rounds one finds the following sub-populations in each of the areas:

- The population present during all the rounds (including births and deaths involving people who are supposed to have been residents);
- The population present during only some of the rounds (1 and 2, 2 and 3, 1 and 3, etc...).

It is clear that in each round the size of the sample can vary, since the sample will be the total number of people in the first category and only a part of those belonging to the second. As there is no evidence to show that these two behave the same way (only the second is affected by migratory shifts), considerable bias can filter in from one round to the next. However, if there is a sufficient number of test areas one can conjecture that the number of departures observed in the test areas equals the number of arrivals (if only domestic or internal migrations are considered, the chances of being covered by the survey are the same for the person who leaves as for the person that arrives, when the sampling-fraction is the same). This hypothesis is in most cases founded, except when some areas have been affected by great overall shifts (large-scale emigration or immigration). These shifts can generally be detected early enough and the appropriate measures taken. For example, the disastrous floods in Algeria led to some sample districts being replaced by others with related features.

When the sample taking is based on a list of households, there are two sub-populations: households covered during all the rounds; households covered during some of the rounds only.

The difference between this method and the preceding one is that here the household lists from one round to the next are lost permanently, the statistics all the more so, as the households which cannot be located often have special features - small numbers, mobility, etc...

3 - Random drawing and the method of drawing.

When the sampling units have been drawn, they should be listed and the sample units drawn. Usually, there is not simply one drawing but several. Most often local considerations led to the population's being classified in several strata, these strata corresponding either to geographical regions or to bodies of homogeneous populations. It is in most cases best to use as many strata as possible. The sampling-frames of each stratum can be the same if, say, the aim of stratification is to study certain zones in isolation, though the populations covered are a priori different from one another. They can also vary from one stratum to the next, if stratification has isolated rather homogeneous groups. Stratification in the Algerian survey had this double aim: on the one hand, urban and rural populations, two groups relatively distinct a priori were distinguished; on the other hand, geographic zones of different sorts were distinguished so as to be able to adopt in each case the particular methods appropriate to its problems. As it was not evident that there was any homogeneity within these strata, and as the population was for all practical purposes of the same size, the sampling-fraction was the same in all the strata, but the method of drawing made it possible to concentrate better the districts to be covered by the survey in zones that could be reached with great difficulty.

Within each stratum, the drawing of the sample can now be made. As we have seen, one should avoid the use of the household as sampling unit. Instead, sample-taking by geographic clusters should be prepared. Within each sample cluster the enumerator must cover the entire population.

In most cases, it is advantageous to draw the clusters in a single step in the sample taking. For the drawing, either a table of random numbers can be used or - as such is generally available and is theoretically valid - a systematic drawing (units k , $k + n$, $k + 2n$, etc...). It is assumed that a complete list of clusters (villages, census districts) exists beforehand.

In some special cases, drawing in two steps of clusters is necessary.

In large countries geographically, or in cases where the number of the sampling (of clusters) is not high, the random or systematic sampling of clusters leads to the clusters drawing being so widely scattered that verification of the field-work is thereby hindered. In such cases, as first step, one goes about sample taking by area units in order to concentrate the clusters of the sampling.

The analysis of several demographic surveys has shown that the optimal size of the clusters is about 200/300 inhabitants. But great variations in this optimal size are possible without any great loss in efficiency. It does however seem advisable not to go beyond the limit of 1000 people per cluster. When the sampling units available are too big, a better solution is sample taking in two steps, in which case clusters of the desired size, these serving as secondary sampling units, are created within each primary sampling unit drawn.

In this (very rare) case, the drawing is made from a list of primary sampling units at a certain ration ($t_1 = 1/n_1$) and from these the list of secondary sampling units is set up from which a sampling at the ration t_2 is later taken in such a way that $t_1 \times t_2 = t =$ the desired sampling-fraction. This procedure requires in the early stages an exhaustive list (by strata) of primary units, and later, of secondary units forming part of the primary unit samples.

The ratios t_1 and t_2 are chosen somewhat arbitrarily. But with the strata, it is preferable to maintain the same probability in the drawing of each sampling unit. If it is possible to obtain the result by successive drawings of $1/n_1$ primary units, and then $1/n_2$ secondary units among the primary units drawn, it is better to use the following method: drawing of primary units with the probability of leaving the observation set proportionate to the number of secondary units that these contain, followed by the drawing of a fixed number of secondary units in the primary sample units.

4 - Size of the sampling.

When one wants to observe certain events touching a population, the sampling, in order to be representative, should include a large enough number of these events. Therefore, it is the frequency of the events observed that determines the size of the sampling, as well as, naturally, the accuracy that is looked for. If one assumes that the accuracy desired is the same in the features studied by the survey, it is clear that one's plans should depend on those observations which are infrequent.

In a demographic study, it is in general the death rate that is studied. If you assume that the death rate is about 15 per 1000 and 2000/3000 deaths can be observed, the sampling should include about 200 000 people.

It is obvious that the larger the sampling the more accurate the sample taking. The added accuracy in moving from a smallish sampling to a larger one is not great (if the sampling is extended to 100 000 people from 1000, the accuracy is only ten times greater). It is far better to take average sized samplings, the sampling errors being generally only one of the factors in question: the errors in observation are likely to increase with a large sampling, and the cost of the operations very quickly becomes prohibitively expensive.

Sampling error

The exact calculation of sampling error varies according to the method of sample taking adopted. However, a simple method of calculations can be generally used for making the first estimates: it is assumed that the events (births, deaths, etc...) touching the population under study follow the binomial law, according to which the probability of an individual's being affected by an event (i.e., of his dying or being born during the observation period) comes out to the following ratios: if p is the rate observed in the sampling, and P the real rate existing in the population, you get

$$P = p \pm 2 \sqrt{\frac{pq}{n}} \quad (\text{at } 95\%)$$

when $q = 1 - p$ and $n =$ numbers of the sampling (1).

Coefficients of variation, which are more eloquent than confidence intervals, might be preferred. In addition, they have the advantage of being valid both for estimating rates (t) and numbers of people involved (e).

$$\gamma = \frac{\sigma_t}{t} = \frac{\sigma_e}{e}$$

Tables I to V will make it possible to get an idea of the accuracy of these types of sample taking, this depending on the size of the sampling and the rates most often found in the third world.

More precise calculations of sampling error should take into account the specific features of the method of sample taking: stratification, drawing in several steps, varying probabilities, etc... We have

(1) The confidence interval at 95% is $p \pm 2 \sqrt{P \cdot Q/n}$, which is calculated by $p \pm 2 \sqrt{pq/n}$

Table I - Confidence intervals at 95% of the crude birth (1) and death (1) rates and of the rate of natural increase (1) according to the size of the sampling (2).

Size of sampling	Birth rate (45 per 1000)		Death rate (20 per 1000)		Rate of natural increase (25 per 1000)	
	2σ	2σ/t	2σ	2σ/t	2σ	2σ/t
25 000	+ 2,6	5,8%	+ 1,8	8,9%	+ 3,2	12,7%
50 000	+ 1,9	4,1%	+ 1,3	6,3%	+ 2,8	8,9%
75 000	+ 1,5	3,4%	+ 1,0	5,1%	+ 1,8	7,3%
100 000	+ 1,3	2,9%	+ 0,9	4,4%	+ 1,6	6,3%

Commission Economique pour l'Afrique (C.E.A.): Demographic goals and size of samplings necessary for surveys of population shifts.

- (1) t
(2) in the case of a direct drawing, in one step only.

Table II - Confidence intervals at 95% of some age specific death rates, according to the size of the sampling (1).

	Age groups									
	less than 1 year		1-4 years		30-34 years		45-49 years		60-64 years	
Proportion assumed to exist in total population (k)	birth rate 45 per 1000		0,13		0,06		0,04		0,02	
Accepted estimate of death rate per 1000 (t)	150		30		10		15		40	
Size of the sampling	2σ	2σ/t	2σ	2σ/t	2σ	2σ/t	2σ	2σ/t	2σ	2σ/t
50 000	+ 15,1	10,1%	+ 4,2	14,1%	+ 3,7	36,9%	+ 5,4	36,3%	+ 12,4	31,0%
100 000	+ 10,7	7,1%	+ 3,0	10,0%	+ 2,6	25,7%	+ 3,8	25,7%	+ 8,8	21,9%
150 000	+ 8,7	5,8%	+ 2,4	8,1%	+ 2,1	21,0%	+ 3,1	21,0%	+ 6,2	17,0%
200 000	+ 7,5	5,0%	+ 2,1	7,1%	+ 1,8	18,2%	+ 2,7	18,2%	+ 6,2	15,5%

Source: C.E.A. : Demographic goals and size of samplings necessary for surveys of population shifts

- (1) In the case of a drawing in one step only.

Table III - Confidence intervals at 95% of the death rates of two age groups: less than 5 years, 5 years and older, according to the size of the sampling (1).

	Age groups			
	0-4 years		5 years and older	
Proportion assumed to exist in total population (k)	0,17		0,83	
Accepted estimate of death rate per 1000 (t)	60		12	
Size of sampling	2σ	2σ/t	2σ	2σ/t
50 000	+ 5,2	8,6%	+ 1,1	8,9%
100 000	+ 3,6	6,1%	+ 0,8	6,3%
150 000	+ 3,0	5,0%	+ 0,6	5,2%
200 000	+ 2,6	4,3%	+ 0,5	4,5%

Source: C.E.A. : Demographic goals and size of samplings necessary for surveys of population shifts

- (1) in the case of a drawing in one step only.

Table IV - Confidence intervals at 95% of age specific fertility rates, according to the size of the random sampling (1)

	Age groups													
	15-19 yrs		20-24 yrs		25-29 yrs		30-34 yrs		35-39 yrs		40-44 yrs		45-49 yrs	
Proportion assumed to exist in total population (k)	0,052		0,044		0,037		0,031		0,026		0,022		0,018	
Accepted estimate estimate of fertility rate per 1000 (t)	110		280		290		240		180		80		20	
Size of the sampling	2σ	2σ/t	2σ	2σ/t	2σ	2σ/t	2σ	2σ/t	2σ	2σ/t	2σ	2σ/t	2σ	2σ/t
50 000	+ 12,3	11,1%	+ 19,1	6,8%	+ 21,1	7,3%	+ 21,7	9,0%	+ 21,3	11,8%	+ 16,4	20,4%	+ 9,3	46,7%
100 000	+ 8,7	7,9%	+ 13,5	4,8%	+ 14,8	5,1%	+ 15,3	6,4%	+ 15,3	8,4%	+ 11,6	14,5%	+ 6,6	33,0%
150 000	+ 7,1	6,5%	+ 11,0	3,9%	+ 12,2	4,2%	+ 12,5	5,2%	+ 12,3	6,8%	+ 9,4	11,8%	+ 5,4	27,0%
200 000	+ 6,2	5,6%	+ 9,6	3,4%	+ 10,5	3,6%	+ 10,5	4,5%	+ 10,7	5,9%	+ 8,2	10,2%	+ 4,6	23,2%

Source: C.E.A. : Demographic goals and size of samplings necessary for surveys of population shifts.
 (1) In the case of a drawing in one step only.

Table V - Confidence intervals at 95% of the average age at childbirth (1)

Size of sampling	2σ (years)	2σ/m (m = 29,3)
50 000	1,286	4,2%
100 000	0,910	3,1%
150 000	0,746	2,5%
200 000	0,644	2,2%

Source: C.E.A. : Demographic goals and size of samplings necessary for surveys of population shifts.
 (1) In the case of a drawing in one step only.

We have seen that the method used in sample taking might use several techniques, stratification generally recommended and the drawing by clusters practically obligatory.

No special remarks need be made about the effect of stratification on the calculation of sampling errors. We need simply say that the advantages in using stratification are unquestionable, a good stratification resulting in greatly increased accuracy, a poor system of stratification not necessarily resulting in a loss of accuracy.

It is not easy to calculate the effects of a drawing in several steps. It appears that in most cases it reduces accuracy, often by just a little, though sometimes with considerable effects. It should be specially noted that apart from the cluster effect, all sampling by clusters can be considered to be sampling in several steps, the cluster (sampling unit) thus considered to be the same thing as the last unit in the drawing. We could cite some of the results of experiments in this area.

In the Algerian survey the sampling error was calculated by two methods, working from a sampling used in two stages of verification. For the birth rates, the relation between the sampling error calculated exactly and the one calculated approximately varies from 1.25 to 1.85 according to the strata. Analogous figures have been made based on surveys carried out in Chad and Nigeria (see Tables VIII, IX and X).

In France, working from two housing samples, one in one step only, the other in several steps, the ratio - which varies according to the features observed - is most often close to 1.5. (1).

In a sampling in two steps, if the number of secondary sampling units drawn in each primary unit is gradually increased, it finally comes out that all the secondary units have been chosen in each primary unit, producing a sampling by clusters. As the number of secondary units is increased, the sampling error is increased as well. One can say that the cluster effect is basically the same as the effect of a drawing in several steps, though somewhat more pronounced.

These two types of clustering are directly related to the spatial dimension of the feature being studied. The effects will be considerable when

(1) F. Chartier, "Erreurs d'échantillonnage pour divers plans de sondage de logements". Annales de l'I.N.S.E.E. II (October 1969) pp.24-25.

the units within the same cluster are alike; on the other hand, if each cluster includes a population that is as heterogeneous as an entire population, there is no clustering. Moreover, the more secondary units there are in each primary unit, the greater the clustering.

If the clusters are not very big, there is often little clustering as regards demographic features, such as birth rate, death rate, division by ages, etc... For Factors such as migration and the rate of economic activity (and all the more so for the type of activity, schooling, etc..) clustering can be considerable. This often depends on individual appreciation.

It can be said that the more reason one has to apprehend clustering, the smaller the clusters themselves should be. The experience drawn from several African surveys makes it possible to state the following practical rule, this for clusters of about 300 inhabitants and the sampling errors affecting vital rates: if the accuracy is the same, a sample of clusters should be about twice as large as a sample drawn directly.

We can also speak of some experimental results obtained from three samplings of dwellings in France, one of them drawn directly, another directly, the third in clusters of 240 dwellings. The coefficient of variation goes from 1 to 1.05 to 1.18 in the case of one of the factors studied, going from 1 to 4.08 to 4.92 in the other. The difference is bigger or smaller depending on whether the cluster is effective or not in relation to the factor studied.

The following tables give an idea of the sampling errors to be expected, this varying according to the method of sampling used. Note that the events measured here are extremely infrequent (births or deaths), something which explains the large size of the samples.

Table VI - Approximate size of sampling necessary for estimates with a given accuracy, assuming that:

$$\sigma_a = \sqrt{\frac{Pq}{n}} \quad , \quad \sigma_b = 1,4\sigma_a \quad , \quad \sigma_c = 1,1\sigma_b \quad , \quad \sigma_d = 1,1 \text{ à } 1,2\sigma_c$$

Accuracy		Size of the sample			
		Direct drawing (a)	Drawing in two steps (b)	Drawing in clusters (c)	Drawing in 2 + steps in clusters (d)
3%	Births	100 000	200 000	240 000	280 000 to 350 000
	Deaths	200 000	400 000	480 000	550 000 to 700 000
5%	Births	40 000	80 000	100 000	120 000 to 140 000
	Deaths	75 000	150 000	180 000	220 000 to 260 000

Notes: Calculations made at a level of significance of 95% for the crude birth rates (t) at about 45 per 1000; for death rates, about 20 per 1000.

(a) direct drawing of n people, not related to one another, chosen from the entire population;

(b) drawing in two steps of n people, not related to one another, chosen from the entire population (this method can be compared with that of the Tunisian survey);

(c) direct drawing of about 500 groups of individuals from all of these groups (drawing by clusters);

(d) drawing in several steps of groups of about 500 individuals from all the groups (method of sample taking in the Algerian survey).

Table VII - Accuracy of estimates for a sample of a given size, assuming that:

$$\sigma_a = \sqrt{\frac{Pq}{n}} \quad , \quad \sigma_b = 1,4\sigma_a \quad , \quad \sigma_c = 1,1\sigma_b \quad , \quad \sigma_d = 1,1 \text{ à } 1,2\sigma_c$$

Size of the sampling		Accuracy of the estimate $\frac{2\sigma}{t}$ (%)			
		Direct drawing (a)	Drawing in two steps (b)	Drawing in clusters (c)	Drawing in 2 + steps in clusters (d)
50 000	Births	4,1	5,6	6,2	6,8 to 7,5
	Deaths	6,3	9,1	10,0	11,0 to 12,0
100 000	Births	2,9	4,2	4,6	5,0 to 5,5
	Deaths	4,5	6,3	6,9	7,6 to 8,3
150 000	Births	2,4	3,4	3,7	4,1 to 4,5
	Deaths	3,6	5,0	5,5	6,0 to 6,6
300 000	Births	1,7	2,4	2,7	2,9 to 3,2
	Deaths	2,5	3,6	3,9	4,3 to 4,7
500 000	Births	1,3	1,9	2,1	2,3 to 2,4
	Deaths	2,0	2,8	3,1	3,4 to 3,7

Notes: calculations made at a level of significance of 95% for the crude birth rates (t) at about 45 per-1000; for death rates, about 20 per 1000.

- (a) direct drawing of n people, not related to one another, chosen from the entire population;
- (b) drawing in two steps of n people, not related to one another, chosen from the entire population;
- (c) direct drawing of groups of individuals (about 500) from all of these groups (drawing by clusters);
- (d) drawing in several steps of groups of about 500 individuals from all the groups (method of sample taking in the Algerian survey).

We should emphasize the arbitrariness in the choice of the coefficients which make it possible to measure the loss of accuracy as one goes from one method to the next. Tables VIII, IX and X, drawn up for three surveys that used method "c" allow the suitability of the proportions we have chosen ($\frac{\sigma_c}{\sigma_a} = 1.54$) to be appreciated.

6 - Distortion of the sample.

For various reasons, it can happen that the sampling covered by the survey is not the same as the theoretical sampling. Mistakes can slip in at the time of the drawing, especially when the sampling frame has not been set up well. Therefore, between the drawing of the sampling and the survey's departure into the field, the principal sample units, if not all of them should be checked. Improvising in the field, the effect of which on the enumerators could only be regrettable, can thus be avoided. That is, if it is necessary to change the sampling unit (because of the impossibility of locating it in the field, poor definition, etc..), it is always better that the enumerators should know nothing of this, so that they do not come to do this themselves.

It often happens during a survey that mistakes in identification are made. This is especially true when the sampling unit is the household (homonyms, etc..). It is possible to avoid such errors to a large extent by defining clearly the units to be covered by the survey, something which also enables the effects of those errors which remain to be lessened; e.g., a household would be described not only by the name and address, but also by the size, professions of one or more of its members, etc...

Table VIII - Algeria (verification of the 1966 census count)

Stratum	Size of the sampling	Number of clusters	Average size of clusters	Births				Deaths			
				Crude rates	Coeff. of variat.		$\frac{(b)}{(a)}$	Crude rates	Coeff. of variat.		$\frac{(b)}{(a)}$
					(a)	(b)	(a)		(a)	(b)	(a)
0	32672	57	573	10 ⁻⁴	10 ⁻⁴	10 ⁻⁴	1,38	10 ⁻⁴	10 ⁻⁴	10 ⁻⁴	1,49
1	38733	69	561	535	234	287	1,23	68	669	1 004	1,58
2	36970	63	587	513	219	270	1,26	110	487	769	1,64
3	49159	95	517	463	237	296	5,16	109	495	813	2,07
4	31665	37	587	552	187	964	1,85	104	440	916	2,00
5	36753	70	525	427	324	599	1,52	93	700	1406	2,43
6	27292	58	571	512	225	342	1,80	116	482	1168	2,15
				417	293	526		95	619	1328	

(a) Approximate figures, which assume that the drawing has been made directly

$$\left(\gamma = \sqrt{\frac{q}{np}} \neq \frac{q}{p}\right)$$

(b) Exact figures taking into account the method of drawing (clusters, method "c" of Tables VI and VII)

N.B. This is a verification of the results of the Algerian census of 1966.

Table IX - Chad (1964 Survey)

Stratum	Size of the sampling	Number of clusters	Average size of clusters	Births				Deaths			
				Crude rates	Coeff. of variat.		$\frac{(b)}{(a)}$	Crude rates	Coeff. of variat.		$\frac{(b)}{(a)}$
					(a)	(b)	(a)		(a)	(b)	(a)
1	17936	59	304	10 ⁻⁴	10 ⁻⁴	10 ⁻⁴	1,57	10 ⁻⁴	10 ⁻⁴	10 ⁻⁴	1,93
2	11931	41	291	420	355	560	1,13	320	409	790	1,23
3	8910	30	297	270	467	530	0,91	240	584	720	1,29
4	8316	28	297	350	550	500	0,90	200	740	960	1,29
5	12814	43	298	350	575	520	1,08	220	735	940	2,21
6	14429	47	307	450	406	440	1,01	320	488	1 080	1,48
7	8932	29	308	450	384	390	1,38	300	472	700	1,04
				550	438	610		430	500	520	

(a) and (b) see notes Table VIII.

Source: Scott and Coker, "Sample design in space and time for vital-rate surveys in Africa" (UIESP)

Table X - Nigeria (1965 - 1966 survey)

Stratum (1)	Size of the sampling	Number of clusters	Average size of clusters	Births				Deaths			
				Crude rates	Coeff.of variat.		(b) (a)	Crude rates	Coeff.of variat.		(b) (a)
					(a)	(b)			(a)	(b)	
				10^{-4}	10^{-4}	10^{-4}		10^{-4}	10^{-4}	10^{-4}	
1A	77 644	47	1 652	373	182	470	2,58	184	262	582	2,22
2A	46 656	24	1 944	325	253	442	1,75	129	406	784	1,93
3A	166 341	89	1 869	353	128	388	3,03	226	161	443	2,75
1B	75 712	338	224	371	185	254	1,37	184	265	337	1,27
2B	45 173	199	227	304	266	361	1,36	129	410	492	1,20
3B	154 785	607	255	345	134	235	1,75	220	169	263	1,55

(a) and (b) See notes Table VIII.

Source: see note Table IX.

(1) The strata "A" cover as much geographically as the strata "B" (except for several units eliminated from "B" because of inadequate data). The analysis in strata "B" covers divisions which are more detailed; i.e., smaller clusters within the larger ones used for the analysis in "A" were used.

At the same time, it is occasionally difficult to find units from one round to the next. This is especially inconvenient when measuring the effects of migrations, because it is the migratory units precisely that cannot be found again. Only sampling by geographical areas can avoid this problem.

Finally, when it comes time for processing, there are always a certain number of records that cannot be used. If there are only a few of them, their distribution can generally be regarded as random.

The only real solution to all these cases of possible distortion is to have a network of very conscientious controllers, for they can make sure that the units have been clearly identified, and on the other hand, concentrate on tracking down those units which do shift, thus reducing considerably the number of unusable records. And as far as the records are concerned, it is essential to eliminate the whimsical enumerator, for his mistakes cannot be righted by random corrections.

To eliminate these distortions (when they are not too numerous) - and without greatly affecting the value of the sample - the following procedures can be used: drawing of a sample bigger than needed and subsequent elimination of units poorly covered by the survey (or not covered at all); replacing units poorly covered by the survey (or not covered at all) by similar units. There are two possible solutions, either doubling the first unit or looking for and then doubling a similar unit.

But the work of the survey takes place primarily in the field, and the survey's success depends on the conscientiousness of the enumerators, and the speed at which the people in charge can make the necessary adjustments.

7 - Problems peculiar to follow-up surveys.

All of the above mentioned remarks can be applied to any survey by sampling. The use of follow-up surveys, however, raises additional problems.

a) Impairment of the sampling

The sampling can be said to be representative if the sampling-frame was perfectly up-to-date at the start of the survey. However, when the survey is to continue for a certain length of time, distortion between the - population and the sample is likely to develop quickly. It is therefore

necessary to give the sampling a "booster", to regenerate the sampling in the course of the survey. For example, if the sampling unit is the household, a list of the new households in the population could be drawn up and a few of these could be covered by the survey. (In this particular case, it is easy to follow systematically from one round to the next the households which have grown out of those on the baseline sampling).

The sampling can be regenerated all the more easily if it is in one step, at least - this based on area units - since it would be only necessary to note the changes taken place since the first count. When sampling is done by spatial units, this "booster" is administered automatically. In such cases, moreover, special attention should be paid to areas where the population varies considerably from one round to the next.

The longitudinal analysis of some cohorts, one of the basic centres of interest in follow-up surveys, poses somewhat more awkward problems. Such analysis is of course impossible except when the individuals making up these cohorts have been covered by successive rounds of the survey. This can be done, therefore, for only a part of the sampling: that part of the population which is settled, or mostly settled, for the entire length of the survey. It is therefore necessary to make corrections unlike those which had been planned for and to consider the risk of contacting only a somewhat biased sampling.

There are two solutions to this problem - to accept or reject the bias in question. If it is accepted, it is not necessary to regenerate the sampling. It can be corrected when the results are being analysed by using formulae of extrapolation that will have been worked out beforehand (estimates by the quotient or by regression, by using the data of a round processed by cross-sections in order to determine the amount of regression. If the bias is accepted, the sample should be regenerated from one round to the next, and each time an individual is covered, one should check to see whether he had been contacted on the previous rounds, those who were not covered being given a retrospective questionnaire. The number of individuals covered on only some of the rounds is thus reduced, something which gives the retrospective questionnaire added importance.

b) Correcting mistakes:

However much attempts are made to eliminate mistakes when the survey is being carried out or processed, some will remain, and these should be

eliminated in the last step before analysis (see Chapter VIII, "Processing").

When considered from the point of view which concerns us here, that of longitudinal analysis, correction of these errors results in either a loss of numbers, or a rather big delay in processing. It would be possible to plan on making corrections after each round, but the information obtained concerning a single individual could no longer be regarded as homogeneous. (We could cite the example of a profession which was not reported at the beginning. Random correction should by no means be taken as being migration for professional reasons.). On the other hand, if instead of making the necessary corrections one waits for all the rounds to be completed, it is impossible to carry out the processing over a period of time. The results of the first part of the survey would not then be available until the end of the survey.

8 - Errors in observation. (Also see chapter "Analysis")

The errors in observation are even more dangerous than sampling errors. The methods we propose here should be used with the greatest caution, but we do think that it is necessary to make some estimate of these errors, however imperfect this estimate may be.

a) The method of Chandrasekhar and Deming.

The method of Chandrasekhar and Deming is based on a comparison of two completely separate surveys that cover the same sampling. It is described in the chapter "Analysis". The method was used in Algeria on a subsampling and in Tunisia, Madagascar, and Cameroon, in very limited experiments. The results that have been obtained are not in fact perfectly satisfactory. The hypothesis on which these experiments were based are too rigid: firstly, it is well nigh impossible to get two surveys that haven't the slightest connection with one another; secondly, it is doubtful that the observation of events within one of these surveys is governed by the same probability as in the other survey. In addition, such a venture is very costly.

b) Estimates by using the quotient, by regression, etc..

The method we outline here should make it possible to estimate, and thus correct, with reasonable accuracy, some errors of observation. Or to be more accurate, we should say that this method enables one to make the start necessary, in work that should undoubtedly yield many results.

The basic idea behind the theory is to compare the results of two separate sources: on the one hand, the general survey, with all its weaknesses; on the other, another source, totally separate from the first, and which would not include any errors of observation. The differences between them, which affect the results, are of two sorts: firstly, the sources in question are not representative of the same total number of people; secondly, one of the sources (the survey) includes errors of observation. The method of estimation by using the quotient can be used to eliminate this first difference. What remains - the errors of observation - can be measured.

The following examples will show this:

Imagine that by processing statistics on revenues one could get, without any error, the ages and numbers of children still living for all working women. In the survey itself, questions would have been asked about activities, when appropriate, and about the ages and number of children. It is thus possible to locate in the survey the subpopulation of working women, with the ages and number of children. The variable "number of children still living" is relatively undisputed, so that there is little error of observation. On the other hand, though, the variable "age" is likely to be very inaccurate.

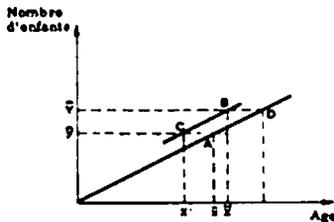


FIGURE 1

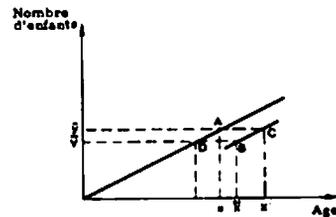


FIGURE 2

All the information that follows can then be recorded graphically:

\bar{x} = average age according to the statistics on revenues

\bar{y} = average number of children according to the statistics on revenues

\tilde{x} = average age of working women according to the survey

\tilde{y} = average number of children of working women according to survey.

There are two reasons to explain why points A (\bar{x} , \bar{y}) and B (\tilde{x} , \tilde{y}) do not coincide. Whereas the statistics on revenues cover all working women, the survey only gives a biased sampling of this population. Secondly, the statistics on revenues are assumed to contain no errors, while for the ages, the survey gives inaccurate information.

We must now correct the sampling so as to eliminate the bias which comes from the surveys not being representative. To do this, we will assume that the quotient $\frac{\bar{X}}{\bar{Y}}$ is correct (the numerator and denominator do not include errors of observation); the value of Y in \bar{y} will be corrected (\bar{y} gives the true value if the statistics on revenues are thorough), and will deduce \bar{X}' in such a way that

$$(\bar{X} - \bar{X}') = \frac{\bar{X}}{\bar{Y}} (\bar{Y} - \bar{y}) \text{ (Point C).}$$

In the two observations we have eliminated the bias due to the samplings not coinciding. The gap that remains between Point A and Point C represents the total amount of error in the survey (at the very least, for the subpopulation "working women"). This error itself is made of two elements: an error due to the sampling (E_s), which can be figured out from our knowledge of the numbers involved in the sampling; and then an error of observation, E_o , that can be calculated by subtraction.

$$E_o = \sqrt{E_t^2 - E_s^2}$$

Figures I and II illustrate two possibilities:

Figure I: in the population covered by the survey, the proportion of young women is not large enough, which accounts for the number of children (Y) being overestimated. On the other hand, the ages were underestimated. This underestimation can be represented by CA, if the sampling error is not considered.

Figure II: in the population covered by the survey, the proportion of young women is too great, which accounts for the number of children (Y) being overestimated. This overestimation can be represented by CA, if the sampling error is not considered.

N.B. It is easier to study the Point D, AC and BD being equal. This amounts to saying that it is the sampling of the survey that is representative, and that the statistics on revenues are biased - but the reasoning is unchanged.

The method described here should be developed further. But let us make the following remarks:

a) It is necessary to have two separate series of observations, one of which includes little error of observation. If need be, a small survey could be made, containing few questions, and in this survey one would try to

eliminate this type of error.

b) This method requires working on variables that are closely related (but rather than correct the samplings by using the quotient, they could be corrected by regression, though the problem remains basically -the same). One of these two variables should include few errors of observation made in the survey part.

c) Only some variables can be used to figure out the error, and this often for only part of the sampling. It is not certain that the errors computed will always exist.

c) Comparison of various rounds

One of the advantages of surveys that include several rounds is that they yield successive observations made of the same phenomena. The differences between these observations can be measured and explained. As the sampling remains basically the same from one round to the next, it is possible to get a rough idea of the extend of the errors of observation and especially of the features which were observed with the least accuracy.

d) Comparison of the various enumerators

It is possible at some point to compare the results given by the various enumerators. This method, however, is open to discussion, because the enumerators are not assigned their territories in random fashion, the bias which might slip in is not necessarily the fault of the enumerators. Nonetheless, rotating the enumerators from one survey to the next would make it possible to measure the main errors made in one population.

9 - Conclusion

The success of the survey depends in part on the method of sampling that is chosen. When the desired goals are taken into consideration, this method should be as simple as possible. For demographic surveys, we believe that the following techniques might be recommended: classification by strata beforehand; drawing by area units in several steps, this necessary only when the range of the survey is very large or when the clusters that can be used are unusually big.

The samples should be rather large, and sample taking itself can be done only when the population is large enough. The only method of drawing

to be recommended is random drawing, even though more empirical methods can be used in some cases.

Sampling error should not in general create great problems. One of the advantages in a study made by sample taking is that errors of observation can be reduced by training extensively a small number of enumerators, and by setting up a system of well-trained and conscientious controllers.

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CHAPTER V

DURATION OF THE SURVEY

The central idea in the methodology of follow-up surveys is that the events taking place in a given period are observed by an enumerator during two rounds, one at the beginning, the other at the end of this period. The total length of the observation period, as well as the frequency of the survey cycles, can vary from one project to the next, but experience has shown that certain general principles must be followed if the work done is to be worth anything.

A) - Total length of observation period

1) Period of continuous observation (1)

The original projects notwithstanding, it always proved necessary to have the continuous observation work cover at least one year, in order to avoid confusion due to seasonal changes. It is in fact rather unusual to have available an estimate of seasonal shifts sufficiently accurate so as to extrapolate, for a whole year, the results of a survey covering less than twelve months. This was tested in Tunisia, a country where the registration of vital statistics is, however, relatively accurate. The extrapolation of the results of the first six months that was done at the end of the second round was shown to be false by the results of the third round (although not only the seasonal changes in births and deaths, but also seasonal variations in recording these events at the official registry, had been considered).

Although the minimum period necessary is twelve months, nothing rules out making it longer, something which would, moreover, have the following advantages:

a) The events taking place in a given period can be known with greater certitude when the period covered by the observation is longer. It is thus possible to avoid, or to correct a posteriori those errors due to "telescoping" (poor definition of the situation of the event in the reference period).

b) A long observation period enables the momentary effects of circumstances and random fluctuations (the latter are greater when the

(1) We make the distinction here between "continuous" observation and "retrospective" observation.

numbers involved are smaller). In surveys covering small populations, there is thus a natural tendency to extend the observation period, in compensation.

It would not, however, be possible to extend the length of the survey indefinitely without taking special precautions, for if the rounds were to occur too frequently, there would be the risk of tiring the people covered by the survey. One might also wonder if over a period of time, the survey doesn't distort the behaviour of those being questioned, this introducing a bias in the sampling.

2) Period of retrospective observation:

If the central idea of follow-up surveys is continuous observation, it is still interesting to take advantage of the first round in the field to carry out retrospective observations. This is a less expensive way of meeting the need spoken of above, for going beyond the minimum observation period of one year (reduction of variations, reducing the effects of telescoping), which also opens the way to making interesting methodological observations on the advantages of the continuous survey over the traditional retrospective survey.

To get the most of retrospective observation work, no less than a year should be allotted here too. However, it appears that the further extension of such observations is to be avoided, as lapses of memory are unfortunately frequent occurrences, and these increase with longer reference periods. Here, as elsewhere, it is to one's advantage to start the survey on a day which is important for the population studied, and the retrospective period of observation will sometimes best be reduced to less than twelve months. Though it is not perhaps as useful, such a survey is considerably more effective. This was done in Algeria, for example.

B) - Frequency of the observation cycles

Whatever the length of the reference period adopted, the most profitable interval between successive rounds must be determined. The various requirements here are contradictory, and there is, in fact, a difficult compromise to make in specifying this interval. On the one hand, it would be ideal to carry out one's observations continuously - permanently - and thus, in effect, increase the number of rounds as much as possible, for when this is not the case, memory has too much of a role to play, however small this may be.

On the other hand, though, the ideal thing would be instead to reduce the number of visits as much as possible to avoid tiring the people covered by the survey, and above all, to reduce the cost of making the survey. The solution adopted depends on the relative importance attached to these contradictory elements. The surveys considered in Part One of this book show great variety in this respect (see the Appendix to this chapter): one month in Ambinanitelo, four in Ankazoabo, six in Algeria, Tunisia, Cameroon, six to eighteen months in Senegal. It is impossible to make any generalizations. An interval of four months allows pregnancies to be detected with relative accuracy, thus guaranteeing the quality of the observations of births and of deaths at an early age. But in order to reduce expenses (three rounds rather than four in one complete year of observation work), one might be led to extend the period to six months, thus reducing fatigue among the people covered by the surveys - without losing the advantage just spoken of. There is also the possibility of making intermediary rounds, in which the enumerator would note only those events that took place since the last round, while in the main rounds the enumerator would use the complete questionnaire.

C) - Timetable

1) Period of retrospective observation (when appropriate)

If it has been decided to make a retrospective survey this complementary to the continuous survey, it must quite obviously be made on the first round. The reference period adopted also will end, obviously, on the day of the first round. But as this date is flexible (all the interviews cannot be held the same day), there are two possibilities open for setting up a good starting date.

For the needs of analysis, it seems best to refer to a period the length of which is fixed (e.g., twelve months). This greatly helps in the analysis of the results, and was the rule adopted in all the surveys carried out in Black Africa. In Tunisia and Algeria, though, it was thought better to increase the quality of the observation work rather than gain this practical advantage. That is, the populations covered by the survey have in general a rather poor idea of the passage of time, and even greater problems in locating events in a daily calendar that often has nothing to do with their cultural context. It is thus very difficult to find people whose memories

can be counted on to reveal accurately whether a recent event falls within the last twelve months or not. It is, however, much easier to fix the date of the event by reference to an important day in the lives of these people. It was this that led to the idea of using in Tunisia and Algeria the most popular holiday in these countries as starting date for the retrospective survey, Aïd-es-Seghir (the end of Ramadan).

2) Period of continuous observation work

These problems do not exist for continuous observation work. On the one hand, the basic principle of the survey makes it necessary to choose the time elapsed since the last survey as reference period. On the other hand, we can assume that the previous survey is a starting date in the minds of those covered by the survey. To emphasize this, in Tunisia, each head of household was given a ticket (taken from a voucher book) on which the date of the round in progress was indicated, as well as the date of the following round. On the next round, these tickets were asked for and the date on which the visit was to be made was verified. This helped refresh the memories of the people interviewed as to the exact circumstances of the previous visit.

The timetable of the survey should be kept to as closely as possible. The household covered by the survey the first time on x day should be covered the second time on $x + p$ (p = the number of days in the reference period); and the third time, $x + 2p$, etc... (1).

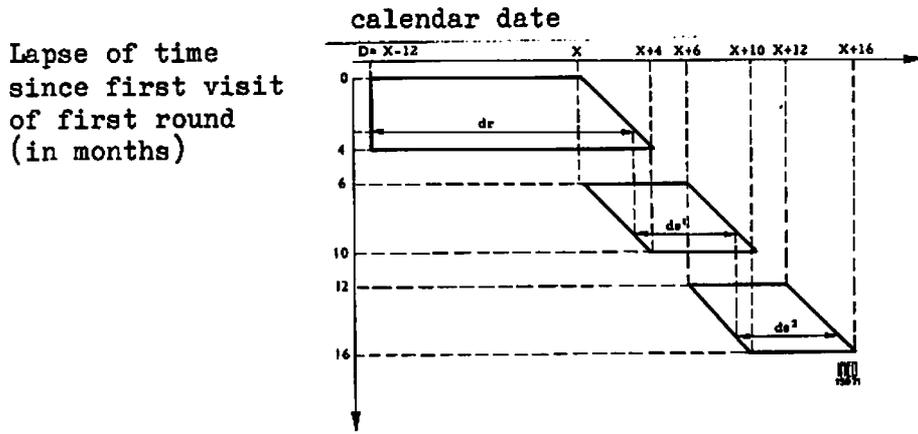
This requirement is in fact all the more important for rounds taking place one year (or in other yearly multiples) after the first round. The rule can be applied to intermediary rounds, though, to facilitate the verification of work of the enumerators (2). It would obviously be ideal that for periods of a year, the timetable be kept to the day, and maximum efforts must be made to keep to this schedule. Certain delays, due to material problems in the field or lapses in the part of enumerators (illness, resignation, dismissal etc..), should be accepted though. When it comes time for the analysis, one need merely weight all the events observed with the correction factor (3).

(1) For the sake of convenience, p is measured in months, even when these months are not of the same length. A first visit 13 February 1968 would, for example, be followed by the second, 13 August 1968 (an interval of six months) The important thing is to keep to the timetable to the day, that the third round should take place 13 February 1969, even if the date of the second round 13 August 1968, could not be kept to.

(2) For this reason, it is good for each enumerator to follow a detailed timetable.

(3) This factor should equal the average number of days really separating the interviews, this divided by 365. It is better to do this than to eliminate those events observed outside the twelve month period.

The start of the continuous survey (that is, the first round) can be set in relation to the desired length of the retrospective observation period, once this has been given a definite starting date. In Tunisia, for example, the first round began twelve months after Aid-es-Seghir in 1967, which marked the start of the reference period for the retrospective observation. Sometimes, though, it is above all geographic and climatic conditions which are important.



Graph I. Timetable of a follow-up survey (preceded by a retrospective survey covering undivided reference periods).

Lastly, the length of each round depends on many and various material conditions (the enumerator-population ratio, the terrain to be covered, means of transport, the skill, training and supervision of enumerators, etc...). For the quality of the survey it is necessary to respect certain norms. The length of a round should be at least one month shorter than the interval between two rounds, as one month is the shortest possible period in which the work can be reviewed and training sessions set up to prepare the next round, these sessions drawing on the lessons learnt during the previous round. Ideally, two months would be necessary to carry out such a programme. But the time spent in the field should not be reduced too much by, for example, using too great a number of enumerators. Verification can only be effective when there is a certain amount of time between the first and last interviews: the controller should correct some errors, and always help the enumerators to improve their skills, etc... The same thing is true of the supervisor in his dealings with the controller. Each level of the hierarchy involves some delay; but if to reduce this, one were to multiply the number of enumerators (and thereby the corresponding verifications by the hierarchy), one would come to the nonsensical result of a costly but perfectly ineffective system of verification.

As an example we can give schematically the timetable of a survey in which the retrospective observation work would start on a noteworthy day, D; the first round, on $x = D + 12$ months; and each round after this on $x + r$, $x + 2r$, $x + 3r$, etc. (with $r = 6$ months), and in which each round would last four months (see Graph I).

D) - Overlapping of observation periods

Up to this point we have assumed that on each round the enumerators asked questions only about the events taking place since the previous round (or on the first round - as the case may be - starting from given date).

But one might take up on each round periods of reference going beyond the date of the prior round, referring to all or parts of the reference periods previously used.

This improves the quality of the observations and makes it possible to verify - with even greater accuracy - the work of the enumerators. But the two sets of statements referring to the same reference period open the way to two different types of methodological analysis: estimates of omissions or double entries; influence of the length of time on memory lapses.

The timetable of reference periods thus becomes somewhat more complicated. We can cite the plans of the Tunisian and Algerian surveys (see Part One).

Appendix

Duration of observation periods - a summary

Country of survey(s)	Number of rounds	Approximate length of each round	Interval between two rounds	Period of retrospect. observation work, when appropriate	Total length of observation work
Algeria	3	5 months	5 months	8-13 months	8-13 months (retrospective) + 12 months (continuous)
Tunisia	3	4 months	6 months	12-16 months	12-16 months (retrospective) + 12 months (continuous)
Senegal Sine-Saloum	7	1-2 months	12-18 months		4 years (continuous)
Khombol-Thienaba	5-6	3 months	12-18 months	12 months	5 years (continuous)
Pikine	5	3 months	6-12 months		4 years (continuous)
Cameroon	5	3 months	6 months	12 months	12 months (retrospective) + 2 years (continuous)
Madagascar Ambinanitelo	12	?	1 month		12 months (continuous)
Ankazoabo	4	?	1 month		12 months (continuous)

CHAPTER VI

CONDITIONS IN WHICH SURVEYS WERE CARRIED OUT

1 - Organizations in charge

In most cases it was the National Statistical Services that first took the initiative - in Senegal (survey in Sine-Saloum), Madagascar, Tunisia, and Algeria - all the more so in the last two countries mentioned, where the surveys were to be nationwide.

In the surveys restricting themselves to more limited areas, the groups initially requesting these surveys cover various sectors: in Senegal, for example, it was the Institute of Social Pediatrics (for the surveys of Khombol-Thienada and Pikine), and in Cameroon, it was a foreign group, O.R.S.T.O.M., which included the survey of Adamaoua in its study projects.

2 - Staffing

a) Organization:

The problem here is not one found only in follow-up surveys; the only difference here between these and traditional surveys is that the field work lasts longer, the teams formed staying together for all or only part of the survey. We distinguish here nationwide surveys from local surveys.

In the more local surveys (in Senegal, Cameroon, Madagascar), where the numbers studied were relatively limited, technical management was taken care of by a demographer, he in turn helped by one to three controllers or heads of teams, depending on the particular case.

The nationwide surveys, on the other hand, require a rather large number of enumerators (60 in Tunisia, 100 in Algeria), and thus effective supervision. For this type of survey, at least two hierarchical ranks must be planned for between those in charge of all the operations and the enumerators: controllers (1) and supervisors. The chain of command must function at both technical and administrative levels, and the controllers and supervisors must be able to command respect in their jobs. When this is lacking

(1) The work in between that of a controller and supervisor is sometimes done by a "head of team".

as was the case in Tunisia, some problems arise that can only be handled by having the people in charge of the survey frequently present in the field. Although these people should spend some time in the field, this should not detract from their other functions.

Both the work of the enumerators in the field and their work on the documents should be verified. Controllers and supervisors should have a part to play in both these areas, though not to the same degree.

The number of enumerators was in general greater during the baseline count than it was on subsequent rounds, especially in Madagascar. In Tunisia and Algeria, however, the organization remained the same for the entire duration of the survey. There are generally about three enumerators for each controller (see Table I). The pattern of team used in Algeria (four enumerators for each controller) appears to be satisfactory. In Tunisia, where there were seven to nine enumerators for each controller, the teams were somewhat too large, this posing problems, most often having to do with equipment (transport).

Table I - Organization of teams of enumerators

	Controllers or heads of teams	Enumerators		Number of enumerators per controller on later rounds
		1st round	later rounds	
Algeria	28 (+ 10 supervisors)	100	100	3-4
Tunisia	7	63	63	9
Senegal				
Sine-Saloum	2	10	5-6	3
Khombol-Thienaba	1	2-3	2-3	2-3
Pikine	1	7	5	5
Cameroon				
Adamaoua	1	7	2	2
Madagascar				
Ambinanitelo	0	27	1	-
Ankazoabo	3	70	10	3-4

b) Recruitment of the enumerators

The recruitment of enumerators generally (as in Algeria, Senegal, Madagascar) relied on two sources:

- staff having already taken part in the operations of a census,
- new staff.

In Tunisia, all the enumerators had worked for the Demographic Statistics Branch. In Cameroon, the entire staff was hired specially for the survey: fifteen trainees were chosen from whom seven enumerators were later picked, after a three week training course.

In Algeria, it appears that the use of civil servants of the municipalities was not always satisfactory.

The level of schooling of the enumerators varies: the "Certificat d'études primaires" was sometimes sufficient, but with the spread of compulsory schooling, as in Senegal, for example, those hired tended to have the "brevet élémentaire" or to be at the level of the "third form" *

c) Training of the enumerators

Because of the circumstances just mentioned, the training of the enumerators was carried out in various ways, although in general, emphasis was put in practical training in the field.

In those countries where trained and untrained enumerators were hired, the training was in general given by those who already had some experience (Algeria, Senegal). For the baseline count, the training periods of the enumerators lasted two weeks in Tunisia (not counting the pilot survey); three weeks, plus one week for a pilot survey, in Cameroon; four weeks in Algeria.

In Senegal, at the time of the first survey (Sine-Saloum), a one week trial survey was made in order for controllers and enumerators to try working together. The new enumerators generally worked for about a week with someone with experience.

Short training sessions were held before each round in most of the following cases:

* Translator's note: The "Certificat d'études primaires" is given at the end of grade school to those who do not go on to secondary school. The "brevet" and the level of the "third form" (in French orientated school systems) has been described earlier.

Table II - Average productivity of the enumerators on rounds following the baseline count.

	Number of people interviewed	Frequency	Length of one round (in months)	Number of enumerat.	Number of people polled per enumerator per month
Algeria	350 000	6 months	5	100	700
Tunisia	140 000	6 months	3-4	63	600
Senegal					
Sine-Saloum	50 000	annually	3-4	5-6	2500
Khombol-Thienaba	12 000	annually	3	2-3	1500-2000
Pikine	5 000	6 months or 1 year	2 (done part-time)	5	1000
Cameroon					
Adamaoua	15 000	6 months	3	2	2500
Madagascar					
Ambinanitelo	15 000	monthly	1	1	...
Ankazoabo	25 000	4 months	1	10	2500

The rough average number of people interviewed in one month is generally lower during the baseline count than on the rounds that follow because of the time necessary to set up the lists at the very beginning (in Senegal, Sine-Saloum, the number jumps from 70 to 100 per working day).

Table II shows the productivity of rounds after the baseline count. Productivity was lower in the surveys done by sampling (700 people per enumerator per month in Algeria and Tunisia) than in those where entire zones were studied (about 2500 people). We should note that in Senegal this varied from 1000 to 2500, but in the first case, a sampling of city blocks was the subject. Between the two rural areas, Sine-Saloum and Khombol-Thienaba, there is a difference, in the case of the latter because only children were involved and not the entire population - thus a survey in which enumerators had to travel for a population which was twice as small. In the survey in Sine-Saloum, where there were two zones, productivity was similar in the densely populated area (80 inhabitants/sq.km) - where dwellings were grouped together somewhat closer.

Ambinanitelo in Madagascar was a special case, for the enumerator, after questioning the notables, immediately went to those households in which an event was said to have taken place. This method was also tried in Senegal during the first yearly cycle in the survey in Sine-Saloum, productivity being relatively similar. The population covered was more dispersed per unit of enumerating time, but the risk of error was obviously different.

A considerable amount of time could be saved by organizing adequate transport. Deficiencies in this area complicated the job of the Tunisian enumerators, this explaining in part the lower productivity there.

In Algeria and in Senegal, a small vehicle was allotted to each team of three enumerators. In the country regions of Senegal, the enumerators had at the most twenty kilometres to cover to return to their base camps at night. In urban areas, the survey zone ten kilometres away, the bus could be used.

In Madagascar, two all-purpose vehicles were allotted per group of thirteen people in one of the zones and travel by foot and canoe was the form of local transport for the sole enumerator in the other zone.

In Cameroon, there was an all-purpose vehicle, bicycles added to this after the baseline count.

Last of all, we should emphasize that the quality and productivity of a survey depend as well on the frequency of contacts between the head of the survey and the teams.

d) Rotating the enumerators on different rounds

The use of follow-up surveys poses a definite question: should the same team of enumerators be sent out to the same places on each round? If the answer is yes, the most obvious advantage is that the team which gets to know better its assigned terrain and populations can take advantage of the material advantages this knowledge brings to improve their work, to do it more rapidly.

On the other hand, though, it is to be feared that the enumerator who on each round goes to the same households will be reluctant to report those errors he might have made on previous rounds, but instead reinforces them, consciously or not.

Several solutions are in fact possible here, and these have been tried, thus far without conclusive results:

1 - Same teams in the same place:

a) all the staff do exactly the same things on each round (but circumstances - leaves, illness, dismissals, resignations - make this difficult to apply strictly),

b) the enumerators are changed within each team.

2 - The controllers of a team are changed, the enumerators remaining in the same location (this can be done with or without changes in the enumerators within the team).

3 - An entire team can be changed.

4 - A complete new set of teams can be trained.

Changing supervisors is also a possibility, though the benefits gained from this are not particularly great.

e) Should there be female enumerators ?

As one of the goals of follow-up surveys is to reduce as much as possible errors of observation concerning events (births and deaths), it is to be hoped for that the women who are capable of childbirth can be interviewed directly, and when circumstances permit, in detail. Very often such a procedure runs up against the opposition of solidly established social customs that set up a more or less clear case of segregation of the sexes, as is true in North Africa. In certain cases, female enumerators have thus been used for work on the fertility questionnaire. This does not, however, solve all problems:

- Coordinating the work of the enumerator (general questionnaire) and the female enumerator (questionnaire on fertility) is not simple;

- It is not easy to make arrangements in the field for teams including members of both sexes;

- The female enumerators are often poorly accepted by the population covered by the survey when it is not customary for women to hold such jobs.

A novel approach was used to solve the problem in Tunisia (1): in the small villages, where an enumerator cannot in any case himself first approach

(1) In big cities and in the country, women are freer, so the problem takes a different form.

a female for the interview, the enumerator was "introduced" by a female social-worker, who served as a pass.

In Algeria, where women are customarily confined, part of the traditionalist population did not approve of the female enumerators, as the work they did symbolized emancipation from the usual male protectors.

f) "Guides"

The recruiting of guides, who are very useful in helping the enumerators visit the household in his sampling in rural areas, is not a technique of follow-up surveys only. Depending on whether the enumerators are isolated or not, the help of the guides must be available either on the first round only or on each round. The interpreter-guide can be useful in those areas where populations speaking different languages live together in the same clustering, when the enumerator does not speak all these languages.

3 - The reception of the population

The survey was generally received well because of the publicity campaign that had been carried out, and also because the families covered by the survey seemed happy to learn that others found them interesting.

The more difficult conditions encountered in urban areas were successfully met in Tunisia by the use of social workers, as we have just seen. We have spoken at length of the problem of interviewing women in Algeria, even when female enumerators are used, this because of the tradition of confining women.

The frequency of the rounds does not appear to have changed the open attitudes of households covered by the survey if the Senegalese survey, now in its eighth annual round (some of these held during the trying period of the droughts), is any indication of this or not.

It is useful to repeat here how necessary it is to have simple questionnaires, which do not cause the attention of the person being interviewed to flag. There are some questions which are taken as a sign that some help from the enumerator is forthcoming, as was the case in Senegal, where questions about illness were asked. Each question should be studied beforehand to see whether the length of the survey that is planned will enable it to be treated without upsetting the survey's schedule.

Even though these statistics must in any case quite naturally be kept secret, the success of future rounds makes this even more necessary. The lists of village populations drawn up by the enumerators must not be transmitted to the administration, and the population should be aware of this. General figures for a village may be published, though if there are significant differences between its figures and the survey's figures, the administration is likely to try to verify this. This is a danger that must be weighed.

4 - Carrying out operations

Follow-up surveys, like any survey, include three phases: preparation, work in the field, processing.

In follow-up surveys, the second phase (operations in the field) is considerably longer and more or less broken up. Overlapping is thus unavoidable and in many cases, this is even to be hoped for: the preparation for each round, observation and simultaneous processing, etc... (see Chapter V, "Duration of the Survey").

a) Preparation obviously includes the definition of the basic idea of the survey, getting money allotted, drawing up documents necessary for the work to be done, and most important, training the enumerators, controllers, and supervisors, as well as carrying out the essential pilot survey (1).

b) Work in the field is in general preceded by a campaign in which the population is given information about the survey. This campaign should, however, be used judiciously and discretely when the survey is to be made by sampling. In this case it is even more important to meet the local notables, for it is necessary for the enumerators to have enough leeway here. The field work proper begins with the first interview on the first round and continues through the last interview of the last round. Between each round, it was planned to leave some free time, this for all practical purposes equal to the difference in time between the duration of each round and the interval between each round. In some cases, the enumerators were to be used at this time in tallying and in transcription (Tunisia, Senegal). This goal could be reached only partially in Tunisia, and the processing of the survey was delayed considerably as a result.

(1) Some surveys skipped this step (Tunisia, for example), but this is a handicap.

This time can be used for three indispensable activities: preparation of the next round (especially when some of the information is to be cross-checked); retraining of enumerators and controllers; regular and special holidays (and if the enumerator works in the field "continuously", this includes Sundays and holidays).

In general, the timetable of operations is planned carefully in advance for each round, as are the itineraries of the enumerators and the teams. This guarantees that the work in the field will be carried out as it should be, all the more necessary as the problems of supplies (transport, food, etc...) are sometimes very difficult. The documents themselves, blank or filled in, should follow a clearly-established routing (distribution, stocking, etc...).

At the same time, the rotation of the enumerators should be planned for, this according to the scheme chose.

c) The most important virtue of processing being its rapidity, it is all the more to be desired that processing should go on at the same time as work is being done in the field, and that this should continue throughout the duration of follow-up surveys, etc... It is therefore useful to have, in addition to all the enumerators, a separate staff in charge of processing only. (Algeria is the best example that can be cited in this respect). If necessary, the consistency of the two staffs can be easily checked, this followed by further verification in the field. The transcription is carried out as the documents are sent in from the field. The first tables can be made just a short time after the end of each round.

When there is a lapse of only a little time between the two rounds, such a system is indispensable, as it is when the original documents must be sent back to the field quickly.

5 - Financing and costs

Under this heading appear some remarks concerning the means of financing, management, and estimates of average expenses per unit (the "cost price" lacking here).

a) Means of financing

While the Algerian survey was financed entirely by the Algerian government, half of the financing of the Tunisian survey came from foreign sources.

For the more limited local surveys, which cost less, financing is relatively easy. In Madagascar, the Malagasy government took care of this; in Senegal, except for the national survey, the cost of which was covered entirely by the Senegalese government, foreign aid has paid for a considerable part of the surveys; lastly, in Cameroon, the decision to carry out the survey as well as the financing came from other sources than the government of Cameroon.

The total length of the survey was not fixed in advance in some cases. The first annual cycle was undertaken with the resources then available in the hope that additional money would be allotted to allow the survey to continue. This was the case in Senegal. The advantage of this system is that the nation's own officials, or foreign help, might thus be stimulated to carry on the work that has been begun. There is the danger, though, that the programme might be interrupted.

b) Management

Independent management of the budget is as necessary as a special budget for the operations of the survey. Delays in paying salaries, in paying for equipment, can affect the way in which the survey is carried out (interval between rounds, etc...). This very important drawback was clearly illustrated in Tunisia; at the beginning of the experiment in Senegal, some similar effects were felt.

c) Costs

In estimating costs, there are two types of consideration that come into question, one of these concerning the relativity of the costs involved, the other referring to the unit chosen for measuring costs.

i) Some of the expenses are already included in the normal working budget of the organizations involved. This is true, for example, of the salaries of some of the staffs, expenses having to do with land and rentals, and material which is already available. In such cases, the cost of the survey is marginal.

Moreover, some surveys gather data which is not only demographic proper. The cost of the demographic part of these surveys cannot easily be calculated. If the other subjects of these surveys vary from one survey to the next, it is difficult to make comparisons.

The traditional demographic data can be analysed more or less thoroughly. One can either make do with makeshift results or instead exploit the data as much as possible, when, for example, the length of the observation work makes it possible to carry out interesting longitudinal analysis (a study of the intervals between births, for example). The cost of processing can thus change total costs considerably, and it is for this reason that such elements were not included in the estimates.

ii) As for the unit to be used, the most useful one seems to be the individual per observation year, but one should also take into account:

- the number of visits per annual cycle;
- the number of yearly observation cycles. It so happens that the cost of the baseline count is higher than that of subsequent counts. In addition, it is only logical that the survey should become easier to carry out over the years, thus less expensive.

Lastly, in surveys by sampling, the cost of the average distance between clusters must be added to the cost of making the survey within a cluster. In any event, the following elements might be distinguished:

- the unit of the individual covered by the survey;
- from this, the cost involved in surveying the numbers planned on.

Because of what has been said, the estimates in Tables III and IV can be taken only as giving points of information. The cost per person polled on each round in nationwide surveys is from five to ten times higher than in limited surveys.

Table III - Cost of national surveys by sampling (in French Francs)

	Algeria	Tunisia
Funds involved	8 000 000 FF	1 000 000 FF
Number of people covered by survey	350 000	140 000
Total duration of observation work	8-13 months	12-16 months
Cost per person polled	23 FF	11 FF
Total reference number	12 000 000	4 500 000
Cost per person in total reference number	0,67 FF	0,33 FF
Cost per person polled per round	7,6 FF	3,6 FF

N.B. These estimates do not include the cost of processing. Nothing would have been proved by comparing the results with the costs of a general census, where the goals and data are of a very different nature.

Table IV - Cost of experimental surveys (in French Francs)

	Senegal			Cameroon	Madagascar
	Sine-Saloum	Khombol-Thienaba	Pikine	Adamaoua	Ankazoabo
Funds involved	160 000 FF	46 000 FF	16 000 FF	31 500 FF	46 000 FF
Number of people covered by survey	53 000	12 500	4 000	15 000	25 000
Cost per person polled	3,00 FF	3,70 FF	4,00 FF	2,10 FF	1,85 FF
Number of rounds	4	6	3	5	4
Cost per person polled per round	0,75 FF	0,61 FF	1,33 FF	0,42 FF	0,46 FF
Number of complete yearly cycles	3	5	2	2	1
Cost per person polled per observation year	1,00 FF	0,74 FF	2,00 FF	1,05 FF	1,85 FF
Number of supervisor-months	23	10	3	27	-

N.B. The cost of the supervisor or technical expert was not included in the experimental surveys. It is mentioned, though, under the listing of the amount of time spent on the survey that appears at the bottom of the table.

Senegal - The estimate is limited to 1963-1965 in Sine-Saloum and 1967-1969 in Pikine in order that the calculations should be of the same general order.

The survey of Sine-Saloum includes provisional processing, as does the survey of Khombol-Thienaba, which gives mainly the mortality rates and quotients by age.

Cameroon- To make comparison easier, the estimate was made from the figures listed in the detailed records covering the main sampling.

Madagascar- For sake of the comparison in question, only the survey of Ankazoaba is recorded here.

If in the very limited surveys the cost price of the technical expert is added, one gets the approximate cost per person polled per round of 1,8 FF - 3,5 FF (Senegal and Cameroon), something which further reduces the gap.

In the event that the cost of the survey in one clustering practically equals the cost of the experimental surveys, the difference is due to the distance between the clusters. This means in effect that for the survey to be representative and sufficiently accurate on a nationwide scale, the cost price would be twice as high. It becomes clear why it is advantageous to abandon the difficult strata (those, for example, in low population density areas) which burden the entire survey considerably, and to tackle these areas instead by more homespun methods (as was the case in the Algerian Sahara).

CHAPTER VII

SURVEY TECHNIQUES

Under the general heading "survey techniques" we take up rather different issues, these more or less directly related to the actual work of the enumerator. It would be necessary as well to consider here the instruction booklets given to enumerators. These documents, which are much too lengthy to be taken up here, were not discussed in the first part of this book, except for those points which are peculiar to follow-up surveys (1). We will take up below first the "field" of the survey and then the questionnaire.

I - The "field" of the survey

The "field" of a survey is both geographic and temporal. Whether it be just a sampling or the entire population which is covered thoroughly by the survey, the definition of the individuals making up these groups relies on locating them on two levels, in time and geographically. Though this is relatively simple in the case of an exhaustive survey that is made in one step only, locating them becomes more difficult when the survey covers a sampling - and this for an observation period which is more or less long. In the case of follow-up surveys in particular, the field should be clearly defined, at the risk of otherwise coming up with differences from one survey to the next.

In this respect, the population of reference must be distinguished from the events of reference.

A) Population of reference

The enumerator should draw up his list of this population, either during the baseline count or on each round, depending on the type of survey. There are two ways of defining these populations - de jure populations and

(1) In other handbooks are indicated some of the traditional aspects that are shared by follow-up surveys and those made in one round only.
R. Blanc, Manuel de recherche démographique en pays sous-développé (Paris: I.N.S.E.E. 1962).
I.N.S.E.E.-I.N.E.D., Afrique noire, Madagascar, Comores: Démographie comparée (Paris: DGRST, 1967).

de facto populations. In the case of the former, it is the ordinary situation of individuals that is of interest, this defined either by referring to someone's legal status, or more often, by referring to his usual situation (which in turn is defined by specific criteria). In the latter case, it is only the situation existing at the time of the survey which is of interest.

One rarely has to choose either one or the other solution. In most cases, the solution adopted falls somewhere between the two, but it is closer to de facto than to de jure, depending on the precise case in question, of course.

In demographic surveys, which refer mostly to birth and death rates, it might seem more intelligent to refer to de jure populations so as to be able to attribute births and deaths to those populations where they took place (1). However, a rather complex set of rules is necessary to be able to define a de jure population, and these rules are difficult both to teach to the enumerator and to put into effect in the field. In general, that is, it is the "usual" situation that must be used. However, a situation is "usual" only if it lasts a certain length of time. "Presence" and "absence" therefore become essential parts of one's working definition - with all the risks of error that these terms imply. Moreover, certain categories of individuals, "permanent migrants" (travelling pedlars, for example) can thus be missed by the survey entirely, or on the other hand, be over-counted, depending on the way in which their migrations have worked out and the rules about the length of presence that the particular survey adopts.

In order to simplify things, efforts have been made to come as close as possible to de facto situations; this is not perfectly satisfactory either, as there are serious problems of interpretation when it comes to interpreting migratory shifts.

The best solution is undoubtedly to gather as much information as possible during the observation work in the field, and to postpone the choice of a population to be used until processing. This can be done in two ways:

Either a de jure population is defined ahead of time, with the enumerator being asked to classify the people covered by the survey in three

(1) Sometimes the sampling itself is responsible for this choice. In Tunisia, for example, where the sampling included only "private" households, a de jure definition was needed to cover correctly those individuals who belonged to collective households.

categories (residents present, residents absent, visitors), all of whom will in fact be covered by the survey; or a definition might be put off until later, when such is feasible. The enumerator distinguishes only between two categories of individuals (present and absent), but for each person notes the length of time and the reason for the presence (or absence), the various rounds making it possible to refine the ideas involved.

This maximalist solution is doubtless the best, to the extent that it enables the population of reference to be defined in relation to situations actually observed.

B) Events of reference

Theoretically speaking, the events of reference are part of the same problem as that of populations of reference, as the two definitions must be exactly the same if they are to be consistent. However, it is not always easy to put this consistency into practice. An event (birth or death) belongs to the field of the survey when the person it touches belongs to the population of reference at the moment it occurs. If a sampling by spatial units and a de facto population (including every person in the sampling area at the time of the survey) have been chosen, every event taking place in the sampling area during the reference period must be included. Pushed to its limits, even the traffic accident which kills someone passing through the sampling area in the reference period must be considered. The difficulties created when applying this definition to some types of events can easily be imagined.

Moreover, as soon as one leaves the de facto population strictly speaking, the definition of the events of reference becomes very complex, as the essential thing is to know whether they took place before or after the people concerned entered or left the field of the survey.

Here, too, the best solution appears to be to put off the final decision until processing. One must therefore ask the enumerators to record all events and to indicate: the exact date and place of the event; the situation of the person concerned at the time the event takes place (presence or absence and reason for these; positioning of the event in relation to the date on which the subject was "present" for the first time.

All of the questionnaires of the surveys studied in Part One have been reproduced and added on to the appropriate chapter. The striking thing about them is their great diversity, and this concerns both form and content.

II - The questionnaires

A) Form

When producing a questionnaire nothing can be neglected: its format, whether printing is to be done on both sides or not, the quality and colour of the paper or cardboard, the number of pages, and (when appropriate), the binding, etc... Each of these items has its own importance at different stages: transcription of the answers, filing the records, verification, tallying. In particular, the spaces must be large enough (with wide columns and enough space between the lines for the information written there to be legible), but small enough so that the questionnaire is not too awkward, too difficult to handle. It is therefore best to use strong paper or cardboard whenever possible, especially if the form is printed on both sides.

Generally speaking, two types of questionnaires are used - individual or multiple. Most of the questionnaires studied here are multiple. In Senegal, however individual forms were used (1); for in this case, the enumerator went back into the field on later rounds with the information already gathered, limiting himself to making necessary additions. In such cases, it would have been very difficult to use multiple questionnaires, where additions and corrections would have quickly become illegible. The individual forms had here the obvious advantage of being simpler and easier to use. It often happens, moreover, that additional questions (for individuals) these concerning some parts of the population, are tacked on to multiple questionnaires. The most common instance of this is the fertility form, which is to be used for each woman capable of childbearing.

In most cases, multiple questionnaires are used for households, and the household must be included in the basic definitions of the survey (most frequently, "household" includes all those people "living under the same roof" or "eating at the same table" who belong to the population of reference). The "household" questionnaire therefore includes in such cases at the very least the identification of the household, a set of questions on membership in the household, and the events that took place during the reference period. Attention should be paid so that some special cases do not escape notice (for example, a single person, making up a household independently, who dies

(1) This method is all the better as the surveys are spread over many years (some of them have been going on for eight years).

during the reference period). It appears, though, that this type of multiple questionnaire is the best one suited for follow-up demographic surveys. It allows the problems of populations and events of reference to be handled best, the changes occurring between two rounds to be followed, and the results gathered to be checked immediately for consistency. Moreover, the data concerning members of the same household are given by some of these members (sometimes by one member only) and it is easier to use a questionnaire covering everybody. (This does not rule out, though, special questionnaires meant for certain well-defined members of the household).

In addition to these individuals and multiple questionnaires, in some surveys (in Senegal and Cameroon, for example), "village ledgers" or "communal ledgers" were used - to record declarations of vital events taking place between two rounds (births, deaths, marriages). In such cases, the operation is more that of a registry of vital statistics than it is a survey proper, in which the person concerned does not have to make the first move. The village ledger must also be distinguished from another type of survey which is based on a system of permanent registration (Algeria). In these cases, the "registrars" regularly make their rounds of the sample households, not waiting for them to "report" births and deaths.

The drafting of the questions requires some important decisions to be made. There is obviously quite a difference between the simple chart to fill in (which merely serves as a guide to the enumerator, who must formulate the questions orally) and the real questionnaire (which the enumerator follows literally, without changing anything). Can the enumerator's judgment be trusted? To what extent? The question came up very clearly in Algeria, where a solution that limited as much as possible the initiative of the enumerator was adopted (without, nonetheless, going as far as to use a questionnaire which was drawn up completely, since this - because of the type of questions asked - would have been much too lengthy). The awkward questions - and those questions considered to be most important - were written out in entirety on a separate form that the enumerator was to consult in order to fill in some parts of the questionnaire (which, it so happens, took the form of a simple chart). The system used in Algeria for the questionnaires, the most complicated of all those studied here, was doubtless too much so. Of course, part of this came from the questionnaire's including many questions on special topics (fertility, profession). In spite of this, it does not appear that the quality of the information obtained suffered as a result.

In any event, it seems best to indicate to the enumerator the exact list of questions to be asked and the order in which these are to be asked, as well as to draw up completely those questions which might otherwise be formulated ambiguously.

The language in which the questionnaire is written - the link between form and content - is itself a difficult problem. The surveys taken up here were in general designed by French-speaking teams, and the first version of the questionnaires was therefore in French. The questionnaire itself, though, was meant to be used in the native language of those covered by the survey. In countries where there was only one native language, and where this was spoken by the enumerator (who, in addition, happened to speak French - as was the case in Tunisia), it was felt necessary to translate on the form itself at least some of the questions, so as to be sure of consistency. It goes without saying that the problem is more awkward when the native language changes from one region to the next. The danger of mistaken interpretation is all the greater there, as the preventive measures to be taken are more numerous (translations, enumerators chosen because of their mother tongue, etc...).

B - Content

In this section we distinguish between the basic questionnaire, which is to some extent the common denominator shared by all follow-up demographic surveys and the additional questionnaires which might be used as well, for all or part of the population covered by the survey.

1 - Basic questionnaire

We treat questions on events separately from those concerning populations.

a) Population

Whatever the form of questionnaire, a list of the individuals concerned must be drawn up, and for each person certain information must be noted (family name, first names, sex, how related (1), date and place of birth -

(1) Very often it is the relationship with the "head of the household" that is studied. This is not enough, however, to make an analysis of the structure of family units, and it is necessary to get a much fuller picture of the relationships between the various members of the household (e.g., Tunisia). If individual questionnaires are used as well, it is easier to locate the individual more easily on later rounds if the family names and first names of the parents at the very least have been indicated (e.g., Senegal).

in all cases; in certain situations, ethnic group, language spoken, level of education, etc...). This inventory of the population covered by the survey can be made on the first round only, on several of the rounds, or even on each round.

If this is only done on the first round (which is thus called the baseline count), on later rounds only those changes which took place in between times need be noted. The inventory of the population will be therefore known at the end or in the middle of the reference period if the first inventory is corrected by adding additional observations later on (this was the procedure adopted in Cameroon).

It might be necessary, though, to make a new inventory, if not on each round (as in Tunisia and Algeria), at least on several rounds. This technique provides a sounder basis for calculations in demographic analysis (for the events can be attributed to a true "average population"), and in some cases can be used to figure out errors made concerning the structure of the population, or to avoid leaving out certain types of events. The decision to use the population questionnaire more than once can be made independently or in regard to other matters.

Obviously, any comparison of the same individual made round by round in longitudinal analysis requires at the very least that the person can be identified without any mistake on each round (by the means, for example, of a reference number). The independence and separateness of the rounds require, too, a system of individual identification.

Independent rounds -

The enumerator knows on the second or third rounds only the reference number used on the preceding round. This is difficult to put into practice, for if the household number can be transmitted from one round to the next without indications as to the make-up of the household, this is not the case with the individual's number, which depends on his position in the household. If we consider this problem to be settled, we might imagine in such a case making a comparison of each person on each successive round. Errors made in the size of households or concerning the individual's features can be considered to be independent of one another from one round to the next. The results of this compromise can later be used in processing to calculate errors, or verifications might be made in the field.

Such a method raises three problems: if the identification of individuals is not accurate, the comparison itself will seem less useful; a return to the field can only be made after the comparison is finished, and this comparison itself requires a considerable amount of time; the households involved sometimes do not understand why the "same work" is carried out at regular intervals.

Dependant rounds -

The enumerator knows all or part of the answers given on the previous round. Practical advantages here are obvious: there is no problem in identifying the individual. The enumerator can himself immediately verify the accuracy of statements made to him on different rounds, making the necessary corrections. However, as there is no longer any independence between the answers that are supplied, it is no longer possible to calculate errors (1). What is more, the enumerator tends to limit himself to noting down new information, which leaves us with a baseline count that is merely corrected on successive rounds. An intermediate solution, though, appears to be more satisfactory (2). On the second, third rounds, etc..., the enumerator has a list of the names of individuals (without any other individual features noted); he knows, in the case of female informants, whether the person in question was or was not pregnant on previous rounds - but nothing else. He must therefore carry out the survey as on the first round without taking into consideration the information obtained then. Later the results obtained are compared with the information he has available, and he can, finally, request clarification when the answers are inconsistent. This system makes it possible to keep the answers at least somewhat independent of one another (this is doubtless relevant when it comes to the size of households, but not for information about individual features, age especially); avoid leaving out certain types of events: the deaths of people previously covered by the survey, the births of children for women who reported a pregnancy on the previous round.

It requires, though, a set of enumerators who are competent and conscientious; the way of conducting interviews must be closely supervised.

(1) These errors concern the omission of individuals, plus information about them known by the enumerators.

(2) Provided that the enumerators, and the checks made, are fair.

Processing is necessarily more complicated (involving the comparison of observations made on several occasions in cases where one wants to measure the extent of error).

b) Events

The basic aim of follow-up surveys is to "catch" the events taking place between consecutive passages, to follow the evolution between two rounds of the population covered by the survey (whence the expression "continuous surveys", which are distinguished from the traditional retrospective surveys). The field of the survey can be extended, though, to good effect by allowing for various reference periods.

- Continuous surveys and retrospective surveys.

There are obvious advantages to be obtained from carrying out the traditional retrospective survey on the first (baseline) round. There is a gain in time. If the retrospective survey is processed quickly it can yield, in a very short time, tentative results. These are naturally to be used carefully. But these results are at least as good as those of any traditional survey and can be used, for lack of better, while waiting for the final results.

There are advantages to be obtained for the part of the survey that is continuous. Knowing that events took place earlier, at the time of the baseline count, makes the rest of the survey more efficient, even when these first results were incomplete. An event which was already reported on the first round and then later declared as taking place after this round, can be classified correctly at once.

There are advantages methodologically. Comparing "retrospective" data with "continuous" data in the same survey enables the respective virtues of each method to be measured.

So that the reference period of the retrospective part of the survey was effective, in Tunisia and in Algeria, a fixed starting date that corresponded to a notable occasion for the entire population (Aïd-es-Seghir) was used. In such a system, the usual advantage gained by referring to the "last twelve months" (this making up a standard one year reference period) was lost; but on the other hand, there was a gain in the accuracy of dated events, which is even more important (during processing it is relatively easy to go back to a period of twelve full months).

- Overlapping of reference periods.

The workings and the advantages of overlapping various reference periods were already covered in Chapter V, "Duration of the Survey". The "events" questionnaire on the second round, third round, etc..., can, that is, cover not only the period since the last round, but can take up again all or part of the reference period used before then. On the second round, for example, the retrospective reference period could be covered again. On the third round, either the retrospective period and the first and second rounds could be covered, or only the second round, and so on.

When gathered separately, information concerning the same events makes it possible to calculate the errors and to measure forgetfulness over a given period of time.

Overlapping reference periods were regularly used in Algeria and Tunisia.

- Verification by using the inventory.

Depending on the type questionnaire used, the answers given to questions might be checked against those furnished on the inventory during the previous round. Such is the case, taken up above, when a list of the names of individuals recorded on previous rounds is available, as well as answers to the question on pregnancy (see "dependent rounds").

- The question of "catching-up".

When a certain type of event is not declared in the appropriate reference period, one way to make this up involves asking for the date of the most recent event of this type in the household (see the Tunisian questionnaire, where some deaths and births could thus be retrieved). The answers given to these questions, moreover, could well be compared from one round to the next.

2 - Supplementary questionnaires

During a demographic survey, one might want to take up one or more subjects that have nothing to do with the observation of demographic changes proper. The case arising most frequently is that of the recent history of women capable of childbearing. But one can also look for additional information on the professions, the level of schooling, etc., of certain categories of people.

This additional information in general can be gathered from a sampling which is smaller; does not concern everybody; and does not necessarily require continuous observation work. These additional questionnaires can thus cover a subsampling (see chapter "Method used in sample taking"); some members of the household only (e.g., married, widowed or divorced women; males older than 15 for the professions, etc...); one round only.

In these cases, the follow-up survey can make it possible to carry out several investigations without overburdening the questionnaire.

This technique should not be abused, though, for multiplying the categories of people and the object of each round could, if done excessively, bias the answers to the basic questionnaires to the extent, that is, that answers can be influenced by particular circumstances at the time they are given (1).

Some of the additional questionnaires might, moreover, require treatment during several rounds (e.g., study of professional migrations); or they might lead to a marked improvement (for example, in the fertility records for married, widowed, and divorced women). In such cases, the additional questionnaire, even though it covers a subsampling, is a burden on all the rounds; and if the range of the survey as a whole is not to be reduced, the number of these operations should be limited.

While on this topic, we cannot emphasize enough the need to design questionnaires that are as accurate and simple as possible. Questions must be set clearly and must not be ambiguous. The enumerator must know thoroughly all the workings of the questionnaire, which should, moreover, be made as practical and easy to handle as is feasible.

C - The objects of the questionnaire.

We have already seen that the questionnaire can include several parts of which one, the basic questionnaire, is meant for the entire sampling; the additional questionnaires, for certain people only (i.e., subsamplings in these categories).

(1) It is necessary in particular to eliminate those questions that have little relation to the main aims of the survey, as well as subjects which are likely to be accepted poorly by the population covered by the survey (income, land ownership, etc., for example), which distract from the atmosphere necessary for a successful survey.

It should be noted, in addition, that the basic questionnaire itself, on the second round, third round, etc., can be reserved to a limited number of test households. This was the case, for example, in one of the surveys in Madagascar, where on the baseline count, one was limited to asking the notables for lists of households where events had taken place, these households then covered by the survey. We could not emphasize enough the inadequacies of such a method, as the method used in follow-up surveys is intended precisely to reduce omissions. The omissions are unlikely to take place in households that the notables know well for having been the "scene" of a demographic event.

We should go even further, and state that one of the major concerns of the enumerator is to question as many people as he can in any one household so as to be able to make the necessary cross-checks.

Conclusion.

These "survey techniques" might appear to be a collection of recipes which, moreover, could not be used everywhere. The dialogue between the enumerator and his informant is affected by numerous psychological, sociological and material factors. It is necessary to weigh these carefully and to choose the solution best adapted to local conditions. It would be disastrous to neglect this side of things, which is necessary for a follow-up survey, which means to reduce the number of errors of observation, to be successful.

CHAPTER VIII

PROCESSING AND ANALYSIS

A) Processing

1 - Main goals.

The goals of the surveys on which this handbook is based are not identical. It is obvious that because of this, different methods are called for in processing these surveys and in carrying them out in the first place. The problems which arise are not identical either. Roughly speaking, two types of surveys can be distinguished: the large-scale surveys, the aims of which are relatively simple (Algeria, Tunisia), and the smaller surveys, with more experimental aims (Senegal, Cameroon, Madagascar), or that are even limited to very specific points (see chapter "Goals").

The processing of the former surveys is much like that of traditional surveys, in spite of some special problems. The others, though, must often use different methods (pairing of documents, for example), something which would have been impossible with a large number of questionnaires.

2 - Methods of processing.

The method of processing is chosen in consideration of the needs of analysis and the number of documents that are to be treated. If, however, one wants to use modern methods, such as computer processing, the cost of such operations should not be forgotten, nor the additional problems that accompany the use of such methods.

The resources available vary, but they can be summarized under four heads: manual processing done directly; the use of intermediary summary forms, punched cards (office calculators), or computer processing. The processes are listed in order of ascending difficulty - in order of ascending richness and potentiality as well. It goes without saying that for a relatively big survey, several methods may be used either simultaneously or successively (quick manual processing followed by the use of punched cards, for example).

a) Manual processing.

This process was the only one used in the surveys in Cameroon and Madagascar. It was used to some extent in other surveys, mainly for rapid processing of certain items (tentative results for a round which had been completed or which was still going on).

A priori, this method seems long and tedious, for it involves searching for the information on each questionnaire which enables the person to be classified according to one of the categories set up beforehand. In fact, though, as the example of Cameroon shows, it seems that this method was responsible for rather rapid processing, because only the baseline count was difficult to treat: the number of cases in which the events referred to periods between rounds was relatively rare, as was - as a result - the additional work involved. In Madagascar, events were compared two at a time. Even if such comparisons cannot be made easily manually - especially because of the difficulty involved in correctly identifying each event (changes in the spelling of family and first names, use of patronymics, different dates given, etc..) - it nonetheless seems that this is the only way of getting satisfactory results. In the case of small card files, this method offers several big advantages: it is not necessary to call for additional help, which is frequently a cause of additional errors. All of the documents can often be handled either by one person alone or by a small group. Such is necessary to avoid differences in interpretation. Lastly, important errors can be detected quickly. This last requirement argues strongly in favour of a rapid manual processing carried out in the field itself. Poor interpretations made by enumerators were thus able to be spotted quickly in Tunisia and Algeria. This was done by verification processing done on the very evening of the survey.

There are, however, a good number of disadvantages, the most important of which is related to the tables used in processing. There must be very few of these, set up well in advance, and they must be very simple (three or four figures at most). Verification and correction of results is practically impossible.

b) Intermediary forms.

Instead of directly processing questionnaires, which are often filled in under rather poor conditions (bad handwriting, rain, etc..) it is better to make up an intermediary form which is handier to use. A first step in this

direction might be found in the use of different coloured forms for certain essential characteristics (sex, age, marital status, etc..), or according to any other system of rapid differentiation: marginal notes on forms, notches made according to a simple code, perforations made in the margins, etc... The forms can thus be easily filed by any number of methods. It is above all very simple to locate all the cards covering a simple characteristic (for example, married men still economically active), and to use these to carry out the type of manual processing desired (1).

Although the system seems a priori very attractive, it is not to be recommended: it combines the disadvantages of manual processing (although these are lessened) with those of processing by office calculators, without having, however, the rapidity of the first process or the rich potential of the second. Nonetheless, one might set up a small easy-to-use card file in order to solve some problems, especially when it involves average sized surveys (20 000 people).

c) Punched cards.

This is the method of processing most frequently used for a large number of records, both for processing by office calculators and for cases where the cards are used as a prop before being sent for computer processing. This is what was done in Algeria and Tunisia, and to some extent, in Senegal.

Two units must be set up if punched cards are to be used: a transcription unit and a unit for the punched cards themselves. For the latter, there are generally few problems, except for that of hiring a staff that is both accurate and quick. Obviously, perforating machines must be available (when need be, it is possible to have the cards perforated by any perforating service already set up, as this is a purely mechanical operation. On the other hand, a transcription unit is often rather difficult to set up. The competence of the staff must be very high, and they must be familiar with the survey in detail and be well supervised. Two solutions have been tried: transcription by the staff of the survey (enumerators) between two rounds or at the end of the survey (Tunisia, Senegal); transcription by a specially trained staff (Algeria). Whatever the method adopted, special training for transcription must be planned on. It is above all necessary to have sufficient

(1) The surveys in Senegal are a good example of how to handle card files this way.

supervision for this unit. In most cases, the codes used were relatively simple, but difficulties could arise at any time. The output to be expected of somebody working on transcription is easily twice as much that expected of an enumerator: in Algeria, where transcription went on at the same time as the survey itself, there were about 100 enumerators (not including supervisors) and 50 people in charge of transcription (verifiers and supervisors not included).

Transcription can be made directly on the questionnaires or on intermediary grids. Transcription on the questionnaire itself has its advantages: it is easy to check, the enumerator is able to do some pretranscription. This presents a big drawback when several different card files have been planned. Perforation must then be done in several steps, with the risk of error that this implies. The questionnaires themselves must be easy to handle for those doing the perforating, as they work under difficult conditions. We think it preferable to emphasize the purely mechanical nature of this process, and this requires transcription grids, which will be different, depending on the card files that are to be prepared, this choice to be made ideally in the perforating service itself. In Algeria, for example, three sorts of files were set up: one on households, with cards which were all the same; one for individuals, with two types of cards (depending on whether or not an individual was affected by a given event); and one for events, with different cards depending on the event (births, deaths, migrations).

d) Computers.

In spite of certain difficulties, these often financial, computers are being used more frequently. This is not always possible, though, nor is it desirable when the sampling covers a small population. The advantages that this method offers, though, are so very great, that one should not hesitate to use it, even if it poses rather big problems. These problems begin when the data is fed into the computer (this done in several ways: optical reading, feeding the information in directly, punched cards, etc...). In the present state of things, we believe that punched cards are sufficiently accurate, but this will probably not be the case in the future). This brings us up to another type of problem: a team of well-trained programmers should be available, these people aware of changes in the development of computers and able to settle unforeseen problems. It should be said that one can buy processing programmes for surveys already prepared, but these can rarely be adapted easily to a particular survey.

e) Where processing is done.

Processing is practically never done in the field itself, but rather as far away as possible. The organization of this stage must be planned with great care: records (punched cards or tapes) should be shipped safely; shipments should be made quickly and deadlines respected; the administration of equipment and supplies should be efficient, in order to avoid waste. As minor as these material problems may seem, it is often these which have led to the most serious consequences.

3 - Correction of errors.

Whatever the method of processing chosen, the question of correcting the various errors that can be made must be faced: errors of observation, errors in transcription, etc... (Sampling errors themselves are unavoidable.).

Therefore, at every stage of the survey, but especially in the field, one should try to reduce these errors by the strictest set of checks. Some errors will remain, of course, however great the efforts made to avoid them. These errors can be divided into two categories: errors which cannot be traced, except in analysis (errors made by the enumerators, sampling errors, etc...) which should be spoken of in a brief note when the results are published; and errors that can be traced (inconsistency, lack of answers, etc...), which should be corrected before the publication of the results. We are only interested here in this second type of error, the others being taken up in the chapters "Methods of sample taking used" and "Analysis".

There are several positions that can be taken: errors can be accepted, or corrected a priori or a posteriori. The most frank approach, accepting some error, is only possible when the results of the survey remain in a limited circle of specialists, for even when statistically speaking an error causes no problems, the psychological impact of such an error is often great (for example, what would be thought of a table which brought out information about a 78 year old woman who was pregnant ?) As a result, these errors are often corrected.

a) A priori corrections.

A priori correction means that the errors are corrected in the card file itself, so as to obtain the proper tables. The card file or records (i.e., the questionnaire itself when processing is manual, tapes in other cases) must be analysed so as to record all inconsistencies, whether those be internal

(concerning, say, the various features of a particular person) or external (related to the features of an individual and the groups to which he belongs). There are certain relationships, more or less subtle, between age and marital status, sex, age, profession, etc... (the internal relationships) and between the ages of parents and children (external relationships). Drawing up this list of inconsistencies is one of the most important things that there is to be done. The scale of this catalogue depends on the form that these records are expected to take: setting up separate files (on households, individuals, etc...) only requires a limited study of each file. On the other hand, though, if files with cross-references are planned, looking for inconsistencies is much more awkward.

Once this catalogue of inconsistencies is drawn up, the files can be sorted through in order to locate those parts which include mistakes, these to be corrected. They can be corrected by one of two ways: systematic correction or random correction (it is always possible to go back to the basic document, the questionnaire, and even to go back into the field. This type of movement in reverse should be as infrequent as possible, as it often complicates things and gives rise to new mistakes. In any event, it alone is not sufficient, and this forms only one of the stages in correction). Systematic correction is a very simple process: it involves replacing inaccurate information by other information obtained earlier (e.g., "sex not declared", is listed as "male", then "female", alternatively; the age difference between a mother and her first child is put down as 15 years, etc...). Even though this method is arbitrary (and provided that the figures picked are chosen intelligently), it has two big advantages - its simplicity and its accuracy. Inaccurate information is replaced by the average figures for the category in question. Mathematically, there is practically no error brought in. This system can be used, moreover, to correct certain obvious bias. In Algeria it was decided to consider undeclared births and deaths as referring to females, in order to correct - at least partially - the much too low figures for this category.

In random correction, information is replaced by information arrived at by chance, this obtained from the mass of acceptable data (sometimes with unequal probability). It is even simpler to assign the individual about whom declared information is false corresponding features of the person closest to him, either geographically (the person immediately preceding) or in other

respects (someone who resembles him in other respects - the "hot deck" method). This method is better than the first if there are to be numerous corrections, as it probably gives a truer picture of things. There is, mathematically speaking, practically no error, and in any case, less than in the first method described.

If one or both of these methods is adopted, and this is often the case, the corrections made will make it necessary to make new corrections for consistency. It is necessary, therefore, to classify the corrections that are to be made and to make these in successive steps.

Example 1) The following data appears on a card: sex not declared; 22 years old, three months pregnant; one child 12 years old. The corrections are: female (because of the pregnancy), 27 years old (the age difference between the mother and her first child is not large enough). In this case, the child's age is accepted as being more accurate than his mother's. The opposite might have been assumed, and the age of the child would have been corrected to 7 or 8 years.

Example 2) Male, 36 years old, profession not declared. The profession listed will be that of a person of the same age and sex who was also covered by the survey. It would be wise to consider another more selective factor here, that of the level of schooling.

Example 3) Male, 6 months, married, profession not declared. He will be listed as single and not working, this on the assumption that his age is probably accurate. But what might equally be the case is that the age given is mistaken, if marital status is the basis standard used. The card could thus be corrected to male, 35 years, married, farmer, the correction consisting in a random choice of age and profession.

These examples show the difficulties that come up in a passable correction programme. If, however, certain features are trusted more than others, the programme might be even satisfactory. It is therefore advisable that the enumerators concentrate on essential features.

b) A posteriori corrections

Instead of correcting the files themselves, one might prefer to correct the tables of the results. There are two advantages to be obtained in doing this: it is possible to avoid the difficult job of correcting the files; and

secondly, because the analyst (who must correct the tables as best he can) becomes familiar with the contents of these tables, he can therefore limit the number of corrections.

If this system is adopted, one must plan on a first and tentative publication of the results, this including space for errors (items not declared, not covered by the regular categories). Afterwards these errors must be corrected on each table. As in the cases spoken of before, systematic corrections can be made or a more flexible system can be adopted (namely, a system of dividing errors proportionally).

If this method is satisfactory for a table taken in isolation, the big drawback of the method is its inconsistency when passing from one table to the next. The processing process as a whole is likely to be somewhat unhomogeneous, and for this reason we prefer the method of a priori corrections.

4 - Comparing successive sets of questionnaires.

The above paragraph takes up the correction of errors found on a single questionnaire. When the various rounds are to be processed separately, the methods outlined above can be used. In fact, though, surveys in more than one round make it possible to make additional corrections by comparing other questionnaires concerning a single person. In addition, longitudinal analyses can be made. The type of analysis (and therefore the appropriate correction programmes) chosen will depend on the scale and aims of the survey.

a) Cross-sectional analysis.

Each round is processed separately, like a census. In this case, one can either use a set programme of correcting errors in each round, without ever comparing the various questionnaires, or else include this comparison in the programme. There are big advantages to be obtained by choosing the first method: the programme is the same for all the rounds; processing can be done more quickly; above all, the practical difficulties arising from such a comparison (especially when there are mistakes in identification) can be avoided. In the second method, one must first decide how each item, in all the files available, is to be compared. And it has to be decided whether the data of each round will be compared only at the end of the survey (1), or

(1) The Tunisian survey is a good example of the way in which the data of the three rounds can be synthesized on one single card. The system of correction of ages that was adopted is especially interesting.

whether the first round will be processed, later the second round (this in relation to the first round), the third round (this in relation to the first two rounds), etc... Whatever the choice made, a set programme for correcting errors should be used, since comparing the records available makes it possible to correct only the mistakes appearing in one of them: male on the first round, not declared on the second round, male on the third round, gives male on the second round. But what is to be made of male on the first round, female on the second, not declared on the third ?

If any cross-sectional processing is to be carried out, it seems to us that this comparison of the records is unnecessary. The benefits to be obtained from such a comparison seem disproportionate to the problems raised. Instead, it would be better to have a very good system of making corrections for each round separately and to keep to this. It would be a shame, though, to give up longitudinal analysis, which is the great novelty and advantage of follow-up surveys.

To the extent that the observations made from one round to the next are independent, processing the results of each round separately might possibly lead to some interesting studies being made on the quality of the information gathered: the effects of the passing of time, the reckoning of ages, etc... But such studies could be made only if the data of the various rounds was processed without reference to one another.

b) Longitudinal analysis.

A comparison of the files item by item must be made if one plans on longitudinal analysis. This is not especially difficult when the files or records are not too numerous. It might be decided to use only a single form for each person, on which would be indicated the data reported initially and the data gathered on subsequent rounds. If, however, the files are more substantial, or if a lot of information on individuals has been gathered, one might use several forms, each of them containing certain unchanging items (for example, a person's sex, which remains the same from one round to the next) and those items that do vary (e.g., profession; when there is a change this might be studied along with professional "migrations"). These forms (or, when appropriate, punched cards or tapes) should be easily identifiable, in order to make comparisons easier. So as to avoid making errors in identification which can lead to the permanent loss of some people, it would be best to use

a system of identification that would allow individuals to be classified in certain well-known orders. The identification number, thus, could be:

- survey zone: department, commune, etc...
- number of the household in the survey zone.
- number of the individual in the household.

When this system is used, the important mistakes appearing on a list of individuals are immediately evident.

Example 1) Punched cards were made for one village covered by the survey. A list of the cards was drawn up, yielding:

197.25.01
197.25.02
157.25.03
197.25.04

It is obvious that the third card includes a mistake, and that the number should be 197.25.03.

Example 2) All of the punched cards were classified by survey zone and household number, yielding:

293.17.01	293.18.01
293.17.02	293.18.03
293.17.03	293.18.04

Obviously, the card 293.18.02 is missing. It should be looked for in the discards of the card file (among those cards that could not be filed elsewhere). If the card is not found, one should take the measures necessary: look for the file corresponding to this household and make up the missing card or a repeat card 293.17.02, producing 293.18.02. (By this method an individual who is "missing" can be replaced by someone else whose characteristics are probably fairly similar; in household 17, the person is probably the wife of the head of the household and the missing card in household 18 is probably that of the wife of the head of the household. The geographic proximity of the two households lets us assume that they share rather similar characteristics - and this is especially true in country areas). Other ways of making up duplicate cards may be used.

Data concerning the same people can be compared once the card files have been classified in a given order. It should be realized, though, that the card files are not identical from one round to the next.

<u>1st round</u>	<u>2nd round</u>	<u>3rd round</u>
223.17.01	223.17.01	223.17.01
223.17.02	223.17.02	- (1)
223.18.01	223.18.01	223.18.01
224.01.01	224.01.01	224.01.01
- (2)	224.01.02	224.01.02
224.02.01	224.02.01	224.02.01

The first item (1) refers to an individual who was present during the first two rounds but absent on the third (death or emigration); the second item (2) refers to an individual who appears starting on the second round (birth or immigration).

The problems posed by these structural differences might be solved by drawing up fictitious cards for the people in question. The comparison of individuals thus falls under two heads: characteristics which vary from one round to the next (sex, date of birth) and those which might possibly be affected by certain conditions (marital status, profession, etc...). Each of these features should be examined in order to detect errors which might have been made and to take measures to correct them.

Example 1

	Sex	Date of birth	Marital status
1st round	M	1940	single
2nd round	M	1939	married
3rd round	M	1940	single

We can accept the declaration about the person's sex; the date of birth might be changed to 1940 (where two answers are identical). If we accept the marital status reported on the second round, that of the third round is impossible. We can accept: single, single, single, or single, married, married, or single, married, widowed. Unless other information is available the three solutions are equally plausible (and the third possibility could be confirmed by the wife's death between the second and third rounds).

Example 2

	Sex	Date of birth	Profession
1st round	F	1935	-
2nd round	F	1933	-
3rd round	M	1934	-

The sex listed on the third round might be corrected, all the more so as it is often women (of the age in question) who do not work. The date of birth might be listed as 1934 (which is the average date).

Example 3

	Sex	Date of birth	Number of children
1st round	F	1940	7
2nd round	F	1938	8
3rd round	F	1955	8

(The survey is assumed to have been made in 1970)

The number of children listed can be accepted (one could verify as to whether a birth took place between the first two rounds), but there is no question of accepting the date of 1955. 1939 (the average of the acceptable dates) might, for example, be chosen instead.

Example 4

	Sex	Date of birth	Level of schooling	Profession
1st round	M	1935	B.E.P.C.	schoolteacher
2nd round	M	1935	B.E.P.C.	civil servant
3rd round	M	1935	C.E.P.	schoolteacher

The level of schooling on the third round can be changed to B.E.P.C., as can the profession of the second round to schoolteacher (the enumerators should, moreover, be asked to furnish more precise answers than "civil servant").

The few examples cited show how difficult it is to draw up any general rules of correction. As it happens, one is often led to adopt some rather strict rules for simple features (for example, the most frequent sex listed; the average date for the year of birth), and to treat more complex cases separately. It is therefore necessary to draw up a list of changes in a person's reported condition that could not be accepted (e.g., a married person can only be listed later on as married, divorced, or widowed), these changes in addition to those features which are themselves contradictory.

Serious difficulties often come from the complex nature of correcting errors before longitudinal analysis. Operations might be simplified thus:

- the analysis can concentrate only on cohorts that are generally defined by sex and age (date of birth). The efforts made will be concentrated on these basic features.

- some information might be processed only when some rather obvious cross-checks have been made (e.g., an analysis of professional migrations would only take up changes of jobs which are very different, as, say, a shift from the industrial sector to the commercial sector). The hard and fast correction of some errors is thus useless. Nothing would be gained, in the case just mentioned, by correcting the following forms:

- 1st round: selling items for the household
- 2nd round: hardware
- 3rd round: bazaar

- it might be possible not to correct errors to the extent that they have been located. If, that is, the errors are distributed randomly and if there are relatively few of them, it is possible to eliminate all the inaccurate forms, something which would result in the reduction of the sampling-fraction. The danger of bias is rather great, though, for it is unusual for the errors to be distributed randomly.

5 - Drawing up the tables.

The main goal of processing is obviously to draw up statistical tables; this operation generally takes place in two phases. While the survey is being prepared a preliminary list is drawn up, when possible, with the help of those likely to use the survey. This will be of use both when the questionnaire is being drawn up and in the processing stage, when various problems of a

practical order will be settled: the format of tables to be drawn up, printing, etc... This first list of the tables should be as complete as possible, particularly because it is from this list that the questions to be asked will be chosen. It is not a question, though, of drawing up a detailed list, nor a definitive list. The important thing is to be able to publish other tables when necessary, once the basic tables have appeared.

In most cases, especially when the survey takes place over a rather long stretch of time, production of the various tables is staggered, this in two different ways: the most important tables are produced first to the extent that this is possible (e.g., processing done round by round); or, the basic tables are prepared first, those of secondary importance afterwards. The desire to publish results quickly should be resisted, and one should not let oneself be snowed under by requests for "high priority" tables, which more often than not turn out to be useless. It is better to produce perfect tables, even if this must be done slowly, than to present masses of organized figures.

It is a good idea to give the people likely to use the survey's results detailed layouts of the tables planned on, emphasizing the various possibilities that exist to change the focus on the various populations involved. The layouts can thus be discussed just as easily as could the tables themselves. It is also possible to avoid making costly rough copies. The list of tables to be drawn up should be widely circulated.

6 - An example of a processing programme.

The example that follows takes up, roughly speaking, the programmes of the Algerian survey. The outline of this survey is, briefly, three separate rounds made in the same households at six month intervals. The questionnaires, those of a census, are the same in all the rounds. Only the identification of the household and that of individuals present during the previous round is carried over from one questionnaire to the next. (Because of the method of sampling used, it is possible either not to meet a household on subsequent rounds, or to meet new households. The problems this can pose is not the subject of these paragraphs).

a) Organization of the card file.

The card file is so designed as to make it possible to carry out either partial or complete processing, as desired. When it is a question of complete processing, the baseline registration should make it possible to

relate features concerning all the members of the household. For partial processing, only those features concerning an "individual" are used (the household as a whole, the individual or single event in the strict sense of the word).

The registration of the baseline round is made thus: a household card (Form 1) includes the features shared all members of the household (size of household, residence, etc...). Then, there are individual forms (Form 2) for each resident in the household (one person to a card). These cards include the information concerning the particular person (age, sex, profession, etc...). Event cards are used for a person when he is affected by a given event.

N.B. - The events that might occur are births, deaths, and departures. Births are associated with the mother. It is therefore possible that (a) several events might refer to the same person (for deliveries of more than one child, for example); (b) an event might concern a person not residing in the household (death, etc...). In the second case, so as not to destroy the organization of the general card file and so as to be able to relate an event to the person directly concerned, other cards - for non-residents - might be made up. On these would be included all the information available on the person in question.

- form 1 : features of the household
- form 2 : features of individual residents
- form 3 } : features of births
- form 4 }
- form 5 } : features of deaths
- form 6 }
- form 7 } : features of departures
- form 8 }
- form 9 : features of fictitious individuals (non-residents)

(Forms 3,5,7 treat the period preceding the first round; forms 4,6,8, the period between the two rounds).

It is thus very easy to make up smaller card files by working with particular cards to study isolated features. A study of deaths classified by sex and age might be made by using the cards 5 and 6. A study of mortality by professions (assuming this to be useful) would include all the registration cards (comparison of figures on Form 9 cards and those on Form 5 and 6 cards).

b) Correction of errors.

The card file is worked on after each registration; three successive corrections are thus made.

1) Correction round by round.

This is based on the baseline registration (BR), which corresponds to one round; errors that have been made are traced and corrected according to the instructions fed the computer. The result is the corrected registration (CR) which can be processed immediately, as it itself no longer contains any errors.

2) Comparison of the three rounds.

By working from the three registrations CR, one can take up each feature separately and trace inconsistencies. A new set of instructions will enable these inconsistencies to be corrected.

3) Re-examination of card file.

The card file is then examined again, following a scheme very much like that of the first correction to whether other mistakes have appeared. A newly corrected card files gives the final registration, which can then be processed either round by round (cross-sectional analysis) or as a whole (longitudinal analysis).

c) Study of a particular case.

Figure I illustrates the procedure used. The three registrations were obtained by transferring the information on punched cards to tapes. The first correction is then made, yielding the following results (several features only have been chosen, but all the features should be verified).

1st round: there are no inconsistencies, either in the cards themselves or when the cards are compared. The registration is accepted.

2nd round: the following instructions are given, "Read the number of male residents, then the number of female residents. Count the cards, correcting the number of residents when there is not a card for each resident: This explains correction A (where 2 becomes 1).

3rd round:(Correction B) the head of the family is listed as married, while his wife's card indicates her death. M will thus be changed to W(widower). There is the possibility of polygamy or remarriage, though such is not very likely.

(Correction C): the individual O2 was involved in two events - the birth of a child and his own death. There should be a Form 9 card (features concerning O2, a fictitious resident). If there isn't a card already, one will be made up on which will be indicated tentatively the features about which information is available: the sex is indicated on the cards for births and deaths; age at the time of death is found on the cards for deaths, etc...

(Correction D): a newborn baby is recorded as being male. However, on the baby's individual form (and the baby has received the number 04 in the meanwhile), the sex is listed as female. The instructions are to list the sex as female whenever there is a dispute as to a person's sex (in order to make up for the under-recording of the births of females).

We thus come out with three registrations R.C. After perhaps processing these, to obtain provisional results speedily (especially important is the corrected registration for the first round, which should be obtained well before the end of the survey), we go on to the second stage of correction. And for this we will take up the three registrations (RC) together, examining them feature by feature.

(Correction E): the age on the first round is greater than that listed on the second and third rounds, while it should be in fact one year less than that of the third round. It will be corrected to 33, which is the prevailing figure (i.e., second round = 33; third round = 33). (The instructions on how to deal with such cases are more complex as sometimes there is no prevailing figure; often discrepancies are even greater).

(Correction F): Card 9, made up during the first stage of correction, is here filled in in greater detail by picking up again the data of the first and second rounds, any changes that might have been made from one round to the next of course taken into account (the age here should go up by a year, for if the person were to continue to live, he would then be one year older than on the first round).

(Correction G): a birth which was traced only on the third round in fact took place between rounds 1 and 2; it is put back in the registration of the second round.

(Correction H): it is likely that the child whose birth had not been recorded was a resident of the household on the second round. He is thus listed as such.

The card index no longer includes any inconsistencies between the three rounds. A study is made again, round by round, yielding the following corrections:

(Correction I): counting the cards makes it possible to correct the number of women listed (from one to two). It should be noted that this confirms the baseline registration.

(Correction J): O2'S number of children should equal, at the very least, the number of birth of the child that was born during the observation period. As a result, 3 and not 2 will be accepted.

After all these corrections have been made, the card file obtained (FR) should normally be free of error. It should not be forgotten, though, that the apparently perfect tables were obtained not by eliminating errors, but by correcting them, this sometimes by disputable methods. A list of corrections will of course be made, so as to allow the analyst to defend and support his conclusions.

	Household Form				Individual Form				Individual Form				Event Form				Event Form				Individual Form				Individual Form																
	Type of card	Household number	Male residence	Female residence	Type of card	Household number	Nº of individual	Sex	Age	Marital status	Type of card	Household number	Nº of individual	Sex	Age	Marital status	Number of children	Type of card	Household number	Nº of individual	Date of birth	Mother's age	Nº of this birth	Sex	Type of card	Household number	Nº of individual	Date of death	Age at death	Type of card	Household number	Nº of individual	Sex	Age	Type of card	Household number	Nº of individual	Sex	Age		
1st round (28.10.69)	Baseline registration	BR	1	n	2	1	2	n	01	M	35	M	2	n	02	F	23	Sp	2																						
	First correction	CR	1	n	2	1	2	n	01	M	35	M	2	n	02	F	23	Sp	2																						
	Final registration	FR	1	n	2	1	2	n	01	M	33	M	2	n	02	F	23	Sp	2																						
2nd round (25.04.70)	Baseline registration	BR	1	n	2	2	2	n	01	K	33	M	2	n	02	F	23	Sp	2																						
	First correction	CR	1	n	2	1	2	n	01	M	33	M	2	n	02	F	23	Sp	2																						
	Final registration	FR	1	n	2	1	2	n	01	K	33	M	2	n	02	F	23	Sp	3	4	n	02	2.70	23	3	F															
3rd round (27.10.70)	Baseline registration	BR	1	n	2	1	2	n	01	M	34	M							4	n	02	2.70	23	3	M	6	n	02	25.7.70	23	2	n	03	M	2	2	n	04	F	2M	
	First correction	CR	1	n	2	1	2	n	01	M	34	M	9	n	02	F	23	Sp	3	4	n	02	2.70	23	3	F	6	n	02	25.7.70	23	2	n	03	M	2	2	n	04	F	2M
	Final registration	FR	1	n	2	1	2	n	01	M	34	M	9	n	02	F	24	Sp	3	4	n	02	2.70	23	3	F	6	n	02	25.7.70	23	2	n	03	M	2	2	n	04	F	2M

Figure 1 - Sample correction of card files

B) Analysis

"Analysis is the breaking up of the whole into its various parts".

The analysis of the results of any survey, and most particularly of the new type of survey under study here, comprises two important aspects: the critical analysis of the data gathered, which is done for the purpose of methodology, and the analysis of the results proper. In the surveys studied here, there are two types of "results", for besides the study of population shifts, one of the goals of some of the surveys was to study the workings of the registry of vital statistics.

We can therefore classify in three groups the different points taken up (or to be taken up) under the heading of "analysis":

I - Criticism from within of the value of the information gathered and the methods used:

For surveys by sampling, an important part of this comes in the study of variants in estimations, a subject mentioned in Chapter IV ("Method used in sample taking") and which will not be taken up again here. We will concentrate instead on:

- 1) a comparison of the retrospective survey and the multiple-round survey;
- 2) studying the results of each enumerator;
- 3) using the results of consecutive rounds in order to complete information gathered on previous rounds.

II - The method of Chandrasekhar and Deming and the running of official registries of vital statistics:

The methodological goals of the surveys described earlier, just as what their results are to yield, pivot on the method of Chandrasekhar and Deming. By attributing parallel roles to the information gathered by the survey on the one hand, and the declarations made to the registry of vital statistics on the other hand, this method makes it possible to judge the value of the survey, to study the workings of the registry of vital statistics,

and to "correct" the observations of the surveys before going on to the demographic analysis proper.

Without using the method of Chandrasekhar and Deming, it would be possible to study the workings of the official registry of vital statistics either by comparing the lump results yielded by the official registry with those of the survey, or by carrying out a number of analyses of the causes explaining the poor functioning of the official registry.

III - The demographic analysis proper:

This section corresponds to the traditional goals of demographic surveys: the study of the population, which will not be taken up here (although in the published results of these surveys, at least one chapter is devoted to this subject), is only a secondary aspect in follow-up surveys where population changes are more important. Nor will we take up here an analysis of the results obtained from retrospective questionnaires (1). The methods used to study shifts are those of cross-sectional analysis and longitudinal analysis.

For each of the points mentioned, we shall first cover the general principles, then their use in surveys for which information is available, and lastly, a critical discussion, in some cases followed by some suggestions.

I - Criticism from within of the value of the information gathered and the methods used.

It is possible to indicate some of the sources of error (and as a result, the reliability of the results) by using only the date of the survey, in test groups of cross-sections.

1) A comparison of the retrospective survey and the multiple-round survey:

This is an important part of analysis, one which makes it possible to highlight the advantages that follow-up surveys have over the traditional surveys, some of whose disadvantages had been criticized (errors in estimating the period of the "last twelve months", omissions of the deaths of young children, etc...) (2).

(1) For these two particular points, the reader should consult the synthesis, Afrique Noire, Madagascar, Comores: Demographie comparée (Paris:DGRST,1967).

(2) In this respect, see R.Nadot's chapter on "Fécondité niveau" in the work last cited.

There are two ways of making such a comparison:

- a) either by comparing the figures (or rates) of events obtained in retrospective surveys with those from follow-up surveys;
- b) or, with the rather specific aim of measuring the importance of the passage of time in explaining omissions, by carrying out a survey of the same reference period on different rounds.

The first approach was used in Tunisia and in Khombol-Thienaba. In Tunisia, the comparison covered six months of the retrospective survey and the interval between the first two rounds: the number of events reported in the retrospective part of the survey was smaller than that between the first two rounds of the following-up survey (13.6% for births, and 27.2% for deaths).

In Khombol-Thienaba, this approach covered the deaths of children 1-4 years old. 126 deaths were reported during the retrospective survey (covering the previous twelve months), and 184 in 1965, 276 in 1966, 237 in 1967, during the continuous survey, the difference between the retrospective survey and the average of the three years that followed being 46%.

The second approach is to be used in Algeria and has already been used in Tunisia, where during the second round, a survey was made a second time of the events occurring between Aïd-es-Seghir in 1967 (beginning of the retrospective observation) and the first round, and where events occurring between the first two rounds were covered by the survey again during the third round: "10.7% of the births recorded on the first round are "forgotten" on the second round; for deaths the proportion goes up to 21.5%".(1).

The drawback to the first approach is that one compares two different periods, in which the conditions affecting births and deaths might have been different. And this difficulty did not escape the notice of people who used this approach. In Tunisia, the number of births and deaths reported to the official registry of vital statistics during the two periods in question were pretty much the same, the argument thus losing its force. For Khombol-Thienaba the survey report specifies, "... however the death rates in 1966 and 1967 were doubtless unusual, and if one bears in mind only 1965, the difference is 32%."

(1) See J. Vallin, "Le temps, facteur d'omission dans une enquête rétrospective". Population III (May-June 1969) 548-549.

As for the second approach, "the independence of the two sets of observations is not perfect. As each of these work with the same households, it is possible to assume that their answers given on the first visit influenced those given on the second" (1).

Nonetheless, these two approaches are interesting, the first with the qualification given above. As for the second, it should make it possible.. by comparing events item by item, to study the basic characteristics of the events that are omitted (sex, order of birth, the mother's age, for births; sex, age at death, how related to the head of household, for deaths). In addition, it should be possible to measure how omissions vary with the amount of time that passes, and later to calculate real "functions of forgetfulness".

2) Studying the results of each enumerator.

Such a study has two goals:

a) firstly, to verify the reliability of the measuring instruments used (that is, the separation of the concepts used in the survey from the variations that necessarily exist in the work of the enumerators). This type of check is obviously not peculiar to follow-up surveys, and would be used in any type of calculation. It was spoken of in the chapter on Tunisia in reference to the results of the retrospective survey. It was used above all in Sine-Saloum, on the one hand for the results of the baseline count (involving ages and the location of residences), on the other hand, for omissions of births and deaths that were "recovered" on the third and fourth rounds.

The report notes "considerable variations from one enumerator to another in the number of people absent, from 0.2% to 8.4%, and from 0.3% to 5.1% of visitors in comparison to the total number of people covered by each enumerator"; when the percentages concerning the same enumerator are correlated, it appears that "the good enumerator pays as much attention to the people absent as to the people momentarily present during the survey; the enumerator who is less attentive will neglect both categories".

"The proportion of children 0 years old when compared with the group including children 0-4 years old varies according to the enumerator between 13% and 28%. The low percentages in general correspond to the estimates

(1) See J. Vallin, "Le temps, facteur d'omission dans une enquête rétrospective". Population III (May-June 1969) 548-549.

which are most accurate, and they are the work, in general, of enumerators who, working separately, found the lowest proportions of people absent and people who happened to be present when the survey was being made".

Lastly, the percentages of births and deaths recovered on the third and fourth rounds vary respectively from 1.3% to 13.1% and 1.0% to 10.7% compared to the total number of births and deaths reported; these variations are great; moreover, the enumerators who found the greatest number of omissions in one zone (Niakhar or Paos-Koto) were in general the same ones in the other zone" .

The importance of the training of the enumerators, of their supervision, and of the verification of their work, cannot be emphasized enough. This type of analysis allows an idea of the survey's worth to be made after it is over.

b) and later - and this is an aspect peculiar to these surveys - to study whether or not it is good to have the same enumerators carry out the different rounds and whether or not it is good to have them study the same households.

The first point came up in Sine-Saloum in relation to omissions that were made and later located. The results are the following:

Enumerators	Percentage of omissions			
	located again		made	
	births	deaths	births	deaths
experienced	4.9	2.3	2.0	1.6
new to the job	4.1	1.0	7.7	4.5

"Experienced enumerators are better able to locate events that have been omitted than enumerators new to the job, and they make fewer omissions".

Thus, it is better to use the same enumerators on the different rounds, as they acquire a certain technical experience in the process. The difficulty is in knowing whether these enumerators should be assigned to the same households on the different rounds: an experiment is to be made in Ankazoabo, where for part of the consecutive rounds new enumerators are being used, and where some of the experienced enumerators have been assigned to the same villages, the others to different villages.

3) Using the results of consecutive rounds in order to complete information gathered on previous rounds.

The cross-sections which may be made on different rounds make it possible either to locate events which had been omitted (and the preceding paragraph has already given some indirect examples of this) or to correct some features which were recorded inaccurately. In this respect, the scope of the analyses that have been made or are likely to be made is vast. A few examples, not at all meant to be limiting, will be taken up here:

a) The study of events forgotten on one round and relocated on another has already been mentioned. Such a study was made in Sine-Saloum, for births, depending on whether the child was still alive or had died; for deaths, depending on the sex and age of the person.

This study might quite profitably take into account other criteria: the month of the event and even the exact date, births taking place on dates that can be declared incorrectly on purpose; the sex of the child, the age, marital status, and ethnic group of the mother; the ethnic group of the father (for births); the ethnic group of the person who died and the cause of death (for deaths); the sex, age, ethnic group of the migrant, reason for the change (for migrations).

b) The study of omissions and double entries on the baseline round which are discovered on later rounds when declarations concerning these persons are made. This study then concerns the value of the baseline round, and makes it possible to focus on the features of those people omitted or recorded twice. Such was done in Sine-Saloum, in Cameroon, and is supposed to be done in Ankazoabo.

c) A study of the location of residences. This problem, which is complicated by the difficulties posed in defining concepts and in collecting information, is mentioned in the surveys of Sine-Saloum and Pikine. It might be taken up by concentrating on: residents present on later rounds but omitted on the baseline round when they were absent; people who are reported to be residents on the first baseline round and are not located on later rounds, checks revealing that they should have been recorded instead as visitors on the baseline round.

d) A study of errors on ages (1): the importance of accurately determining the age structure of a population did not escape the notice of the authors of the study cited above: "it is essential for African countries to apply themselves to in-depth studies first of all for determining ages. Without this, the additional information learnt is likely not to mark any progress in our knowledge". They suggest that studies be made "in which the ages of people covered by the censuses be determined as accurately as possible" (2). Follow-up surveys seem an ideal way of carrying out such studies, which might be approached in several ways:

- In Tunisia, a "degree of accuracy" of dates of birth is to be established after the comparison of the three rounds. This should yield interesting results.

- In Sine-Saloum and Khombol-Thienaba, a study of the base of the age pyramid (from 0 to 4 years) shows that each year's ages are gradually becoming regular as the generations born in the observation period enter the pyramid.

- Lastly, in cases where the questionnaires used on the different rounds do not list the dates of birth obtained on the baseline count, a comparison made of the ages declared at one year's interval should make it possible to study, for each person, how (depending on the age) the following relationship is distorted:

$$a_1 = a_0 + 1$$

(a_0 is the age declared on the baseline round; a_1 , the age declared one year later).

In the matrix of age groups (a_0, a_1), the figures other than zero will not be found only on the diagonal located above the main diagonal. That is, one should be able to find instances where $a_1 = a_0$ (because of people's liking for round numbers, a young girl without children being always listed as being 14 years old, the man who reaches the age where he must pay taxes), or where

(1) On this subject, see especially the article of Sabagh and Scott, "The Historical Calendar as a Method of Estimating Age: the Experience of the Moroccan Multi-purpose Sample Survey of 1961-1963". Population Studies XXIV (1970) 93-109.

(2) In the study that has been already cited in this section, see the chapter by F. Gendreau and R. Nadot, "Structure par âge, actuelle et future".

$a_1 > a_0 + 1$, for jumps of more than a year (a minor becoming an adult; a girl of 13 without children on the baseline count listed as 15 years old if she has a child one year later, etc...).

It might also be useful to make this type of study on groups of ages covering five years, this underlining the advantage of studies carried out over a period of five years.

II - The method of Chandrasekhar and Deming and the running of official registries of vital statistics (1).

This method, which has been used here primarily to study the functioning of official registries of vital statistics, also can be used to judge the value of the information obtained from follow-up surveys. This involves making a review "from outside", bringing in information not gathered by the survey.

1) The method explained.

What is done is to compare item by item the events recorded by two sources of information - the registry of vital statistics (or "village ledgers") and the follow-up survey. It should be pointed out here, moreover, that this approach can be used equally well in traditional surveys (where it was introduced and applied, in fact, the first time). It does not appear to have attracted the interest of African demographers, until it became time for them to carry out follow-up surveys.

Each type of event (births, deaths) is classified under three heads: events recorded by both sources; events recorded only by the survey; events recorded only by the official registry of vital statistics.

registry of survey \ vital statistics	Yes	No	Total
Yes	x	z	x + z
No	y	u	y + u
Total	x + y	z + u	x + y + z + u

(1) C. Chandrasekhar and W. Edwards Deming, "On a Method of Estimating Birth and Death Rates, and the Extent of Registration". Journal of the Am. Statistical Assn. XLIV (March 1949) 101-115.

x, y, z are known quantities. In order to estimate u (i.e., the number of events missed both by the registry of vital statistics and the survey), and by assuming the two sources to be independent, we come up with the formula (that is, the formula of Chandrasekhar and Deming):

$$u = \frac{y \cdot z}{x}$$

According to this formula, the ratio of events reported to the official registry of vital statistics to those which it missed is the same, whether or not these same events were reported by the survey.

If we use the following notation:

FU = event reported to follow-up survey

VS = event reported to registry of vital statistics

$\overline{\text{FU}}$ = event missed by follow-up survey

$\overline{\text{VS}}$ = event missed by registry of vital statistics

one comes up with the following conditional probabilities:

$$\text{Prob} \left[\text{FU}/\text{VS} \right] = \frac{x}{x + y}$$

$$\text{Prob} \left[\text{VS}/\text{FU} \right] = \frac{x}{x + z}$$

$$\text{Prob} \left[\text{FU}/\overline{\text{VS}} \right] = \frac{z}{z + u}$$

$$\text{Prob} \left[\text{VS}/\overline{\text{FU}} \right] = \frac{y}{y + u}$$

The assumption of independence merely means that:

$$\text{Prob} \left[\text{FU}/\text{VS} \right] = \text{Prob} \left[\text{FU}/\overline{\text{VS}} \right] = \text{Prob} \left[\text{FU} \right]$$

and that:

$$\text{Prob} \left[\text{VS}/\text{FU} \right] = \text{Prob} \left[\text{VS}/\overline{\text{FU}} \right] = \text{Prob} \left[\text{VS} \right]$$

or in other words,

$$\frac{x}{x + y} = \frac{z}{z + u} \quad \text{and} \quad \frac{x}{x + z} = \frac{y}{y + u}$$

which gives:
$$u = \frac{yz}{x}$$

The ratio of events reported to the registry of vital statistics is thus:

$$p = \frac{x + y}{x + y + z + u} = \frac{x + y}{x + y + z + \frac{yz}{x}} = \frac{x[x + y]}{x[x + y] + z[x + y]} = \frac{x}{x + z}$$

Likewise, the ratio of events reported to the survey is:

$$q = \frac{x}{x + y}$$

And it can be shown that the variance in the estimate of the total number of events is $\frac{Nyz}{x^2}$, that is, that the coefficient of variation is $\frac{\sqrt{yz}}{Nx^2}$

These calculations are valid for either all births and all deaths or for separate categories (particularly for the types of distribution which may be found in more than one tally), as follows:

- births and deaths by village,
- births and deaths by month,
- births and deaths classified by sex,
- births according to the mother's age,
- births according to the mother's ethnic group,
- deaths classified by sex and age,
- deaths by ethnic group, etc...

This method, moreover, suggests that the best estimate of the whole is that reached by adding together the estimates concerning each part of the population in question, and that which appears to be the highest figure.

2) Use of this method in the surveys studied in this book.

The surveys in Algeria, Tunisia, Sine-Saloum, Adamaoua, Ambinaitelo and Ankazoabo have either already used this method or are planning to do so.

a) In Algeria, the primary goal is to estimate the error of observation

b) In Tunisia, the method has been used in the sheikhdoms of Goraa and Oued-el-Khatéf (this is the complementary spoken of in the chapter on Tunisia). It revealed that the survey had registered in these places 96.9% of the births and 87.6% of the deaths, the figures for the official registry of vital statistics being respectively 78.4% and 60.1%.

c) In Sine-Saloum, where the registry of vital statistics has recorded only about 15% of the births and 3% of the deaths, this method was used to compare the results of the survey with the listings in the village ledgers (which had been filled in by the heads of villages). The results were as follows:

- In Niakhar, 91.8% of the births and 92.6% of the deaths were recorded by the survey, as opposed to 57.7% and 38.1% respectively by the

village ledgers. In addition, separate monthly estimates were made.

- In Paos-Koto, 86.7% of the births and 88.6% of the deaths were recorded by the survey, as against 28.1% and 19.2% respectively by the village ledgers.

d) In Cameroon, the rate of coverage of the official registry of vital statistics varies from 1% to 10% in the two cantons of Adamaoua studied.

e) In Ambinanitelo, lastly, the results were as follows:

- 81% of the births and 72% of the deaths were reported by the survey; 77% of the births and 74% of the deaths were recorded by the registry of vital statistics.

- The calculations were made after the events had been classified in two categories indicating whether or not they had occurred while in health care facilities (where they were systematically declared).

- In addition, separate estimates were made by villages and by months, for births and deaths; by sex of the child and the mother's age for births; and by sex and age of the person for deaths.

- Lastly, for events to be found in both sources, a comparison was made of the features that were found. This showed, in particular, that if the two sources generally agreed about the residence of the mother (for births or of people who had died), and about a child's sex (for births) and about a dead person's age, the two showed discrepancies in the dates of declarations (for births and deaths) and the age of the mother (for births).

f) This type of analysis is to be used and perfected in Ankazoabo, where the four communes of the sub-prefectures covered by the survey have big differences in area, population, population density, health and medical facilities.

3) Criticism of this method.

The formula of Chandrasekhar and Deming demands some comment:

q) If we are to assume that the two sources are independent, we must have a detailed account of the various categories of events; that is,

- the quantities $(x + y)$ and $(x + z)$ should be exact and homogeneous. This requires in particular that the observation period should be well defined, something which is difficult because of the stretch of time taken up by the baseline count and the homogeneousness of events and reference population. This last factor leads to the survey's considering de facto

populations and events, as it is these populations which are used by the official registry of vital statistics.

The quantity x must be exact, which makes it necessary for events shared by both sources to have been identified well. This is often problematic because of differences between the two sources in declarations of names, ages, and dates. This problem is particularly important where births are concerned, for very often the child does not immediately receive the name he will bear finally (there is sometimes a delay of one year). It is therefore possible for the quantity x to be under-estimated (or over-estimated, in the case of births). There is thus a problem in making tallies, for it appears that the identification must be made manually. Although this is feasible in a small area, like that of Goraa and Oued-el-Khatf (Tunisia), of Niakhar and Paos-Koto (Senegal), of Ambinanitelo and Ankazoabo (Madagascar), it is much more awkward to carry out in a nationwide survey.

b) In the case of nationwide surveys, there is also the problem in sampling, for if the two sources are to be compared, it is essential that the sampling units considered should be zones of the official registry of vital statistics that have been thoroughly covered: sheikhdoms and communes (673 sheikhdoms and 137 communes), arrondissements and communes in Senegal (86 arrondissements and 31 communes), communes in Madagascar (780 communes), etc. The size of the sampling should therefore be much bigger than that drawn from a "simple sampling" (see chapter "Method used in sample taking").

c) If one of the two sources were to function perfectly, either y or z would be nil, and u also would be nil. This is the case, for example, of events which occur in medical and health care facilities, as they are systematically reported to the registry of vital statistics. For the two sources to be entirely dependent on one another, one would have to assume that the two quantities, y and z , were nil at the same time; that is, that an event reported to one source was necessarily declared to the second source as well; in this case, too, $u = 0$. In any event, the quantities x , y , z , represent the minimal estimation of the number of events. It should be noted, though, that this estimation is not very big if events found in the two sources have not been identified, and it is moreover fairly small when events have been mistakenly considered as "shared".

d) There is, lastly, the question of independence, which is, it seems, rarely what it should be. On the one hand, an event which is reported to a

follow-up survey is most likely to be reported to the registry of vital statistics, the informants encouraged to do so out of fear of being punished (this attitude perhaps somewhat reinforced by the enumerator). Similarly, an event recorded at the registry of vital statistics will most certainly be reported to the survey (for there is no reason to cover this up). On the other hand, it is likely that an event not reported to one of the two sources has a greater probability of being missed by the other source (this might be the case, for example, of children who die at a very early age).

By using the same notation as before, we get:

$$\frac{x}{x+z} > \frac{y}{y+u} \quad \text{and} \quad \frac{x}{x+y} > \frac{z}{z+u}$$

that is:
$$u > \frac{yz}{x}$$

The formula of Chandrasekhar and Deming therefore tends to underestimate omissions.

e) Conclusion: though this method cannot be used with reserves, it is of great interest. It allows one to appreciate the scale of things, and as the interdependence of the two sources leads to underestimating the extent of omissions, the estimate it provides, though not perfectly accurate, is better than that reached by unaided observation. This method also allows one to get an idea of the differences in declarations made to the survey and the official registry, when different features are in question. Are the births of boys reported more regularly than those of girls? Do the deaths of the elderly go unreported, etc...?

It should be noted, though, that in the surveys cited here, the complete method, as proposed by Chandrasekhar and Deming in 1949, has never been used totally, the problem of the independence of sources being only touched upon (except indirectly in Ambinanitelo, where the official registry of vital statistics seemed to show some improvement over the year of observation). It is to be hoped that in the surveys that remain to be processed and undertaken this method will be used fully, albeit with some precautions (and perhaps with some improvements made). In any event, because of the problems arising from sampling and the cumbersomeness in comparing the two sources, this method will be used more judiciously, in some zones only in the sampling, and elsewhere over a year only. This method, that is, should be thought of as an auxiliary method which allows one to get additional and interesting information about some points in particular.

4) Other methods of studying the workings of the registry of vital statistics.

As has been shown above, the method of Chandrasekhar and Deming is one way of studying the functioning of registries of vital statistics, a goal of some of the surveys under study here. It is not the only method available. A comparison of all the results of the survey (rather than a comparison item by item) with those of the official registry is another means available, as is a study of the causes of the poor functioning of official registries.

a) General comparison of the survey and official registries.

This can be carried out either with the results of retrospective questioning or with the results of the different rounds. It can take up either the total number of events or vital rates. Analysis revealed that the retrospective survey was more complete than the official registry.

b) Studying the poor functioning of the official registries.

This might take several forms, as we have seen in Tunisia, Sine-Saloum, Cameroon, and Ambinanitelo.

- In Tunisia the complementary survey was followed by a survey on motivation made in households where an event had been reported to the survey but not to the official registry, in order to learn the reasons why a declaration had not yet been made.

- In Sine-Saloum, factors explaining the poor running of the official registry were studied in "the zone under demographic observation, but also in the entire country, this both at meetings of those in charge of the official registries, or during the rounds of a controller from the statistical services"; the analysis speaks in particular of the distance at which the official registries are located, the delay in making declarations after the event takes place, the absence of an official in charge of the registers, and the absence of a registry book itself.

- In Cameroon, the official registry was described both as it is supposed to be on paper and as it is in fact in the zone covered by the survey. The reasons for its poor functioning seem to be the cost of making declarations and the fact that the secretary of the registry remains in one place.

- In Madagascar, a first and general analysis was carried out (1), parallel to the survey in Ambinanitelo. The analysis of this survey bore upon

(1) F. Gendreau, Essai sur la recherche démographique à Madagascar (Tananarive: O.R.S.T.O.M., 1968).

the distance at which the official registries are located, the use of maternity clinics, the rainy season, the delay in making declarations after the event takes place.

The variety of these analyses rules out our making a complete list of them. Before leaving this point, we would, however, mention how very valuable such studies are, as concrete suggestions as to how to improve registries come out of them (Tunisia, Senegal, Cameroon, Madagascar). Lastly, this type of study seems to be an area where demographers and specialists in other fields (legal experts, historians, sociologists, administrators) can work together.

III - Demographic analysis proper.

A study of population shifts can be made either from the crude data of the survey or after extrapolations by the method of Chandrasekhar and Deming.

An analysis can be made after each round (Tunisia, Sine-Saloum), after all the rounds together, or by calendar years (for surveys taking place over several years, as in Sine-Saloum).

The aim of this sort of analysis is not only to furnish the total number of events but also a description of the features of these events and their distribution (differential analysis), vital rates, portraits of the groups in which changes were recorded during the observation period.

1) Differential analysis.

What is involved in this analysis is first of all a definition of the criteria used in classification and then the examination of the meaning of the differences revealed.

a) Criteria used

The table that follows summarizes the various criteria used in surveys for which there are published results, whether these have been reported in summary fashion or in detail.

b) Tests of significance

Such tests should enable one to see whether the differences between groups (by sex, age, ethnic group, month, village, etc...) have any real significance.

In the surveys under study here only the survey of Khombol-Thienaba was tested this way. The χ^2 test was regularly used to compare, by twos, groups of villages or years.

Event	Feature studied	Sine-Saloum	Khombol-Thienaba	Pikine	Cameroon	Ambinanitelo	
Birth	Event	Date	x		x	x	
		Place	x			x	
	Child	Sex	x				x
		Mother	Residence	x			x
Age	x				x	x	
Ethnic group	x				x		
		Marital status				x	
Death	Event	Date	x	x	x	x	
		Place	x	x		x	
		Cause		x			x
	The deceased	Residence					x
Sex		x				x	
	Parents	Age	x	x	x	x	
Ethnic group					x		
	Residence	x					
Migration	Event	Date	x		x		
		Place	x		x	x	
		Reasons for	x				
		How constituted	x				
Migrant	Sex	x		x			
	Age	x		x	x		
	Ethnic group			x	x		
Marriage	Event	Date			x	x	
		Husband	Age			x	x
	Ethnic group				x		
	Wife	Age			x	x	
Ethnic group				x			
Number of this marriage					x		
	Number of wife						
Husband	Age					x	
	Ethnic group				x		
Wife	Age					x	
	Ethnic group				x		

The test of χ^2 is as follows:

Let P = the number of people in the population and
 e = the number of events observed during the survey.

The frequency of the events is: $t = \frac{e}{P}$

If the population is divided into k groups (1,2,...i,...k),

Let P_i = baseline population of group i and

e_i = the number of events observed in this group.

The frequency of the events is then: $t_i = \frac{e_i}{P_i}$

The test of χ^2 consists of calculating the quantity: $\sum_{i=1}^k P_i \frac{(t_i - t)^2}{t(1-t)}$

which represents the "gap" between these observations and what these would be if the population were "homogeneous"; that is, if the various component groups behaved the same way. In this case, this quantity is a χ^2 with (k - 1) degrees of freedom. The χ^2 table allows one to decide whether, at a given level of significance, one will accept or reject the hypothesis of the population's homogeneity; i.e., the differences observed are significant or not, depending on whether the χ^2 calculated is greater or less than that found in the table. All of this tells clearly and simply whether the "gap" is too great to be explained by random causes (thus the need to explain this by

introducing the element of the population's heterogeneity.

The only main limitation in the use of this test in the case being studied is that none of the number of events (e_1) should be too small (fewer than 10).

If there are only two groups, the formula is simplified and the quantity is calculated

$$\chi^2 = \frac{P_1 P_2 \cdot (t_1 - t_2)^2}{P \cdot t (1 - t)}$$

(χ^2 with one degree of freedom)

The square root can take the form

$$\frac{t_1 - t_2}{\sqrt{t(1-t) \left(\frac{1}{P_1} + \frac{1}{P_2} \right)}}$$

One comes out with the test of the normal law (χ^2 with one degree of freedom being the square of a normal centred and reduced variable).

To conclude, we cannot recommend enough the systematic use of these tests in differential analyses, for it is useless to talk of differences between groups unless these are significant.

2) The rates.

a) We will not take up here definitions of the rates used in demography (1), but instead problems that arise when figuring them out, that is, the reference period, the events to be considered in the numerator and the population to be considered in the denominator.

- In Sine-Saloum and in Khombol-Thienaba, a calendar year was used as reference period, while in Algeria, Tunisia, and in Ambinanitelo, the year used as reference period was movable, and was bracketed by the dates of the rounds. These years are identified in the results by the median dates of the rounds.

- In all of the surveys, it was de jure events that were observed (except in Ankazoabo, where de facto events were also observed). In the published reports, the populations given in the denominator are the "average" de jure populations (half the number of the reference populations).

(1) R. Pressat, L'analyse démographique (Paris: P.U.F., 1969).

b) This calls for several comments:

If the various rounds take place at fixed intervals for each household covered by the survey, it is better that the year be movable; if such is not the case, and if each round does not last too long (less than a month, for example), it might be better to consider using the calendar year, as was done, say, in Sine-Saloum, where the baseline count was brought back to 1 January 1963, the events thereafter classified by calendar year. In Ankazoabo, the situation covered by the survey on the first round concerns 1 October 1969, and the events taken into account will be those occurring before 1 October 1970.

Careful attention should be paid to uniformity of the two quantities that appear in the numerator and denominator: *de jure* events with *de jure* populations and *de facto* events with *de facto* populations. In the first case, then, one would be careful to consider only those events occurring to migrants whilst they were still residents, just as those events occurring to immigrants before their arrival would not be treated (this type of information one can learn), nor would events occurring to emigrants after their departure (and this information could be obtained only with difficulty in any event). This is done in order to produce some compensation.

Lastly, if the simplest average population is half that of the two reference populations, this method of making calculations does not, however, use information provided by the survey as to the time during which each person actually was covered by the survey. Taking this information into account would consist in calculating the average population, by weighting each person according to the length of his presence.⁽¹⁾ The correction made may or may not be negligible, depending on whether or not births, deaths, arrivals, departures, are uniformly spread out in time (or whether, instead, they are subject to important seasonal fluctuations that do not cancel one another out). In Sine-Saloum, therefore, we can calculate from published figures that the relative difference between the reference populations and the total number of people whose length of presence was weighted is about + 2.5 per thousand in Niakhar and - 5.6 per thousand in Paos-Koto; correction would change the birth rates respectively from 49.0 per thousand to 48.9 per thousand and from 51.1 per thousand to 51.4 per thousand. This method, moreover, would make it possible to calculate independently the rates of, on the one hand, the people who did not change their residence during the observation period, and on the

(1) For example, by regrouping people by the length of their presence in the survey in months and by drawing up the total number of "weighted" people according to the length of their presence in the sampling.

other hand, the migrants (depending on the length of time they are present in the sampling).

3) Longitudinal analysis.

This consists in studying the cohorts over a period of time, "cohorts" being groups of people who have lived through a similar type of event during the same period of time (1): generations, marriage generations, groups of immigrants, etc...

This type of analysis was used in traditional surveys (and in those surveys studied here in which a retrospective questionnaire was used on the first round), primarily to study the offspring of women. The method gives rise to a certain number of problems - no longer remembering whether events of the distant past were declared or not, for example, or judging the representative nature of the women who, at the time they are covered by the survey, are only the survivors of the generations in question.

The advantage of follow-up surveys is that one can carry out a "continuous observation" (2) of the population during a particular period, with the longitudinal analysis including none of the problems just spoken of.

The surveys here studied, though, did not use this method, though its advantages have been amply proved (3).

It is true, though, that there are two major obstacles to its use: firstly, the value of the survey comes from its being an observation of some length, while most follow-up surveys went up to only one year of permanent observation; secondly, it is difficult to form cohorts that can be really followed easily (tracing emigrants, in particular, would be too costly).

The first obstacle could be eliminated by extending the length of the surveys already spoken of in the chapter "Duration of the survey". A study made over a six year period would thus make it possible to analyse the mortality figures for a generation of 0-4 year olds. As for the second problem, it is inherent in the method but in the case of a national survey, the behaviour of emigrants (and individuals who enter the sampling) and

(1) United Nations, Multilingual Demographical Dictionary in Population Studies XXIX (1958).

(2) L. Henry, "Réflexions sur l'observation en démographie" Population XVIII n°2 (April-June 1963).

(3) L. Henry, "Problèmes de la recherche démographique moderne" Population n°6 (November-December 1966).

substitutions of the latter for the former, should be a valuable control, if it can be assumed that the two groups behave in a similar manner.

4) Studying "changes in situation" (1)

a) Basic argument.

There is, however, a method of cross-sectional analysis which is perfectly adapted to follow-up surveys and to the "continuous observation" such are based on; this is the study of groups of individuals who during one of the rounds, showed shared features, and whose subsequent changes in these areas are followed by means of the information gathered on later rounds. This technique, which is based on comparing particular items (regarding individuals or correction of errors. What is involved here is its use in the analysis itself.

b) Its use in the surveys studied here.

- Algeria: it is planned to carry out an analysis of the population contacted on the three rounds (this analysis to be the most complete) and of the population contacted during only one or two rounds, this latter analysis including a study of the reasons explaining why an individual belongs to this category.

- Sine-Saloum and Khombol-Thienaba: an analysis carried out on the latter history of pregnancies has made possible a study of stillbirths and infant mortality.

- Pikine: data reduction of the later history of each individual from one census count to the next has made it possible to figure out the probability of emigration according to the location of earlier residences.

- Abidjan and Yaounde: here, too, a comparison of residences has yielded interesting results concerning:

. changes in the type of dwelling (European style, in building lots, or improvised);

. changes in the location of the residence between the two rounds in Yaounde;

. calculation of "stability tables" for cohorts made up according to one's "seniority" in a particular residence (Abidjan and Yaounde);

c) Suggestions.

This method is very general and might be developed in several ways. It is, for example, already used in the study of migrations or advancement

(1) The term was first used by Y. Tugaud in "Méthode d'analyse d'un tableau "origine-destination" de migrations". Population XXV N°1 (Jan-Feb 1970).

in schooling. By using it in follow-up surveys the following could be studied:

- migrations in tables relating the region came from to that chosen as destination, region being used broadly to mean "village", "commune", or even "milieu" (urban or rural), dwelling (modern, traditional) etc...

- changes of profession or religion.

- overlapping: of periods in the study of the actual lengths of absence or presence.

- changes in the size of households.

All of these tables can naturally:

- be made up for all "migrants", but also for various categories (ethnic groups in particular);

- made up in a series according to rounds and periods;

- be followed by a test of χ^2 (a test of independence designed to see whether there have been any preferential "flows" or the calculations of the correlation ratio (to measure the influence the different classes used have on one another) (1); the drawing up of tables indicating the likelihood of changes in situation.

Lastly, it would be interesting to carry out yet another analysis, this more involved, showing the influence the change of one situation has on changes in other situations: the influence of marriage on the residence chosen, or migration, on religion, etc...

Conclusion

The main points that would appear deserving of emphasis, at this stage in our study, are the following:

a) the great diversity in the analyses that can be carried out working from the information gathered (2);

b) the need to go beyond the traditional methods of demographic analysis, by using new techniques (of which some have been tried and perfected in the surveys studied here; other possible areas for investigation have been suggested as well; new endeavours must continue to be made in order to get maximum value out of the work invested in follow-up surveys);

(1) See Y. Tugault, op.cit.

(2) We should mention here a particular problem in this kind of survey: because of the length of the observation period, it is not always the same people who are in charge of the field work and survey analysis.

c) the inadequacy of the calculations of margins of error that we have available at this time. (If the causes and the types of errors have been analysed rather often, the accuracy of the results is not always specified. Measuring demographic phenomena, though, is subject to error, like the calculations made in any other field, and it is essential for the person who is to use the results to know how reliable they are).

d) the superiority of follow-up surveys over traditional surveys. The overall results of the traditional surveys (1), had revealed:

- the extent of errors in ages, and this would call for in-depth studies;
- the lack of detail in the data on various shifts. (If various cross-sections made it possible to grasp the figures for fertility, figures relating to deaths, especially by age groups, are very unsure).
- the lack of data on migrations.

The answers already provided by follow-up surveys to these questions merit continuing efforts in this field.

(1) See the study already cited several times in this chapter, as well as O.R.S.T.O.M.'s "Compte-rendu du colloque de Démographie". Bulletin de liaison des Sciences Humaines n° II (April 1969).

CHAPTER IX

RESULTS

Summary table of results obtained in the surveys studied
in Part One(1)

Demographic events		Algeria	Tunisia	Senegal			Cameroon	Madagascar
				1	2	3		
Deaths	seasonal variations crude rate per 1000	- 12,1	* 13,3	* 6	* 34,3	* 27,3	* 1965-1966 : 22 1967-1968 : 21,5	* 18
	specific rate infant death rate per 1000	- 109	* 116,2 (unconfirmed)	- -	* 105	* 144	* 1965-1966 : 152 1967-1968 : 178	* 67
	non-infant death rate per 1000	-	*	-	109	81	*	44
	according to cause	-	-	-	-	-	-	*
Mortality tables	tables life expectancy at 0 years	- -	* 54,6 yrs (unconfirmed)	- -	* 27yrs	* 37yrs	* 43 years	- -
	life expectancy at other ages	-	-	-	-	-	e ₅ : 50 years	-
Marriages	crude rate per 1000	-	-	-	-	-	21 to 23	11
	crude rate of divorce per 1000	-	-	-	-	-	9 to 10	8
	life expectancy at various ages	-	-	-	-	-	*	*
Births Fertility	seasonal variations crude rate of births per 1000	- 47,0	* 39	* 34	* 49	* 51,1	* 1965-1966 : 35 1967-1968 : 24	* 55
	fertility rate(by ages) average number of child. per 100 women, 15-49 yrs. classified by sex	- *	* *	- -	* -	* -	* 363	* -
	according to mother's ethnic group	-	-	-	*	*	*	-
		-	-	-	*	*	*	-
Migration	departures between two rounds	-	-	*	*	*	*	*
	by destination	-	-	*	*	*	*	*
	arrivals between two rounds	-	-	*	*	*	*	*
	origin of arrivals	-	-	*	*	*	*	*
	place of birth	-	-	*	*	*	-	-
	last known residence (by birth-place)	-	-	*	-	-	-	-
Description of the population								
Growth Reproduction	population by age/sex	*	*	*	*	*	*	*
	sex ratio	*	*	*	-	-	*	*
	professional structures	-	-	*	*	*	*	*
	religious structures	-	-	-	*	*	*	-
	schooling	-	-	*	-	-	*	*
	by age/marital status	-	-	*	*	*	*	*
by ethnic group	-	-	*	*	*	*	-	
Various sociological features	average number of inhabts.	-	5,4 per household	-	-	-	5,7 per sare	-
	rate of polygamy	-	-	-	*	*	*	-
	number of each woman's marriages	-	-	-	-	-	*	-
	ration of births in maternities	-	-	-	-	-	-	*
	place of work	-	-	*	-	-	-	-

(1) Not supplied by the survey

* Results not yet available or not able to be included in this table in their present form.

AN OVERALL VIEW

For several reasons, it is dangerous to draw up a table offering a general view of the follow-up surveys that have been carried out up to now in Africa.

Such a project is, first of all, still premature, as the surveys - which have begun recently and which by definition are to continue in the field for some time yet - have not all been completed. In cases where they have been completed, though, the results have not always been published in definitive reports. There are, though, articles and shorter and less official notes (these nonetheless useful in communicating tentative results). For lack of definitive results, we will refer to these sources, emphasizing from this point on the precautionary measures that should be taken in interpreting them. It is certain that most of the surveys have collected masses of information that as of this writing have only been treated in rather brief analyses that have not yet used the documentation available to the fullest possible extent.

It is difficult to present a general view of the results, as well, because although generally speaking their surveys share a methodology which is singular, this methodology has been applied in rather different ways in some of the studies; and this often makes comparisons difficult.

Lastly, the goals vary according to the demographic features of the particular population studied, according to the resources available, the training, and even the personalities of the investigators who decided which orientation their studies were to take.

a) Classification of the surveys.

This work does not take up studies not relating to Africa, such as:

- The first example of a follow-up survey, in the state of Guanabara in Brazil (1), undertaken by the Latin American Demographic Centre in 1961 (over one year, 2411 families were studied, with four rounds made at irregular intervals);

- The Indonesian survey of 1961-1962;

(1) United Nations, "Enquête démographique expérimentale de Guanabara" in Etudes Démographiques XXXV (1964).

- The Indian survey of 1964, the "pilot registration scheme of rural Gujrat (1), taking in a population of 36,000 inhabitants (rounds being made at six month intervals); or between December 1963 and November 1966 in five villages of Mehrauli Block in South Delhi" (2); this survey including a population of 5,582 inhabitants (rounds made at six month intervals); or between July 1965 and June 1967 in Kerala (3), covering a population of 260,000 inhabitants (rounds at six month intervals also);

- The survey in eastern Pakistan (now Bangladesh) from January 1962 to December 1965 (4), this covering a population of 42,000 inhabitants (with rounds at six month intervals and overlapping follow-ups of one year);

- In Western Pakistan, this survey carried out just like the one preceding (4);

- In Thailand, from July 1964 to June 1965 (5) on a population of 172,000 (rounds made every three months);

- In Turkey, from October 1965 to September 1966, covering a rural population of 38,100, an urban population of 29,700 (rounds made every three months); in the city of Ankara between December 1965 and November 1966, with a population of 24,900; in Istanbul, between January 1966 and December 1966, on a population of 15,000 inhabitants; in Izmir, between February 1966 and January 1967, on a population of 13,400 - the rounds of all these surveys at three month intervals .

Other African experiments, such as the Moroccan survey, the "multi-purpose survey" (demographic and agricultural), are only taken up here briefly, this Moroccan survey the first nationwide African survey in more than one round (these at six month intervals), between December 1961 and February 1963.

(1) D.C. Mehta and M.H. Shah, Report on Pilot Sample Registration Scheme, Rural Gujrat (Ahmedabad; Director of Health and Medical Services, 1966). The data given concerns only the resident population.

(2) D.V.R. Murty and P.K.Jain, Report on Pilot Sample Registration Scheme in Five Villages in Mehrauli Block, South Delhi: December 1, 1963 - November 30, 1966 (New Delhi: Central Family Planning Institute, February 1967).

(3) Sample Registration: Derala State - Report N° 1 for the period 1965-1966 and Report N° 1 for the Period 1966-1967 (Trivandrum: Bureau of Economics and Statistics, November 1967 and August 1968).

(4) Farhat Usuf, Population Growth Estimation: Studies in Methodology I - Matching of Vital Events (Karachi: Pakistan Institute of Development Economics (Research Report n° 67) April 1968).

Report of the Population Growth Estimation Experiment: Description and Some Results for 1962 and 1963 (Karachi: Pakistan Institute of Development Economics, 1968).

(5) Report of the Survey of Population Change: 1964-1967 (preliminary report) (Bangkok: National Statistical Office, February 1969).

Let us quickly go through the distinctive features of each of the seven surveys studied here:

Algeria: the registry of vital statistics works well, at least for births. The survey, which was costly, was based on a large nationwide sampling, drawn by using theories of probability sampling, had very complete demographic goals (especially for fertility, deaths, and migrations), these including a study of the economically active population.

Tunisia: the same could be said about the functioning of the official registry and national sampling used here. Drawing was done in the same fashion. The aims were purely demographic (changes in birth rates, death rates, drawing up survivorship and fertility tables) though these were somewhat less ambitious than those of the Algerian survey. The survey was rather expensive. In two sheikhdoms, a complementary survey measured under-recording at the official registry.

Cameroon: the official registry needs improvement. The investigations were limited to a zone including 15,300 inhabitants, these covered thoroughly by the survey. The demographic goals of the survey were somewhat limited (the number of deaths observed was too small to allow drawing up survivorship and fertility tables of any real statistical value). Relatively inexpensive.

Madagascar: the official registry is relatively satisfactory where births are concerned. The survey was limited to a zone of 14,400 inhabitants, who were thoroughly covered. As in Cameroon, demographic goals were relatively limited and the cost of the survey, here too, was relatively low. A new survey is being carried out in another region.

Senegal: the official registry needs to be improved. Three zones were studied exhaustively in rural zones (in Sine-Saloum, Niakhar and Paos-Koto, with respectively 4,100 and 5,200 inhabitants; in Thiès and Khombol-Thienaba, with 12,800 inhabitants); by random sampling in urban zones (in Pikine, a section of Dakar, where a 1/20 sampling of 5000 people was drawn at random). The goals were partly demographic, in the usual sense of the word, and though necessarily limited by the small number of observations, these were rich in certain areas, such as health conditions of children younger than fourteen years old, and in the profile of the causes of death among children in Khombol-Thienaba, in motivation in a fertility survey in Pikine and Khombol-Thienaba.

To classify the surveys very roughly, we could divide them into two basic categories, those which are major and those which are minor (these terms

not being used pejoratively). In the first group would appear the Algerian and Tunisian surveys; in the second, the surveys carried out in Cameroon, Madagascar and Senegal.

Each type of survey is designed to do different things. The major surveys (which would be classified as macro-demographic) make it possible to gather the data essential to drawing up tables of survivorship, of marriages, of fertility - these valid on a national scale (and sometimes for particular regions or ethnic groups) - indices of migratory movement between given zones, tables indicating the occasions on which people start or stop the economically active part of their lives. Data might also be collected about school attendance and perhaps on employment and unemployment. All this information is useful in analysing future demographic development and making predictions in related fields (in economic fields especially). It was impossible to make such predictions without accurate figures from the registry of vital statistics.

The more minor surveys (which are micro-demographic) are more suitable for studies in several disciplines when the survey consists in studying a given region exhaustively. Such surveys can study more appropriately problems like the criteria needed to evaluate demographic pressures in a region, reproduction, the adaptation of migrants in their new milieu, or some sociological and psychological problems, as was the case in Senegal.

b) Particular advantages of this method.

Some useful purpose might be served by coming back to the particular advantages obtained by using this method. By referring to the seven case studies taken up in the first part, we come up with four types of advantages:

1 - Obtaining demographic figures that are more complete and of higher quality than the results usually obtained from the census and registries of vital statistics. There is, however, not the slightest intention in the minds of the investigators working this way to replace these two traditional sources of demographic statistics. On the contrary, improving operations in these areas is what is hoped for. This method can merely provide a temporary solution until the registry of vital statistics gives perfectly satisfactory results and until the data supplied by censuses are better. If these surveys, which are often costly, were to result in a slackening in the efforts of governmental authorities to improve official statistics, it would be the exact opposite of what we are aiming to do. These surveys aim in part rather to

show up the weaknesses in official statistics so that corrective measures can be more intelligently taken, by showing, for example, in what regions or in what specific fields (births, deaths) these weaknesses are most evident.

Follow-up surveys do not merely mark one stage, a changeover, in the general improvement of the official registration of vital statistics but a means of accelerating this type of improvement.

A general survey (1) of the types of methods used to gather information in Asia up through 1969 (the surveys covered in our volume are therefore not the same ones) has shown that the coverage of births was between 43% and 86% (with a median figure of 56%) in official registries of vital statistics, between 67% and 96% (with a median figure of 67%) in single-round surveys, and between 66% and 92% (with a median figure of 83%) in follow-up surveys. The coverage of deaths was from 33% and 92% (with a median figure of 49%) in the official registries of vital statistics, between 33% and 90% (with a median figure of 51%) in single-round surveys, and between 50% and 90% (with a median figure of 72%) in follow-up surveys.

It is evident that in Asia follow-up surveys are a more efficient means of collecting data, especially on births. In Algeria, Tunisia and Madagascar, 95% of births - a similar result then - are covered, even though the statistics supplied by the official registry of vital statistics are relatively adequate in these countries.

2 - Obtaining for population shifts figures that are more complete and of higher quality, this based on the principle that as short an interval as possible should separate the event from the observation of the event. It is thus necessary to repeat the occasions for making these observations so that events are not missed. though the frequency of the rounds should not be increased to such an extent as to become burdensome to the informants (or to modify their behaviour), nor as to increase the cost of the operations and the complexity of processing the data that are gathered. In order to get a good idea of the particular circumstances of a given population, better data may be expected from surveys in which the same or overlapping questions are asked several times than from the necessarily more incomplete and rapidly gathered questionnaires submitted by surveytakers who cannot go back into the

(1) W. Seltzer, "Some Results from Asian Population Studies". Population Studies XXIII, N° 3 (November 1969) 395-406.

field to invalidate or confirm results. On two different rounds, for example, different ages might be given, this indicating that mistaken information was submitted on one of the visits. It is thus possible to make necessary corrections on a further round.

The quality of the information gathered can be improved by the less impersonal contacts between enumerator and informant that are possible on successive visits. Such is not possible in a census or single-round survey.

Follow-up surveys thus aim to avoid those errors made by omission or by having incorrectly assigned events to particular times. In these surveys, the masses of information gathered are almost checked automatically.

3 - Providing a richer mass of information that is of higher quality than the demographic statistics currently obtained and better than that obtained from single-round surveys. This is what happened in Algeria, where subsamplings were tacked on to the main sampling so as to learn of the marital and childbearing histories of women, of employment and unemployment, of migration. All of this data could be related to those provided by the main survey, which is especially concerned with the general circumstances of the population. This was also done in Senegal, where the surveys made could relate the child mortality rates to the quality of medical and social facilities and where the numerous aspects of the fertility rate could be studied.

It is therefore incorrect, in our opinion, to call these surveys "population growth estimates" (PGE), for they go far beyond mere growth estimations.

4 - Making easier explanations of the phenomena studied, especially since demographic events are discrete but interdependent. By trying to isolate the variable of time, one comes close to reproducing the ideal laboratory conditions in which the scientific method can be applied (not entirely, obviously). Cause and effect can be studied more easily. In general, these surveys do not record miscellaneous data, nor are they designed to be mere measuring devices. The working assumption is that when an event in a series occurs, it is influenced by all the other accompanying circumstances and by events that came before. The history of an individual or a couple is not, that is, a mere repetition of homogeneous events. Every change in his situation has its influence on the future. It is therefore appropriate that

there should be occasions for observation at different stages of these series and not merely at the end of it all. Let us give a few examples - marriage, the birth of the first child and later of other children. When the size of a family n is increased to $n + 1$, the behaviour of the couple is not the same as when the family changed from $n - 1$ to n . Likewise, we could cite the relationships studied by B. Lacombe and J. Vaugelade in Senegal (1) between weaning and infant mortality or fertility and infant mortality. These showed the interdependence of factors in the relationship of fertility, nursing, and infant mortality, for in Africa weaning seems to be responsible for an increase in infant mortality. There is, as well, the evidence produced by P. Cantrelle's study of the relationships between alternating seasons and illness and mortality in Khombol-Thienaba. Or, in Senegal once again, a rudimentary method of measuring (according to the length of the pregnancy) the foetal mortality rate and the rate of induced abortions is now being used in follow-up surveys. Each month the urine of women suffering from amenorrhoea in puerperium is analysed .

In the case of migrations, a follow-up survey will make it possible to discover after the fact what the characteristics of the migrants were at the time they left. Up to now, the studies carried out by censuses and single-round surveys have been limited to the condition of the migrants in the place migrated to and have come into contact with the migrant only when he was in his new environment.

All of these examples illustrate the indisputable superiority of methods of continuous observation over single-round surveys (even those with retrospective data) in analysing touchy problems. Single-round surveys necessarily come after the fact. That method which remains, as it were, on the lookout for events before they happen so as better to observe them and their evolution, is richer and more useful than one which tries as best it can to reconstruct afterwards the past of the group of people experiencing an event. This past can almost never be perfectly situated in its original context. The analysis of cause and effect is obviously easier and more profitable when an event can be accurately situated in the circumstances surrounding it and when its subsequent history can be followed. After an event, especially a long

(1) B. Lacombe and J. Vaugelade, "Mortalité au sevrage, mortalité saisonnière. Un exemple: Fakao (Sénégal)". Population XXIV, N° 2 (March-April 1969) 339-343.

time after, there is a tendency to work too selectively, especially when the subject has moved or when there is the danger of his leaving the field of observation - because of death, for example. This causes the sample to be selective (e.g., only migrants who are still alive, and in the same place, are studied by a census or a single-round survey).

Any particular situation is the result of factors that should be traced when possible from the very time they come into existence and not merely after they have come into play, or worse, long after their effects are finished. The great advantage of follow-up surveys is to allow the person doing research to observe the event in its original context and at the time it occurs.

* *
*

The use of such a method, however, does not present advantages only, in part because any continuous survey has more losses in the sampling than does a simple survey, since generally speaking only that part of the population which can be observed all during the survey will count, and entries in the sampling and departures from it will be a natural result of births, deaths, and migrations. There are two ways of mitigating these disadvantages. One of these is to break the total amount of observation time into relatively short units, as was done in the Brazilian state of Guanabara (1). For example, one would note the number of births occurring to women per month rather than per year, as is usually the case. When this is done, it is necessary to keep accurate records of the observation time of each person studied and this involves some complications in setting up processing between rounds and in calculating the various rates. It can be assumed, secondly, that the number of entries and departures from an area because of migration (as well as related events - births and deaths) generally counter-balance one another.

Lastly, the method is not perfect and some events will be left out, as is the case when more traditional methods are used, unless appropriate measures are taken. In this category of event, we could put, for example,

(1) United Nations, op.cit.

children born or deceased between two rounds, or the people (and the events concerning them) who have joined a population or sampling unit after one round and leave it before the next one, not having remained long enough to be counted as "immigrants". This type of person, frequently found in the cities, where he is an "urban nomad", will completely escape being counted demographically if afterwards he forms part of a population or another sampling unit, once again for a short period of time.

One of the principal drawbacks of this method is its rigour, demands for skilled personnel and its cost especially. As a result, failures in this type of survey are even more telling than in more traditional surveys. The method of carrying out such a study should be studied in minute detail by those responsible before the survey actually gets underway. The demographer is no longer somebody working in an office on population statistics that are more or less abstract or who is engaged in meditation on a mere wisp of a statistic. Not only must he work in the field and engage in active research that is often costly (and in many cases he is the one responsible for limiting expenses), but he is also led to question the legitimacy of what he does and the conditions in which he has chosen to work. This means he is less inclined to be a neutral observer of what he studies, for he knows that his research is meant to give a certain orientation to actions of governmental authorities. Thus, health and education programmes were inspired by the survey in Thienaba (Senegal), and people went as far as to compare the death rates in control groups and in groups receiving measles vaccine or in groups having medical care facilities, or the services of male nurses, dietary counsellors, and available medicines.

c) Some problems which arise.

Let us take up one by one some of the points which created difficulties in the surveys that have already been carried out in Africa.

1 - Should only de facto data be recorded ?

All of the follow-up surveys carried out in Africa restricted themselves to de facto data (births, deaths, migrations, etc...). Variables such as attitudes or opinions were not included on the questionnaires, as was done in the attitudinal fertility surveys on knowledge and practice of contraceptive measures and in some motivation surveys on migrations. The aim

of the follow-up surveys was to provide exclusively demographic rates.

It should be noted that as of this date, very few follow-up surveys in the world have included psychological and sociological variables. These are found only in fertility surveys and here, too, in relatively small number. Several factors explain this, first of all the reluctance investigators have to work into a survey these variables so long as essential data like birth and death rates are unknown. In addition, including such factors involves increased expenses, often requiring whole sets of questions that yield finally only a small number of variables. In fertility surveys, for example, the questionnaires often contain a hundred questions or so, and require interviews generally lasting an hour, these to be conducted by specially trained personnel. Such goals must be abandoned in the major surveys, as was the case in Algeria and Tunisia.

Nonetheless, there are obvious advantages to be gained in relating simultaneously and at regular intervals de facto variables and psychological and sociological factors. Even though this was not a priority concern of the investigators working in Africa, the possibility of making such connections in the future should not be eliminated, for variables in attitude, behaviour, and opinion are important in explaining demographic phenomena. Gathering data retrospectively in these areas is of even more dubious value than it is for de facto data. Cause and effect cannot be determined easily when de facto and psychological variables cannot be established at the same time, as when a woman married for n years and coming to the end of her childbearing period is asked her opinion on the ideal age for marriage and on the ideal number of children. Demographically speaking, it is more interesting to ask younger women such questions and then to follow the development of their attitudes and behaviour.

2 - The need to establish a hierarchy of goals.

Hierarchy of goals should be fixed from the very beginning. What is needed most of all? Estimates of crude birth, death and growth rates must obviously be of great importance, especially when the statistics of the official registry of vital statistics are of little use, as in Cameroon and Senegal. On the other hand, when the statistics furnished by the official registry of vital statistics are more satisfactory (especially for births), as in countries like Algeria, Tunisia and Madagascar, more ambitious goals

might be set, as was in fact the case in these countries.

It is undoubtedly the Algerian survey that had the most ambitious goals. In some areas, this survey should be able to provide more information than either a census or a routine demographic survey could yield. It could produce more than a census since the questionnaire already includes all the questions that had been asked in the census of 1966 (and interesting comparisons could be made here), without, though, the detailed breakdown which might be useful in setting up future sampling-frames. In addition, there were questions that could not be asked in a census without making things too cumbersome, thus jeopardizing the survey's success. The Algerian survey should be able to yield more fruitful results than could a routine demographic survey because of the great size of the sampling, which makes it possible to study a greater number of variables statistically and these in greater depth. If this survey were to include a detailed breakdown of the population, a census would doubtless be unnecessary. The information yielded would be of greater value than that of a census and of higher quality (without its costing more). The results would be available even more rapidly. This is perhaps one of the "optimal points", which shows what it might be best to do in future work on demographic statistics in the third world.

3 - Can subsamples be added on to the main survey ?

It is possible to add subsamples on to the main survey so as to study specific problems in greater depth. If such is to be done in one round only, corrections might be made with information gathered on other rounds.

Obviously, the method of random sampling should be used. This was done in Algeria, where on the second round a subsampling of one in every ten households was drawn from the master list, making it possible to interview all the women in a household on their childbearing history. The exact figures could be drawn up of the intervals between births and the relations to be made with other demographic factors (age at marriage, total length of childbearing period) or with variables that are more sociological (status of one's residence, social and job categories, etc...). Another procedure had been planned, this covering two separate subsamples. In one out of ten households on the last two rounds, all males over 15 years old and all women between 15 and 50 years and living in cities were to be interviewed on their jobs. This had to be abandoned, for lack of funds.

It would have been very interesting to add on a subsampling to study the schooling of children, as had been planned. Statistics in this area are most often drawn up by the schools themselves, and it is not easy to judge arrivals and departures, the number of drop-outs, of repeated years, nor the regular progression from year to year. A follow-up survey in which families would be questioned on school attendance during the preceding year and in which the children's real behaviour could be observed the following year, would be of great use in this respect.

Attention should be paid so that the complexity of these operations does not cause the main survey to take second place.

4 - Can new questions be added from one round to the next ?

Follow-up surveys make it possible not only to record changed circumstances and newly occurring events but to enrich one's knowledge of a population without loading down the questionnaires excessively: all the questions to be asked can be divided up among the various rounds, either for the entire sampling or for only a part of it. It goes without saying that the most awkward questions would best be left for the end.

This technique was used extensively in the surveys in Khombol-Thienaba and Pikine in Senegal. New data were gathered on each of the six rounds for the entire sampling: characteristics of individuals, marital and childbearing histories of women (first round); new data on pregnancies, weaning and the resumption of sexual relations and the period after childbirth, attitudes and opinions about fertility (second round); additional sociological data (third, fourth, and fifth rounds); and during the very last week, information on the frequency of sexual relations (sixth round).

5 - Making connections between the follow-up survey and the official registry of vital statistics.

When surveys have been carried out in countries where the registration of vital statistics, if not complete, is not too unsatisfactory (Algeria, Tunisia, Madagascar), an effort has been made to compare the reporting of events either to both sources or to one of them only. If this "linking" or "twinning" is carried out correctly and if the two sources of information are independent of one another, what is called the formula of Chandrasekhar and Deming can make it possible to estimate the numbers involved in the fourth category of events - events declared to neither source.

Nonetheless, making connections between separate documents that treat the same event poses problems that are awkward and costly, for such operations are necessarily limited to only some facts appearing in the documents of registers of vital statistics. Such measures cannot be completely satisfactory. It is not always possible to locate records of events which have been recorded, for sometimes there are problems of identification, these because the ages listed or the name (when there are homonyms or pseudonyms) is not recorded the same way in both sources. It sometimes happens that the vital statistics are not declared within the legal deadlines and the late entries are frequent. Lastly, the independence of the two systems of registration - the theoretical basis of such an operation - is doubtful, since an event declared to one source has good chance of being declared to the other, for the populations under study of ten make such connections independently and naturally. Thus it happened that in Tunisia, an improvement in the records of the official registry of vital statistics was noticed when the survey was being conducted.

Such operations are logical most of all when an entire area is covered by the follow-up survey, as in Madagascar. But when the clusters drawn randomly in the sampling system used are of small or average size - as the theory of errors makes necessary - working with the documents of the official registry of vital statistics is long and difficult, the elements of the population covered by both sources overlapping only to a limited extent.

Because such operations are costly and difficult, as a survey made in Pakistan revealed, our experience with such methods in Africa is still limited. Outside Madagascar, such an experiment was made in two rural sheikdoms of Tunisia, both of which were covered by the same questions as in the main survey but more thoroughly. Unfortunately, in both cases the amount of "linking up" that was done was limited. Statistical analysis does not make it possible to draw any clear conclusions about such a method, even though the method's usefulness is not in question, since it attempts to pinpoint the weakness in the registration of vital statistics or in the survey - or in both sources.

6 - Survey to explain why events are not recorded by the official registry of vital statistics.

We should mention an interesting extension in Tunisia that has been made of linking up declarations recorded by the official registry of vital

statistics and the survey (1). In the two sheikdoms in which such operations were carried out, enumerators questioned households on the reasons for which an event reported to the survey had not been declared to the official registry (64 births and 59 deaths in 88 households). The reasons most often given include the distance between the homes of the informants and the offices of the sheikh, the existence of private cemeteries, and most of all, the population's ignorance of the registry of vital statistics.

It would be good for these investigations to be extended and expanded to the regional level, for they would make it possible to achieve one of the basic goals of follow-up surveys - evaluation of the functioning of the official registry of vital statistics and reasons for non-registration.

7 - Advantages in setting up overlapping registration periods.

There are advantages to be had in making several visits during the same period of time and comparing the statements which are given for that same period. This was done in Algeria and Tunisia, where during the first round questions were asked on events that had taken place after Aïd-es-Seghir of the preceding year (retrospective period) and on the second round, six months later, on the same retrospective period and on the time falling between the two rounds (2). In Tunisia, it was found that 10.7% and 21.5% fewer births and deaths respectively were reported for the retrospective period on the second round as on the first, these differences more pronounced in the country than in the towns. Is it the increased passage of time which explains the omissions made on the second round, or were the periods of time in question poorly perceived by the informants (on the first round as on the second)? Both explanations are valid, for it is probable that informants would find it more difficult to situate events in relation to the beginning of the retrospective period (Aïd-es-Seghir), the farther back in the past this is. Instead of "catching" the omissions of the first round on the second round, such omissions were strengthened when the period of time for these "slip-ups" was extended. These results should make it possible to better appreciate the value of retrospective surveys.

(1) C. Paulet, "Un prolongement de l'Enquête Nationale Démographique Tunisienne". Population XXIV, N° 6 (1969) 195-197.

(2) J. Vallin, "Le temps, facteur d'omission dans une enquête rétrospective". Population XXIV, N° 3 (May-June 1969) 548-549.

Overlapping observation periods were used in Madagascar in circumstances similar to those of Algeria and Tunisia, and in Pikine (Senegal) as well.

8 - The size of the sampling.

The important question of the size of the sampling has a major influence on the general plan to be followed by the research. In fact, it would be desirable to evaluate statistically what can be analysed before preceding with any survey. Is it possible, with the size of the sampling chosen and the method of sampling used (both of these influenced by the amount of men and material available), to calculate birth, death, and growth rates in the populations covered by the survey, to draw up survivorship charts by sex, by regions, ethnic groups, major regions, to determine migratory matrices with satisfactory confidence intervals? If, for example, the small size of a sampling is such that a birth rate of 45 per thousand has a 95% chance of falling between 42.2 and 47.8 per thousand (and this is true when the size of the sampling is 50 000 and the drawing by clusters of 500), there are good reasons for wondering whether such uncertain results justify the cost involved. A priori reasoning could yield the same estimate and with no greater risks. Fertility rates by age will fall within a confidence interval range that is even more extensive. What African government is going to spend valuable money - this already in short supply - to set up a statistical system that will yield the same information that is already available, even if such is based on less rigorous scientific techniques? The answer to this depends on the quality of the information already available. When the registry of vital statistics does not exist for all practical purposes or when it is so unsatisfactory as to provide very little useful information, it is only natural to accept larger confidence intervals, thus a sampling which is less extensive. This was the case in Cameroon, where the survey yielded lower birth rates than one might have expected a priori, though these must yet be confirmed.

The limits of demographic analysis in any given case must also be examined. Is it possible, that is, to go beyond crude birth and death rates so as to draw up fertility and life expectancy charts? The size of the sampling will depend on the event occurring the least frequently (that is, death), and as the Algerian investigators found out, drawing up a chart of the death rate is demanding work, requiring the recording of 5000 to 7000

deaths. It was precisely this factor that was determinant in the choice of the size of the master sampling in Algeria.

9 - Sampling problems.

The methods of sampling used have an obvious influence on the results obtained and on how they are interpreted. There are only two real choices, as in any demographic survey.

1) A thorough survey of an entire population, the problem of sampling not really entering into consideration. This was done in Cameroon and in the Senegalese surveys in rural zones.

2) A random drawing (by strata or not), as in Algeria and Tunisia. The size of the clusters should be uniform but not so big as to produce a clustering effect, which would have unwanted effects on sampling error (a drawing by clusters should be twice as big as a systematic sampling, other things being equal), nor so small as to complicate work in the field. Clusters of 300-500 people seem to reconcile the two contradictory needs for accuracy and ease of operations.

If strata are used, variable sampling rates should be avoided so as to keep the calculations of estimates simple. Above all, the household should not be chosen as final sampling unit because of the mobility of a population and difficulties in making identifications. (In Tunisia, 17% of the households drawn randomly from the 1966 census were not found during the first round's work in the field). Geographic units are to be preferred (with the geographic units drawn randomly thoroughly processed) to using people, households, or even housing, as basic units.

Exhaustive surveys have several advantages, among them relatively small costs because of easier field work, getting to know better the population covered by the survey, and the possibility of setting up verifications of the registration of vital statistics (when such exists). There are also disadvantages - the lack of representativity on the national level and generally speaking, the small size of the sampling, the application of such a method in a widespread and relatively homogeneous population somewhat uneconomical.

Random sampling has the advantage of making it possible to cover a larger area, where the population is this heterogeneous, but it has the drawback of costing a lot and of multiplying the errors of observation due

to the difficulties that exist in making verifications. Lastly, it is impossible to link up the results with the data of the registry of vital statistics.

10 - Internal verification and "linkage".

In operations that are sometimes so awkward, means of verifying the data gathered should be sought whenever possible outside of the field work.

Internal consistency in the results should be looked for, as was done in Cameroon, by verifying all the results to see whether, for example, divisions by age corresponded with fertility and mortality levels. The stable or semi-stable population patterns of the United Nations can be used for this (1). In general, this is only possible when at least one mortality chart is available, though this is itself one of the things to be produced by the survey.

It is also possible to compare the results of two separate sources of information. There are three ways of going about this:

1) carrying out a single-round survey in which the retrospective data gathered is verified either against the information recorded by the registry of vital statistics, or against the information gathered by a parallel survey of the same type, as was done in Pakistan.

2) carrying out a thorough follow-up survey in a limited area, comparing the results obtained with the data of the registry of vital statistics, as was done in Madagascar and in two Tunisian sheikhdoms. The formula of Chandrasekhar and Deming can be used to estimate the number of events recorded by neither source.

3) carrying out a follow-up survey based on a random sampling in a large population. In this case, it is the subsequent rounds that will provide a type of self-verification, especially if there are overlapping observation periods. It is very difficult, though, to link up the results with the data of the registry of vital statistics, for the zones covered by the survey with drawing by clusters do not correspond with those of the official registry

(1) Le concept de population stable: application à l'étude des populations de pays ne disposant pas de bonnes statistiques démographiques (New York:United Nations (Doc.ST/SOA/Ser.A/39), 1969). Manuel IV. Méthodes permettant d'estimer les mesures démographiques fondamentales à partir de données incomplètes (New York: United Nations (Doc.ST/SOA/Ser.A/42), 1969).

For this to be possible, the clusters would have to average 4000 to 5000 people, and this would lead to a considerable loss of accuracy. At the most, such linking up could be made on a smaller scale than that of the total sampling.

11 - Problems of distortion in the sample.

First of all, who is to be covered by the survey? Is it the people of the households, houses, or areas drawn randomly (de facto population) or the people who customarily live in a particular place (de jure population)? In the latter case, it is necessary to define clearly what criteria of residence are to be used, so as to distinguish the visitor from the immigrant and the resident who happens to be away temporarily from the emigrant.

Likewise in the case of births, must all births taking place in the area of the sampling be recorded, even if these refer to people absent during the rounds, or must these births refer only to people present during the rounds, wherever the births themselves took place?

As a criterion of residence, it is one's presence in a place for six months or a stated intention to reside in a place for at least six months that is increasingly used. As for the events themselves, generally speaking, those events taking place within this population (births to women who have residence in one place for at least six months, deaths of people who had resided in one place for at least six months) are accepted. These events will be included in the average yearly population figures used in calculating the various vital rates. Increasing the number of rounds covering the same sampling would make it possible to sort out both persons and events at the end of the survey.

12 - Analysis and results.

Even though the accuracy of one's calculations is no true judge of the quality of the work done, nonetheless a method will be judged by the results it produces. These results have been mentioned here only incidentally, for this book is primarily concerned with methodology. The analyses, moreover, are not even close to being finished and the results thus far obtained have not lived up to the earlier expectations of investigators.

In all the surveys, crude death, birth, and growth rates were calculated for those retrospective periods that exist, as well as for the observation

period, though these rates generally do not include sampling errors. Some of the results, however, are quite surprising. Thus, in the department of Adamaoua in Cameroon, the birth rates obtained for the years 1965-1966, 1966-1967, 1967-1968, are respectively 35, 29 and 24 per thousand. A priori, it seems difficult to accept such wide variations. Sampling errors and errors of observation must be examined so as to explain this. It is possible that the first rate, which compared to the others is high, was too high because it referred to a retrospective observation period (the limits of which the population perhaps misunderstood). It is possible that births were reported that actually had taken place earlier.

Likewise, when birth rates for subgroups (regions or different ethnic groups, for example) are given in a survey, standard deviation rates or coefficients of variation for different probability thresholds (even though calculations cannot always be worked out easily when the sampling is by strata and in several degrees) should be matched. The confidence intervals should always be calculated, even when no sampling has been made, the survey processing exhaustively the area it has chosen empirically. Standard deviations are calculated just as if the population was part of a larger hypothetical whole.

Survivorship ratios and fertility tables are often drawn up, but the standard deviation of a synthetic index such as of life expectancy at birth or of cumulative fertility (with the conditions in which the sampling was drawn of course taken into consideration) are much rarer. Even though these calculations are somewhat difficult to compute, this should be done if the results are to be interpreted correctly, especially when a population is divided into subgroups which will be compared.

Calculating migratory flow is also touchy, as there are often several dimensions involved. For example, if the flow of entries and departures in the sample is to be calculated by sex (two possibilities), by 5-year age groups (seventeen possibilities), by native regions (say eight possibilities) and regions taking migrants (say eight possibilities), the totality of immigrants in the area covered by the survey (representing at most 3% - 5% of the population) will be splintered into 2,176 categories, although no sociological features of the immigrants have been taken into consideration. Such large-scale computations cannot be made worthwhile except for a very large sampling, covering many hundred thousands of people.

For the analysis itself, there are advantages to be gained in applying the methods of data correction and estimation of parameters that have been perfected for the use of countries with partially inaccurate statistics. Let us recall several examples here:

- Methods in which zhrd ztr "smoothed over" and adjustments are made in the cases of people whose age is unknown. Both methods are of considerable importance in Africa, where insurmountable problems in determining ages are often met with.

- Estimates of certain parameters (birth rates, death rates, life expectancy at birth, survivorship ratios by age, ratios of childbearing, etc..) depending on the data available, these most often based on the stable population theory (1). This method, as we have said, should make it possible to check the internal consistency of the results, verifying, for example, that the plan with classifications by major age groups coincides with the rates of childbearing.

- The method developed by William Brass (2), for African surveys in particular, apparently, might also be quite usefully applied. This method is based on collecting for each woman data on all births taking place up to the survey and on those taking place the year before in particular. Corrective coefficients make it possible to get the figure for accumulated fertility at some ages (cross-sectional analysis) to coincide with the average number of children declared by women (longitudinal analysis) in cases where the difference is due to women's mistaking the reference period involved. It would be interesting to use this method in two different ways: calculating the cumulative fertility rate by using the figures for births recorded during the year preceding the survey (retrospective survey) and by referring to the births recorded between rounds during the year of the survey itself.

(3)
W. Brass[↓] has developed another very clever method, this one meant to help estimate death rates among very young children. It is based on one's knowledge of both the total number of living children born and the number of children still alive (these classified according to the ages of the women covered by the survey). Such information makes it possible to draw up a

(1) United Nations, op.cit.

(2) W. Brass, A.J. Coale, P. Demeny, D. Heisel, F. Lorimer, A. Romansak and E. Van de Walle, The Demography of Tropical Africa (Princeton: Princeton Univ. Press, 1968), Chapter 3.

(3) W. Brass, "The Construction of Life Tables from Child Survivorship Ratios", in Conférence pour l'Etude Scientifique de la Population, Vol.I (New York, 1961) 294-301.

survivorship ratio for children up to adulthood. Several assumptions must be made (the arrangement of births by age groups of the mothers and the mortality rate among very young children must remain invariable, the same rate of omission must apply to surviving children and to those deceased). It would be interesting to compare the estimates made thusly with those obtained directly by the survey, either for the retrospective period or for the deaths declared between rounds.

B) Conclusion

These surveys, which are very difficult to set up, are above all meant to improve the gathering of data. They do not claim to be merely empirical, for they also mean to gather data in the light of the experimental phase to follow, subsequent rounds, by revealing latent structures, supposed to lead to the investigator's confrontation of the facts that he wants to study with the facts themselves. What is involved here is a means of measurement and a method of research that are meant to avoid that distortion of reality produced when contacts between the enumerators and the people covered by the survey are too brief especially in developing countries, where such contacts are of major importance.

The success of these methods depends on the amount of care with which the field work is carried out. Moreover, from the very beginning, before operations have reached a point where the strategy can no longer be modified, it is important to draw together in an overall chart the various elements involved: size of the sampling, type of sampling, type of rates to be obtained (these compared to those already available) sampling errors in each case and cost.

CONCLUSION

Follow-up surveys mark definite progress over single-round surveys. Nonetheless, one would be ill advised to think that they provide a simple means of measurement or the perfect means of measurement, for studying populations where the registration of vital statistics is lacking. The several examples that have just been given show that, quite on the contrary, the use of this method requires that great precautions should be taken, its very advantages requiring it to be used all the more adroitly.

There is no reason to be surprised by this, for it is always the application of a technique which creates problems. This was so for single-round surveys and their periods of retrospective questioning. Though these periods of retrospective questioning seemed to be so simple, they created such difficulties in practice that the results obtained often had to be questioned. The calendar itself, which provides an easy means of determining the age of an individual, was in practice also somewhat more fastidious.

One is thus rather tempted to blame the method and not the use it is put to (1). It is therefore wise to prepare oneself in advance for possible disappointments that might result from using this method improperly. As of this writing, a good number of experiments have been broken off or abandoned, so this warning is not out of place (2).

It is by no means unlikely that some single-round surveys could have yielded better results if the techniques used in the various stages had been used with more precision, thoroughness and completeness. Similarly, the

(1) As the saying goes, it is the poor workman that blames his tools.

(2) For example, the experiments with a travelling registrar of vital statistics in Guinea (1955) or Gabon (1961), attempts to carry out follow-up surveys in city areas of Morocco (1962) or Madagascar (1968), the recent Indian experiments with registration by sampling, etc...

follow-up surveys that have been made up to now have not always been carried out with all the care that such an approach requires.

There is no doubting that this technique, though better adapted to the particular populations here in question, is more difficult to use. Almost at every step one encounters new problems or familiar problems that have become even more complex:

- the method of sample taking used and the need to define clearly the unit used, since this must be located several times in succession;
- techniques for comparing different rounds, as there is a great danger of the enumerator's jumping to the hasty conclusion either that the initial situation of a household has not changed or that it necessarily must have changed. Locating the same person after a period of several months does not by itself mean that his situation is clear or that it has been understood;
- processing itself and the analysis that follows, since the many possibilities present in single-round surveys (1) are multiplied and far more varied (cross-sectional and longitudinal analyses, indices of individuals, households, or events, rates for whole periods or parts of periods, etc...)
- the use of different techniques within the same survey (comparing the various methods used to determine ages, comparing the periods of retrospective questioning and repeated entries, etc...)

There are two things to watch out for and these are apparently present in the several surveys carried out as of this date: first of all, needless complication of entries, this automatically reducing their quality; secondly, insufficient use of the material gathered and the subsequent loss of information that is available.

We hope that future surveys will be as simple as possible (with the logical arrangement and phrasing of the questionnaires apparent to the enumerators). Processing should be as complete as possible, complications at this stage not being as harmful as they are in the field.

Above all, we hope that those in charge of surveys carried out in the future realize that even the most elaborate and well worked out method means nothing unless it is used well. More than in the other types of survey, the process of follow-up surveys depends on the care with which the field work is done, thus on the ease with which this can be carried out and its results verified. But this is nothing new.

(1) For births, for instance, work can be done on the births occurring in the previous twelve month period, these births classified by the mothers or by the heads of household, the total number of a woman's offspring, various conclusions that can be reached by working with age pyramids.

Appendix 1

MOROCCO

Multi-purpose surveys (1961-1963)

1 - Goals

Multi-purpose surveys:

Demography

Agriculture

Area cultivated

Yield

Production

Breeding

Employment (city areas)

Housing (city areas)

Demographie:

The survey came after the census of 1960 and its main goal was to produce further information on births and death.

Background note:

This survey was one of the first follow-up surveys and it is by far the most important multi-round demographic survey in French-speaking Africa.

2 - Range of study

All Morocco except for the following categories:

Nomads

Jews living in cities

The province of Tarfaya

Population counted separately

Estimated population

240 000

70 000

Numbers of people involved in the scope of the survey (the estimate of 1 July 1962 is based on the census):

Population in city areas: 3 372 000

Population in rural areas: 8 161 000

For various reasons, the use of follow-up surveys in city areas had to be abandoned. In this work, we have limited ourselves to the survey in rural areas which, covering a population of 8 161 000 people, involved making three rounds in each sample household.

The milieu is a traditional Moslem one. It is very difficult to interview women. The roads are excellent except in the north.

3 - Numbers involved

Total reference number

rural zones in Morocco: 8 161 000

Sampling:

first round 329 960

subsequent rounds 63 666

4 - Method used in sample taking

Sampling-frame

list of villages drawn up for the 1960 census

primary sampling units (PSU): the village("douar")

Stratification

(1) geographically: 11 agricultural/economic strata

(2) by size: 4 substrata within each geographic stratum, these 4 substrata based on the recorded size of each primary sampling unit.

Type of sampling

Sampling in one step. The entire population of each primary sampling unit was covered by the survey (sampling by clusters).

Drawing

Systematic drawing of primary sampling units with a constant ratio in each substratum, this variable between substrata and approximately proportionate to the average size of PSU of substrata. Variable ratios between geographic strata, these chosen by the geometric mean of the following two sections:

(1) drawing with a uniform constant ratio.

(2) drawing with uniform constant numbers involved.

741 PSU's drawn for the first round; subsampling of 149 PSU's for the second and third rounds, 146 of these finally polled by the survey. (Drawing of PSU's of the subsampling: 1 in 5 systematically).

Error

Sampling error was calculated only for the estimates of population rates.

5 - Duration of the survey

First round: December 1961 - February 1962 (some of the PSU's later on)

Second round: May 1962 - July 1964 (average round for each household between second and third rounds: 197 days);

Third round: December 1962 - February 1963 (theoretically, exactly one year after the first round in each household).

Results published: March 1964.

6 - Conditions in which survey was carried out

In charge: Central Statistics Section

Financing (1) 1961-1962	Central Statistics Section	1 850 000 DH
	Ministry of Agriculture	<u>1 500 000 DH</u>
		3 350 000 DH
	1963 for tallying	1 600 000 DH

It is impossible to itemize that part of the financing which is only of the demographic survey.

No outside financing.

Personnel: 1 director and 1 assistant, aided by two technical experts and various statisticians.

Field work: controllers (holding a "brevet" or higher degree) 40
head enumerators (secondary school education) 40
enumerators (holders of a "Certificat d'Etudes Primaires") 200
hiring done by competitive examination
training period: 2 courses April 1961
September 1961

+ numerous refresher courses

40 teams, each consisting of 1 controller
1 head controller
5 enumerators

Transport: 40 vehicles (2CV Citroen), these new and purchased especially for the survey.

(1) A Moroccan dirham = approximately 1.1 French Francs.

7 - Survey techniques

Subject:

resident population (present or absent), plus temporary residents (these people not, however, included in the analysis).

Questionnaires:

first round: list of households in the primary sampling unit.

1 demographic questionnaire per household. Some of the retrospective questions on births and deaths occurring during prior twelve month period.

second round: 1 demographic questionnaire filled in without referring to the questionnaire of the first round. Only the list of heads of households was available for the enumerator's use.

1 age questionnaire for each person. This was a very detailed questionnaire, the aim of which was to help in estimating ages in combination with the regular calendar.

between second and third rounds:

collation of results of first two rounds. The office keeps a file on each household in which inconsistencies are found and which lists all people whose names appear on only one of the lists established for each of the two rounds.

third round: the enumerator had at his disposal the demographic questionnaire filled in on the first round and was asked to indicate the absence or presence of each person listed therein.

solving each of the inconsistencies listed on the inconsistency form.

1 questionnaire for each household on births and deaths occurring in previous twelve month period.

8 - Processing

first round: tallying done by standard office calculators.

longitudinal survey:

tallying done manually. This method is rather complicated when it comes to making connections between the questionnaires on each household (for details, see the article by Sabagh and Scott cited below).

Collation: In 10% of the primary sampling units, no more than 15% of the population would be included in the collation. In the remaining 90% of PSU's, an average of 5,3% could not be included in the collation. The job of collating was long and tedious (involving thirty people working over a period of four months).

Population base:
that of the second round.

Time involved: see above.

9 - Results

Data gathered: total population in each region and stratum
size of households
sex
age
marital status
date of birth, province
education: number of years, degrees
languages: reading and written knowledge/spoken language
fertility (women)
birth rate
death rate

Vital rates: estimations according to the longitudinal survey, with the exception of the 10% of PSU's spoken of above.

	<u>Estimated rate</u>	<u>Standard deviation of estimate</u>
births per thousand	44.8	+ 1.08
deaths per thousand	21.0	+ 1.07
natural growth per thousand	23.8	+ 1.5

10 - Bibliography

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G. Sabagh and C. Scott, "A Comparison of Different Survey Techniques for obtaining Vital Data in a Developing Country". Demography IV(1967)759-772.

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Appendix 2

IVORY COAST

Social and Economic Survey of Abidjan

1 - Goals

The survey, the idea of which was thought up in 1963, was to satisfy two needs.

1) to describe accurately the demographic and social situation of Abidjan in 1963;

2) working from this description, to indicate the basic trends which would make it possible to make medium and long range predictions for the development of the city and region.

2 - Range of study

The city of Abidjan can be divided into three parts:

1) the continental part, including the plateau, Adjame and Cocody (the latter built recently) with Europeans and well to do Africans as residents

2) the island of "Petit Bassam", which includes

- Treichville (typical African section, highly populated by people of very varied backgrounds; a system of avenues separates the various land allotments.

- Marcory (more modern section, inhabited by predominantly African employees and middle level executives).

3) the coastal section can be grouped under two headings: stable population and non-stable population. In both cases, a great variety of nationalities and ethnic groups can be found.

The precise areas covered by the survey included the sections of Adjame, Cocody, Attiéboubé, the Plateau, Treichville, Marcory, Koumassi, and the villages of Abobodoumé, Locodjo, Sauté, Vridi, Petit Bassam and Port Bouet.

3 - Numbers involved

Because the survey included several different subjects, different samplings were prepared.

The first demographic count provided a file of households from which the sampling of the other surveys was to be made and covered a master sampling (R) of 10 000 people, these representative of the population of Abidjan (approximately 200 000 inhabitants).

Four complementary surveys covered the subsamplings S_1 , S_2 , S_3 , and S_4 . The purpose of these was to study natural and migratory changes.

The second demographic count, conducted like the first one but one year later, covered another sampling (R_2) (in which a further distinction was made between new R_2 and old R_2).

Six surveys on budgeting and consumption were made on sampling H and C.

The master-sampling R was thus broken down into nine subsamplings, the size of which varied between 250 and 3 000 households.

4 - Method used in sample taking

The total reference number of the survey was first of all divided into five strata:

A) Modern housing: the plateau of Cocody, Marcory, and the industrial area - European population.

B) Somewhat improved "community" housing: building constructed by building groups, groupings of civil servants.

C) Housing in standard blocks of land allotments: Treichville and Adjamé. Foreign population. Sections divided in blocks 40 metres x 40 metres.

D) Housing on building plots.

E) Traditional style housing not on building plots.

The sampling-fraction drawn in the master sampling R was $1/10$ for Stratum A and $1/5$ for Strata B,C,D, and E.

With each stratum a basic sampling unit was chosen, and a list of these units (imaginary or real) was drawn up. Afterwards, a random drawing of the units to be counted was made.

Stratum A:- sampling unit: housing

- list of houses with their numbers drawn up from land register and observation in the field.

- systematic drawing ($1/10$) of clusters of 5 houses, each of these separated from one another by housing not in the cluster (clusters with gaps).

Stratum B: - sampling unit: housing

- list of houses supplied by constructors
- systematic drawing of 1 in every 5 houses

Stratum C: - sampling unit: blocks 40 metres x 40 metres

- list and numbering made from maps
- systematic drawing with fraction set at 1/5

Stratum D: - sampling unit: building plots

- numbering made from maps
- systematic drawing set at 1/5 clusters of two building plots (very often two adjacent building plots are owned by the same person).

Stratum E: - sampling unit: the courtyard (all housing giving on to the same courtyard)

- systematic drawing with fraction set at 1/5, working from readings of the cartographical service (courtyards often overlapped and were generally not of the same size).

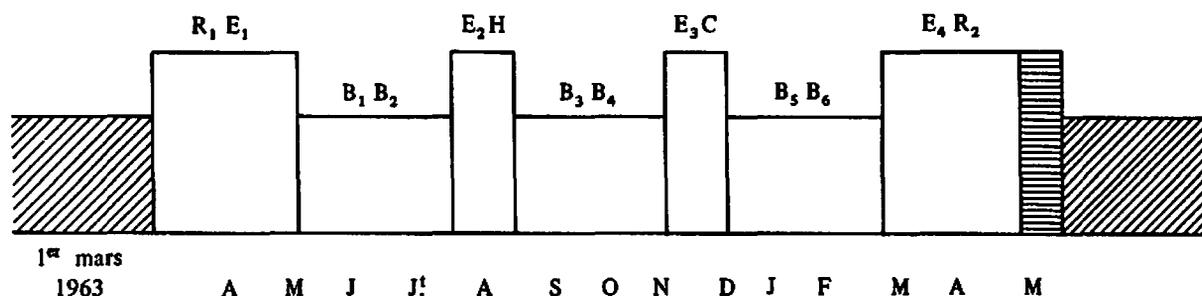
In Strata A,B,C,D,E, whenever an uninhabited house was drawn, it was replaced by a house that was inhabited.

In Stratum D, whenever a dwelling overlapped two building plots, the drawing of building plots was staggered by one additional unit on each side.

For R_2 it seemed advisable to renew the sampling by separating old R_2 : sampling fraction of 1/3 applied to the list of PSU's covered by survey during R from,
new R_2 : list of new PSU's per stratum and area.

5 - Duration of the survey

The survey was carried out over a fourteen month period, from March 1963 to May 1964. The frequency and length of the rounds were as follows:



6 - Conditions in which survey was carried out

Body in charge of survey: the Ministry of Finance and Economic Affairs and Planning had SEMA (Société d'Economie et de Mathématiques Appliquées) carry out the survey.

Hiring and training enumerators: 40 enumerators (at the level of the "Certificat d'Etudes Primaires") who spoke Dioula (the main vernacular language) and other languages when possible, were hired. (Two enumerators could speak Ebrié and Mossi).

Training programme: 14 to 23 February 1963.

For Stratum A, four female enumerators, both African and European, were used.

Publicizing the survey and preparing the population psychologically:

The support of municipal bodies and leading figures made it possible to publicize the survey on a large scale and to reach most of the population. In general the survey was well accepted.

7 - Survey techniques

a) Questionnaire:

The enumerators took note of all people - present, absent, temporarily present - residing in each primary sampling unit drawn.

- For each dwelling, a two page multiple form (R) was filled in. On page 1 information identifying the dwelling was listed. The count proper appears on page 2. Various features for each person in the dwelling were noted.

- A special questionnaire E, developing certain demographic topics, was filled in for one out of every three dwellings.

- Questionnaire B, on budgets, was made up of five charts relating to:

- . total expenditures
- . all incoming money on a particular day
- . make-up of the household (same table as in questionnaire R)
- . people taking part in the meal used for observation work
- . income of the household

- The questionnaire contains thirty one questions relating to housing (legal status of the resident, etc...; classification of the dwelling by type of construction, by rooms included, by household equipment and appliances, etc...).

- In questionnaire C are recorded for each household on the day of the survey the number of movements from the dwelling, the places gone to, the means of locomotion used, and the reasons for these trips.

Questionnaire R₂, lastly, is a multiple household form.

b) Timetable.

R₁ and S₁ got under way on 24 February 1963 (enumerators divided into six teams, each team working in a sector; verifications in the field made regularly by supervisory personnel and team heads).

End of surveys R and S₁, 15 April.

From 1 April to 13 May, coding was carried out and a rapid tally made in order to make up a card file.

13 May, survey B gets under way (for one month the enumerator visits several households, each of them three times a day).

24 June: survey B₂. The survey is carried out like B₁.

1 August: survey S₂ and H get under way.

28 August: survey B₃ begins.

2 October: survey B₄ begins.

12 November: surveys S₃C begin.

12 December: survey B₅ begins.

18 January 1964: survey B₆ begins.

24 February to 5 May: surveys S₄R₂ begin.

18 April: end of R₂

8 - Processing and Analysis.

Those enumerators not used in survey taking immediately began tallying the results of the preceding survey. It was thus possible to obtain the main results quickly.

Transcription was done on special transcription sheets, not the questionnaires themselves.

9 - Results.

We limit ourselves here to demographic results. Survey R provided a description of the population in 1963 (residence, sex, age, ethnic group, etc.). Surveys S and R₂ made it possible to follow the various shifts in this population. According to R₁, Abidjan includes 230 370 people (127 510 of these adult men and 102 850 adult women). The following rates were recorded between R₁ and R₂: crude birth rate: 47 per 1000; overall fertility rate: 190 per 1000; crude death rate: 19.3 per 1000.

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Appendix 3

CAMEROON

Survey on the standard of living in Yaounde (1964-1965)

1 - Goals.

During the survey on the standard of living, demographic observations were meant to record the changes in the population of the federal district of Cameroon, which had been covered by a census in 1962.

2 - Range of study.

The city of Yaoundé can be divided into four areas:

- a) an area with modern housing where predominantly Europeans and well to do citizens of Cameroon live;
- b) an area for civil servants;
- c) an outlying area, sparsely populated and highly agricultural;
- d) an area where the traditional type of housing is found.

3 - Numbers involved.

The total number of people involved is about 100 000. This figure can be broken down by areas thusly:

- a) 6 000 people (area with modern housing);
- b) 12 000 people (area for civil servants);
- c) 10 000 people (outlying area);
- d) 60 000 people (area of traditional type housing).

4 - Method used in sample taking.

The household was the statistical unit chosen. The survey covers 548 households drawn by clusters (blocks) in the four strata.

Stratum A: modern housing	24 blocks
Stratum B: civil servants	23 blocks
Stratum C: outlying area	20 blocks
Stratum D: traditional housing	<u>53 blocks</u>
	120 blocks

These 120 blocks represent about 1/5 of the total reference number (550 blocks). The 548 households can be broken down as follows:

Strata A and B	212 households
Stratum C	93 households
Stratum D	<u>243 households</u>
total	548 households

The method of sample taking used posed several problems, namely:

- the 1962 census provided a sampling frame that was relatively old;
- the primary sampling unit chosen (the household) could be neither easily defined nor easily located.

5 - Duration of the survey.

The survey was carried out in two phases, with a six month interval for each block.

The first round started 1 July 1964 and work in the field lasted one year.

6 - Conditions in which survey was carried out.

a) Body in charge of survey: the survey was carried out by S.E.D.E.S. (Société pour le Développement économique et social) and the Ministries of Planning and Finance.

b) Financing: the cost of the survey was 45 100 000 Francs CFA. This money came from two agreements (1) between the Government of Cameroon and the "Fonds d'Aide et de Coopération".

In addition, the commune of Yaoundé supplied personnel and material the value of which can be set at 1 000 000 Francs CFA. The tallying done by office calculators was financed by a subsidy of the Foreign Aid Branch of I.N.S.E.E. (3 650 000 Francs CFA).

c) Personnel: Practically all the personnel carrying out the survey were Cameroon nationals. Administrative supervisors were mostly foreign technical assistants.

d) How survey was accepted by population: generally speaking, the survey was accepted well by the population, especially in the urban area and the district of the civil servants. The survey was accepted even more openly on the second round.

(1) N° 45/C/63 and N° 8/C/64.

7 - Survey techniques.

a) Population and reference events: A household was defined as being the people regularly living under the same roof and using the same kitchen. Residents (present or absent) are those individuals with residence in a dwelling for more than four months (the same criteria had been used in the 1962 census).

b) Questionnaires: During the first round, individuals were recorded on housing forms that included the following information:

- date of settlement in Yaoundé
- date of arrival in dwelling
- location of previous dwelling (in Yaoundé)
- residence before arrival in Yaoundé
- departure date (for those not present)

Six months later the enumerator went around with these housing forms to note down events taking place after the first round.

8 - Processing and Analysis.

a) How various rounds were processed and then matched:

In the earliest stages, each round is processed separately, so as to make cross-sectional analyses, i.e., the equivalent of two censuses at a six month interval.

Later on, the two rounds can be compared. There are three types of population.

- Population A (covered on the first round only)
- Population B (covered on the second round only)
- Population C (covered on the first and second rounds)

A priori it is population C which will furnish the richest material for analysis, though populations A and B will be kept in mind.

b) Errors related to longitudinal analysis: the information gathered on many individuals is likely not the same from one round to the next. This can be explained either by a simple error (for example, listing a different date of birth) or by a new and important event (e.g., migration).

During computer processing, some obvious logical inconsistencies can be corrected; other corrections can be made randomly.

9 - Results.

1) Numerical results for the two rounds.

	Change	N° of residents
Resident population on first round		105 985
Changes between the two rounds		+ 4 343
. foreign emigration	- 4 317	
. natural changes		
- births	+ 2 069	
- deaths of children	- 135	
- deaths of others	- 419	
. foreign immigration	+ 7 145	
	<hr/>	
	+ 4 343	
Resident population on second round		110 328

2) Natural changes

Birth rate : 39 per 1000

Death rate: 11 per 1000

Natural growth rate: 28 per 1000

Overall fertility rate (15-39 years) 154 per 1000

(175 per 1000 in 1962)

10 - Bibliography.

Enquête sur le niveau de vie à Yaoundé 1964-1965

Paris: S.E.D.E.S., 1967

4 volumes

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Vol.II : Les budgets des ménages camerounais

Vol.III :

Part I: Données complémentaires sur les conditions de vie des ménages camerounais résidant à Yaoundé.

Part II: Les dépenses sur place des ménages non originaires résidant à Yaoundé (Note de synthèse)

Appendix 4

ZAIRE (formerly CONGO-KINSHASA)

Survey of the city of Kinshasa

1 - Goals.

A survey was undertaken in Kinshasa to obtain information on births, deaths, immigration and emigration. The survey was above all a test of methodology, and this explains the relatively small numbers and the frequent rounds.

2 - Range of study.

A section of the city of Kinshasa comprising three communes and located east of the Ndjili River was chosen. The survey was carried out in an urban area.

3 - Numbers involved.

The three communes include 170 000 inhabitants. The sampling drawn includes 5% of each commune.

4 - Method used in sample taking.

The sampling-frame was drawn from the list of inhabited building plots. The primary sampling unit is the building plot.

The sampling was drawn with the help of a table of random numbers made from the list.

5 - Duration of the survey.

The survey began in June 1969 and lasted eighteen months. The frequency of the rounds was one per month.

6 - Conditions in which survey was carried out.

The personnel consisted of:

10 enumerators

2 secretaries

1 team head

The bodies responsible for the survey were:

the head of the Division of Surveys

the Technical Division of the Planning Office

7 - Survey techniques.

No information available.

8 - Processing and Analysis.

Tallying was done by four people.

9 - Results.

Not available.

10 - Bibliography.

None.

Appendix 5

BURUNDI

Demographic Survey

1 - Goals

The relative accuracy of the various administrative counts and of the demographic survey of 1962 led to plans for a survey of the population and housing and to a restructured system for counts of "population and livestock". It was also necessary to determine the various vital statistics and to define the population features of the rural milieu.

2 - Range of study

Burundi is a small country, with an area of 24 970 sq.km (= 10 747 sq. mi.) in the heart of central Africa. It is 1500 km from the ocean by the most direct route. The country is a craggy land bordering Lake Tanganyika.

The density of the population is 134 inhabitants/sq.km., a rather unusual figure in Africa. The total population was estimated at 3 550 000 people in 1970 - most of these Roman Catholic.

There is only one major city, the capital, Bujumbura (with approximately 100 000 inhabitants).

There are some groupings of 5000 inhabitants. The rest of the population lives scattered over the country. The lack of villages is a characteristic feature of Burundi.

97% of the population is engaged in raising livestock, in agriculture (coffee, bananas, tea, cotton) or in fishing.

3 - Numbers involved

The population was estimated as being about 3 550 000, but as financial resources available did not make it possible to have a census, a sampling of 30 000 people was planned (i.e., twenty-four primary sampling units, each including 1250 people).

4 - Method used in sample taking.

The administrative divisions newly set up were used as the basis of choosing primary sampling units:

- 8 provinces
- 18 arrondissements
- 78 communes
- 2427 hills

Under each province are the estimated population figures and the number of hills and arrondissements within.

The primary sampling units were divided proportionately to each province's population. Moreover, because of population shifts within the same or several provinces, it was necessary to have one primary sampling unit within each arrondissement. This gave a total of eighteen primary sampling units, the remaining six divided among the arrondissements, depending on their population.

One thus has the number of primary sampling units per arrondissement as well as the number of hills per arrondissement. With the help of a table of random numbers, as many hills as necessary were drawn within each arrondissement.

Lastly, depending on the population of the hill drawn, either part or all the population is used. If necessary, the populations of nearby hills were added on so as to get 1250 people.

Province	Estimated rural population (1970)	Number of arrondissements	Number of PSU's drawn	Number of hills
Bubanza	210 000	2	2	97
Bujumbura	220 000	2	2	145
Bururi	400 000	2	3	271
Gitega	580 000	3	4	380
Hurumvya	390 000	2	2	215
Muyinga	510 000	2	3	324
Ngozi	720 000	2	5	579
Ruyigi	370 000	3	3	397
Burundi	3 400 000	18	24	2 408

N.B. Each primary sampling unit (PSU) represents about 140 000 inhabitants.

More recent data on the population showing that a slightly different division of the population would have been more suitable should be considered during tallying.

5 - Duration of the survey

The survey was scheduled to last fourteen months, from April 1970 to June 1971, so as to observe population shifts within a full twelve month period.

April 1970: setting up enumerators in the field for a fourteen month stay

May-June: first round on each hill

July, August, September: second round

end of September-October: third round

November, December, January 1971: first tally

February, March, April: fourth round

May-June: last round, exactly one year after the first round.

6 - Conditions in which survey was carried out

The body in charge of the survey was the Statistics Department of Burundi. The proposal received the approval of the Ministry of Planning.

Financing was carried out exclusively by Burundi.

- total cost: 2 820 000 Burundi Francs

2 000 000 from the regular budget of the Statist.Dept.

500 000 from the regular budget of the Dept.of Agronomy

100 000 from the budget of the communes

220 000 from the special survey budget (this money was in fact never granted).

It is to be noted that no foreign aid was requested.

Personnel:

1 research planner (S.E.D.E.S.) and 2 French foreign technical assistants took care of planning and later of directing work on the survey.

The rest of the personnel was locally hired and included:

- 1 part-time supervisor of the survey

- 24 enumerators

- 1 driver

- plus secretarial and typing staffs of the Statistics Department.

Enumerators were chosen from those people who had already taken part in agricultural surveys (or even the 1965 demographic survey). A four-week training programme was designed to familiarize them with the questionnaires of this survey.

Material:

- 1 Renault 4L
- 1 Land Rover (rarely available, this was replaced in September 1970 by a Peugeot 404 van)
- 2 Peugeot 404 vans for setting up enumerators at their stations
- 32 000 questionnaires
- 1 000 ballpoint pens
- chalk
- tally forms and miscellaneous material

All this was furnished by the Statistics Department.

Facilities:

Several offices were set up in Bujumbura at the Statistics Department. Several offices were set up in Gitega.

Each enumerator was given a cabin on the hill assigned to him. The cabin was built and paid for by the communes.

7 - Survey techniques

Personalities and leaders of the hill covered by the survey were told of the aims of the survey by the enumerator. With their approval, a meeting was then arranged for the entire population in question.

Any person who passed the night preceding the enumerator's round in a "rugo" was interviewed - up to 1250 people on each hill.

Questionnaires: there were six questionnaires used:

- D₁ : baseline count - count of 1250 people to be interviewed by each enumerator
- D₂ : household form - to be filled in for each household. Included information on vital statistics, employment, schooling.
- D₃ : age form - to determine the ages of those interviewed as accurately as possible so as to construct age pyramids.
- D₄ : forms for women - each woman of childbearing age was to be covered on one of these forms so as to help calculate fertility rates, birth rates, infant mortality rates.
- D₅ : housing form - to yield information on the housing conditions of households.
- D₆ : population shifts - to give information on population shifts occurring within a household during the year of the survey.

Calendar of operations:

After the method of the survey and the questionnaires were prepared, a four week training course was organized for the enumerators in January 1970.

- February 1970: pilot survey in Zege
- 23 March - 15 April: setting up enumerators in their stations on the hills
- end of April: beginning of the survey
- May - June:
 - numbering of "rugos"
 - questionnaires D_1 - D_2 filled in up to 1250 people covered
 - date of round noted
 - pregnant women noted
- July, August, September:
 - questionnaires D_3 - D_4 filled in
 - ages determined
 - women questioned by enumerators
- end of September-October:
 - third round: questionnaire D_5 (housing)
 - questionnaire D_6 - population shifts pointed out by "rugo" chiefs have been noted as early as the first round.
- November, December 1970 - January 1971:
 - verification of questionnaires
 - first tally
 - break for enumerators
- February, March, April:
 - enumerators go back to hills
 - questionnaires added to and corrected
 - various questions: supplementary surveys (handicrafts)
- May-June:
 - last round, one year to the day after the first round
 - questionnaire D_6 is filled in after D_2 has been checked
- June 1971: final processing, final report.

8 - Processing and Analysis, in preparation.

9 - Results, not yet published.

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This is not meant to be considered as an exhaustive bibliography in 1970 but rather as a starting point for further work.*

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* Translator's Note: The references given below reproduce substantially those given in the original French. These have not been revised since the 1971 printing. When available, English titles of bilingual publications have been given, but no effort has been made to translate such titles otherwise. Bibliographical research will probably be easier when working with the standard title of a publication in French than with the correct (but not standard) translation of such into English.

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