

Groupe de Démographie Africaine

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**POPULATION SIZE
IN AFRICAN COUNTRIES :
AN EVALUATION**

Volume I

Paris
1986

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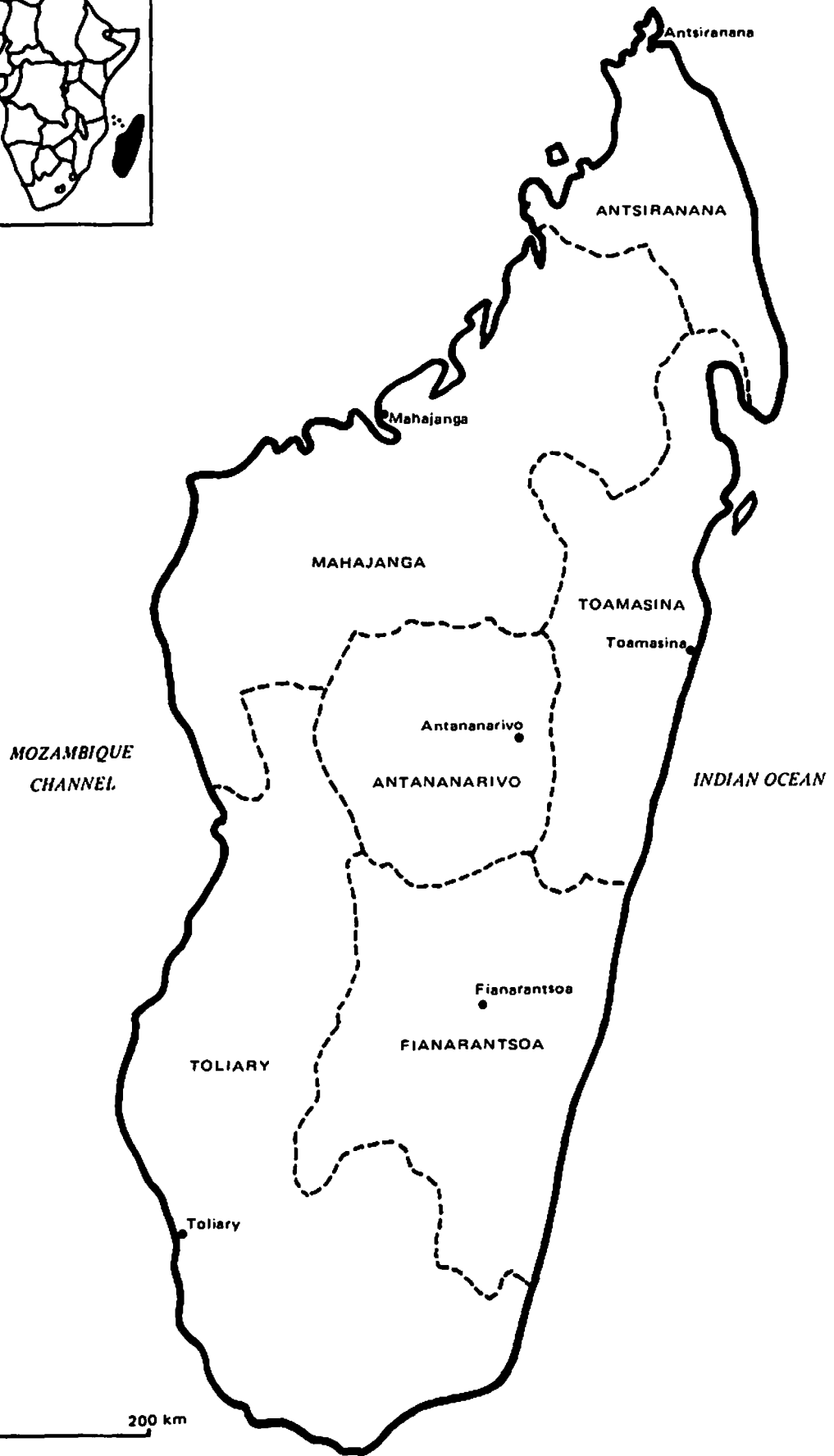
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MADAGASCAR

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OCTOBER 1979

MADAGASCAR



M A D A G A S C A R

I. DESCRIPTION OF SOURCES OF DATA AND POPULATION ESTIMATES

Four major categories of sources of data relating to estimates of the population of Madagascar can be identified :

- old estimates, before the colonisation of the Main Island
- administrative sources
- compilation of partial data
- statistical collection

These sources differ in their objectives and in their methods of observation or evaluation and therefore provide results of varying value to the demographer. However, it must be emphasised that each of these sources has prevailed during quite distinct periods in the history of the Malagasy people.

1) Pre-colonial estimates

The Merina monarchy certainly carried out enumeration operations on the population of the kingdom well before colonisation. Being military in character, the results were treated as "State secrets" and disappeared when annexation of the island took place in 1896. No numerical data on the population were ever published by the Merinian oligarchy.

Nevertheless, quite disparate estimates have been advanced by some of the travellers who came to explore the island during this period.

a) Aims and methods of estimation

The first estimates were made in the context of the conversion to christianity of the African people and the establishment of trading posts (1500-1850); in 1650 the Abbé Nacquart estimated the Malagasy population at 400 000, and six years later, in 1656, Etienne de Flacourt proposed the figure of 800 000 inhabitants. In fact, Etienne de Flacourt was the successor of Jacques Prony, who founded at Fort-Dauphin the first trading post of the French East Indies Company (1643).

The development of slavery during this period in any case necessitated some knowledge, however vague, of the size of the local population.

Later on, the imperialist system of exploitation and war strategy of colonial annexation were to find part of their logic in the demographic evaluation of colonies.

In this pre-colonial period, the suggestion that foreign travellers used exhaustive methods of enumeration appears to be totally inconceivable. Therefore, it is proposed that the various estimates produced by the European travellers were the product of their own imagination or at least the results of some "magical" adjustments. Among the formulae used in these adjustments would be without doubt spatial extrapolation (the geographic density method) or certain criteria based on demographic structure (ratio of rural/urban population, structure by major age groups, number of tribes, etc...)

Consequently, Jean Laborde, primarily familiar with relatively densely populated zones of Madagascar (central regions, notably Tananarive), considered the population to be in the order of 8 million in 1870, a figure grossly overestimated compared to reality.

Finally, sight must not be lost of the role these visiting "demographers" wished their figures to play, to cultivate an attitude on the part of their readers (the imperialist State, the Papacy, the Administrative Council of a colonial company...) and encourage political, economic or social intervention in the colony. It can even be suggested that this role was a determining factor in the estimation of population figures.

b) The various estimates

Table 48

MADAGASCAR - VARIOUS POPULATION ESTIMATES
IN THE PRE-COLONIAL PERIOD ACCORDING TO EUROPEAN TRAVELLERS
(units - thousands of inhabitants)

DATE	EVALUATIONS	SOURCE
1650	400	Abbé Nacquart
1656	800	Etienne de Flacourt
1665	from 1 211 to 1 600	Soucher de Rennefort
1741	1 600	De la Martinière
1768	4 000	Abbé Rochon
1776	from 250 to 300	Benyowsky
1777	1 500	Baron de Benyowski
1792	from 4 000 to 5 000	Kerguelen
1818	2 000	Silvain Roux
1828	4 450	Prince Coroller
1829	2 000	Capitaine Jourdain
1839	2 000	Bona Christave
1859	3 000	Barbié du Bocage
1868	5 300	Capitaine S. Pasfield Olivier
1870	8 000	Jean Laborde
1874	2 500	Rev. Joseph Mullins
1875	4 500	Von. L. Jedins
1879	from 3 500 to 4 000	Rev. Sibree
1881	5 000	Rev. J.G. Baker
1889	3 000	Grandidier et Elisee Reclus
1890	7 000	Dr. Catat

After the 1896 annexation, evaluations continued to the end of the 19th Century :

1897	6 000	W. Gibbs, American Consul
1898	from 4 000 to 5 000	Père J.B. Piolet
1900	2 260	Fournier

It is emphasised that these estimates are far from being consistent. Nevertheless, Fournier without doubt came closest to the true figure, for the Census of 1900 gave a figure of 2 242 000 for the Malagasy population.

2) Administrative Sources

Despite being endowed with several sources of data, Madagascar belongs to that group of countries with "incomplete statistics" in the field of demography. The permanent or periodic sources are administrative in character, and are more often than not inaccurate.

They are three in number :

- the Sub-Prefecture Reports ("Monographies de Sous-Préfectures")
- Civil Registration
- International disembarkation and embarkation cards

The collection of data is the responsibility of the administration. The publication of results is ensured by the National Institute of Statistics and Economic Research (I.N.S.R.E.) in consultation with the Ministers concerned. This Institute carries out processing of the data (in the case of Civil Registration and international disembarkation and embarkation cards) or re-arrangement of data with a view to its presentation in tabular form (sub-prefecture reports).

a) The "Sub-Prefectures Reports"

On 6 November 1896, by order of General Gallieni, the first population census in Madagascar took place, in compliance with a law decreed by Queen Ranavalona III. This attempt ended in failure, and it was not until 1900 that the operation resulted in the enumeration of 2 242 000 Malagasies (at 1 January 1901). Since then, annual administrative censuses have been carried out on the population of Madagascar, the results of which, at the sub-prefecture level, are published in the "monographies".

* Aims and methods of collection

The collection procedure is intimately linked with the organisation of the Malagasy territorial administration. It should be borne in mind that a reform of the administrative sub-divisions was carried out in 1976.

Before the reorganisation, the village was the basic administrative unit. A group of villages delimited geographically constituted a commune.

According to the size of the population and the state of its socio-economic infrastructure, a commune was described as either "rural" or "urban". In fact, the canton generally coincided with the geographical delimitation of the commune; the difference lay in the matter of jurisdiction. The Chief of the Canton was designated by the central authorities to run the Canton, whereas the commune was represented by a Council and Mayor chosen by municipal election.

The sub-prefecture was a grouping of several cantons. It was administered by a sub-prefectural bureau, having the Sub-Prefect as its Head. At a higher level was the Prefecture incorporating several sub-prefectures.

Finally, the Province, made up of a number of Prefectures, was the main geographical unit in the administrative sub-division of Madagascar.

This former territorial sub-division manifested itself as follows :

- 6 provinces
- 18 prefectures
- 92 sub-prefectures
- 776 cantons
- 779 communes of which 46 were urban communes
- 25 231 villages

At the outset, the Sub-Prefecture Reports had been established principally to aid the control of disorder by placing the inhabitants under the permanent control of the centralised colonial state. While maintaining this disciplinary aspect, the Sub-Prefecture Reports usually served a double purpose in the neo-colonial period :

- budgetary forecasts and control of tax returns
- the exploitation of socio-economic data with a view to better administrative management: reports on the activities of various administrative services, statistics on the evolution of demographic data, the production of principal agricultural commodities, calculations of the damage caused by cyclones or catastrophes...

The Sub-Prefecture Reports are compiled on an annual basis. The central responsibility for the work lies with the Ministry of the Interior and more specifically with the Service for General and Territorial Affairs.

Blank tables are issued by this Service to the Sub-Prefects, the latter delegate the gathering of the data necessary for completing these tables to the cantonal heads.

The collection of data is not regulated by precise instructions as to its execution, and differs according to the environment, urban and rural.

In urban environments, the information is drawn from enumeration questionnaires on a direct contribution basis. These questionnaires include individual data on the members of households about their civil registration status (sex, date of birth, marital status) and socio-economic characteristics (race, nationality, educational background, occupational group, profession...). A certain period of time is fixed for the head of household to return the questionnaire, duly completed, to the District Head. The latter sends the results of the partially processed questionnaires to the Deputy Mayor of the district for the completion of the blank tables.

In rural areas, the village Head keeps a register including a roll of all the inhabitants under his jurisdiction. Personal information, entered on one line, and grouped by household, includes notably: name and forenames, age, sex, race, marital status and occupation.

In principle, the village Head up-dates his register annually. In order to do this, he deletes from the list the dead and emigrants, and adds the newborn and immigrants.

A village is usually made of several hamlets. In fact it is the hamlet Chiefs who provide the village Head with the information relating to the inhabitants under their jurisdiction. The enumeration register of the village is therefore a compilation of personal data brought in by the hamlet Chiefs. Thus in urban environments, it is the head of household himself who plays the role of interviewer, while in rural areas, it is the hamlet chief who more or less fills the part. Nevertheless, in neither of the two cases is a systematic interview of members of the household carried out.

* Processing of Data

The Sub-Prefecture Report contains information relating to the sub-prefecture with a breakdown by canton and commune. The processing of personal data is done at district level in urban environments and at village level in rural areas. Processing is done by the District Head or Village Head.

The results obtained in this way are sent to the Deputy Mayor or to the cantonal head who, after having checked, verified or corrected the statistics, sends them on to the sub-prefectural office.

The Sub-Prefect, assisted by his deputies and secretaries gathers the data, presents them in tabular format, and comments on them in a report: this constitutes the Sub-Prefecture Report. Two copies of the latter are produced, of which one is passed to the Minister of the Interior who endorses the documents.

* Processing and publication of the results at the national level

The copies of the Report, endorsed by the Minister of the Interior, are sent to the INSRE for the purposes of analysis and publication of the results. The INSRE, and more specifically, the Demographic Section, groups together the data at prefectural, provincial and national levels.

Thus, in the brochure entitled: "Population of Madagascar at January 1" INSRE publishes among other things the results of the analysis of Sub-Prefecture reports with regard to:

Table 49

MADAGASCAR - POPULATION AT 1 JANUARY IN SUCCESSIVE YEARS

YEAR	POPULATION in 000's	YEAR	POPULATION in 000's
1901	2 242	1937	3 758
1902	2 299	1938	3 758
1903	2 454	1939	3 833
1904	2 516	1940	4 016
1905	2 553	1941	4 034
1906	2 613	1942	3 986
1907	2 642	1943	4 190
1908	2 707	1944	4 523
1909	2 738	1945	4 144
1910	2 870	1946	4 236
1911	2 966	1947	4 094
1912	2 988	1948	4 023
1913	3 011	1949	4 088
1914	3 264	1950	4 143
1915	3 351	1951	4 234
1916	3 496	1952	4 296
1917	3 501	1953	4 389
1918	3 520	1954	4 461
1919	3 489	1955	4 578
1920	3 119	1956	4 674
1921	3 255	1957	4 842
1922	3 336	1958	4 975
1923	3 311	1959	5 098
1924	3 456	1960	5 183
1925	3 519	1961	5 353
1926	3 579	1962	5 536
1927	3 591	1963	5 753
1928	3 618	1964	5 999
1929	3 709	1965	6 234
1930	3 665	1966	6 462
1931	3 722	1967	6 676
1932	3 725	1968	6 912
1933	3 736	1969	6 199
1934	3 783	1970	7 321
1935	3 808	1971	7 551
1936	3 696	1972	7 820

Source: Administrative Estimates

-
- geographical characteristics: rural communes, urban communes, settlements or towns of 1 000 inhabitants or more, sub-prefectures, prefectures, provinces, national territory;
 - civil registration characteristics: sex, major age groups : 14 and under, 15-20 years, and 21 and over;
 - socio-cultural characteristics: races, nationalities.

Finally, it should be noted that the last Sub-Prefecture reports were published in 1972 just before a reorganisation of the territorial administration.

Table 49 shows the Malagasy population at 1 January in successive years since the first administrative census of 1900.

b) Demographic movements

Continuous observation of demographic phenomena in Madagascar is achieved by the recording of Civil Registration statistics for natural movements, and by the completion of international cards of disembarkation and embarkation for international migratory movements.

* Civil Registration

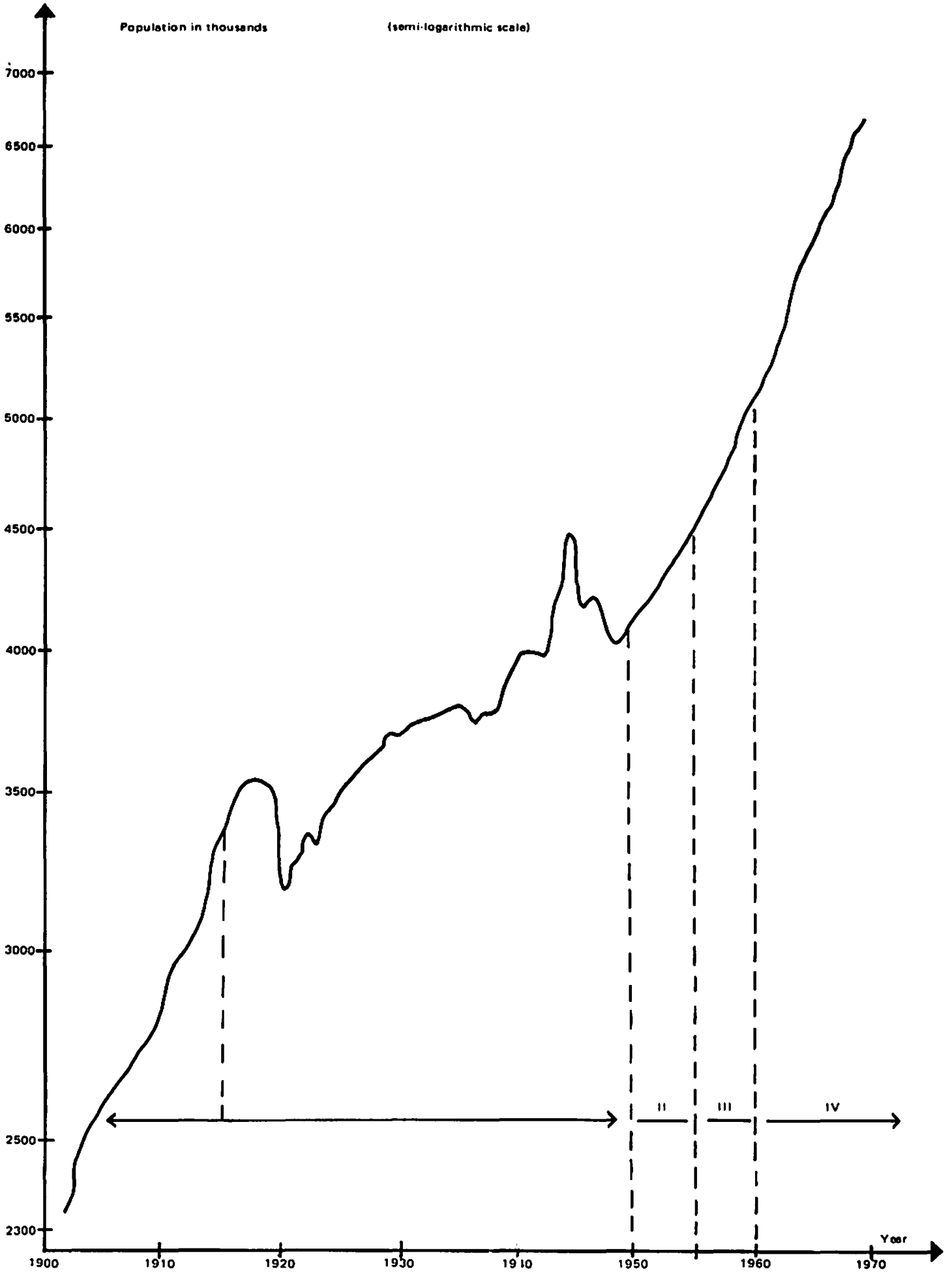
In Madagascar, the Civil Registration recording system was established for the first time by Queen Ranavalona II in 1878. At that time, the field covered was far from exhaustive in either the geographical sense or in terms of the population touched by the system. Nowadays, although registration offices are scattered throughout the island, significant under-declarations are still apparent.

In each administrative unit consisting of communes, civil registration lists are kept up-to-date by the Civil Registration Officer in the person of the Mayor with the assistance of his deputies. Each year the Civil Registration Officer asks INSRE to send out birth and death "statistical forms" as well as "marriage bulletins". These statistical forms may be completed by the respondents themselves, by nurses or mid-wives, or by the Civil Registration Officer.

For villages distant from the civil registration centre, the village heads keep all declarations in a register. These are sent on to the Civil Registration Officer who copies them on to statistical forms and into the registers. The forms, duly completed, are sent to INSRE, generally monthly, and are then recorded and classified by administrative ward.

As forms are returned, the declared events are analysed manually by the Demographic Section, based on processing models. The results are published in "The Population of Madagascar on January 1st of the year", and classified according to the three principal events: marriages, births and deaths. Only the numbers of births and deaths are of interest in up-dating population figures.

CHART 7 MADAGASCAR
EVOLUTION OF THE POPULATION SINCE 1900



* International Disembarkation and Embarkation Cards

These are the police documents which foreign visitors must fill in at customs posts. They are collected by the Ministry of the Interior, who sends them monthly to INSRE where they are analysed with a view to publication: in particular these documents contain information of a civil registration and professional nature, as well as the itinerary of the journey being made.

If long range movements appear to be satisfactorily recorded, traffic to and from the neighbouring islands (Comoro Archipelago...) is impossible to check effectively. Therefore, although Madagascar is an island, statistics on migratory movements display inaccuracies.

Nevertheless, these cannot be too significant, as the technicians consider that this source is one of the best of those established with the help of administrative documents.

It should be noted that the results of processing of the data on international migration are also included in the publication "Population of Madagascar on 1 January of the year".

* Adjustment of Figures

This is carried out according to the classic formula :

$$P_1 = P_0 + (B - D) + (I - E)$$

It should be emphasised straight away that the migratory balance for Madagascar is negligible; in 1975, 51 295 arrivals were counted against 53 535 departures, i.e. a migratory balance of 2 240 for a total population of around 7 000 000 inhabitants. This statement is confirmed by the figures for previous years : 1966, 1967, 1968, 1969.

Consequently, only the natural movement balance is taken into account in the adjustment of the figures provided by the administrative estimates :

$$P_1 = P_0 + (B - D)$$

with P_1 = updated figure

P_0 = figure from administrative estimates

$B - D$ = balance of natural movement based on civil registration statistics

Table 50
MADAGASCAR - ANNUAL ADJUSTMENT OF FIGURES FROM ADMINISTRATIVE ESTIMATES FOR 1ST JANUARY (1960-1973)
 (Unit : thousands of inhabitants)

YEAR	P ₀	B - D	P ₁ (Adjusted figure)
1959	5 098	101	
1960	5 183	111	5 199
1961	5 353	122	5 294
1962	5 536	-	5 475
1963	5 753	-	-
1964	5 999	139	-
1965	6 234	145	6 138
1966	6 462	139	6 379
1967	6 676	159	6 601
1968	6 912	165	6 835
1969	7 199	174	7 077
1970	7 321	174	7 373
1971	7 551	189	7 495
1972	7 820	198	7 740
1973			8 018

3) Compilation of partial data: "The Population of Madagascar in Mid-1962"

Up to 1959, the only sources of demographic data with a national bearing on Madagascar were administrative in nature, and therefore with scarcely any guarantee of scientific accuracy.

During the years 1959-1960, the INSRE carried out an enumeration in six large towns, provincial capitals.

From 1960 to 1964, this enumeration was extended to urban communes, centres of 5 000 inhabitants or more.

In 1962, rural areas (all settlements with less than 2 000 inhabitants) were subjected to a one in two hundred statistical sample survey.

The coverage of population by these various statistical operations is estimated at 97%. Therefore, in the context of a study carried out by the Institute of Training and Demographic Research (IFORD) of Yaoundé, it was considered opportune to piece together these partial data at a specific date in order to obtain a total population figure for Madagascar. It should be made clear that the survey carried out in rural areas was a budget-consumption survey which provided, among other things, demographic data. The date of this survey was taken for the assembly of data since in 1962 the rural population represented 87% of the Malagasy demographic universe.

The figure of 3% of the total population residing in pre-urban centres (2 000 to 4 999 inhabitants), not covered by the statistical operations, was estimated on the basis of the results of the administrative censuses of 1961 and 1964.

By adjustment of the figures from urban censuses, and in conjunction with the assembly of data mentioned above, an estimate is obtained of the total population of Madagascar in mid-1962 : 5 783 300 inhabitants.

4) Statistical Collection

At the present time, Madagascar has only two sources of demographic data using statistical collection on a national scale:

- a demographic sample survey: "Demographic Survey - Madagascar 1966",
- a statistical enumeration: "The First General Census of Population 1975".

a) The Demographic Sample Survey

The Demographic Sample Survey of 1966 was carried out by INSRE at the request of the "Commissariat General du Plan" in order to provide a satisfactory estimate of the growth rate of the Malagasy population.

* The questionnaire

The questionnaire in use included :

- a household sheet containing information on civil registration, socio-cultural and professional details about people resident in or visiting the household,
- a sheet on deaths in the household which have occurred during the previous twelve months,
- a sheet for women concerning women over 12 years old, to obtain information on fertility at the time of the survey, total fertility and total mortality.

* The survey

This was a two stage sample survey:

- the first one at the cantonal level with a ratio of 1/10,
- the second one within cantons with a ratio of 1/20.

The total ratio of one in two hundred gave a growth rate of 0.3 percent with a 95 percent confidence interval.

After a stratification according to the density of population and geographic situation, the first draw provided 77 cantons; the figures for the population in the cantons were taken from the reports of the sub-prefectures for the year 1964 and their area from the "Code géographique" of the INSRE.

A list of villages in a logical geographical order (along an itinerary) was established in each drawn canton. Then, a systematic draw of villages was made for every $P_i/10$ inhabitants (P_i being the population of the n th canton). It was then necessary to count in the village as many times 50 inhabitants as there would have been individual persons drawn during a systematic survey.

Carried out in this manner, the survey presented a sample of approximately 39 000 inhabitants.

* The estimates

The observed results provided among other things:

- the size of the total population in mid-1966: 6 200 000 inhabitants with a 95% confidence interval of \pm 200 000 inhabitants
- the natural increase rate: 2.1% with a 95% confidence interval of \pm 0.4%

This natural increase rate results from a 46‰ birth rate and a 25‰ gross death rate.

It must be mentioned that the rate for Lotka was estimated at 2.3%.

b) The Census

The first general census of population started in 1975 with the financial backing of the United Nations Fund for Population Activities and the National Fund for Economic Development.

The decision to carry out a first general census of population was taken as early as June 1965 by the Interministerial Committee for Planning and Development. The objectives of this operation were defined and decided upon by the National Census Commission where all ministerial departments and some private administrations are represented.

Between 1967 and 1971, INSRE were to elaborate a methodology, prepare the necessary documents and test them by means of pilot surveys carried out in urban centres and rural communes.

* Methodology

Different categories of population were considered in the method of collection:

- according to the environment: urban and rural populations
- according to the type of residence: transient population (hotels,...) population of specific institutions (barracks, convents, prisons, ...) population of households with a distinction drawn between present or absent residents and visitors.

Three periods were envisaged for the carrying out of operations in the field according to the environment:

- 1st period: the census of the town of Antsirabe and of the large urban centres and provincial capitals with the exclusion of Tananarive-ville. These are agglomerations of more than 45 000 inhabitants.

Night of the census: 26-27 January 1975.

- Second period: the census of the town of Tananarive and other urban centres which were on the whole urban communes representing the chief towns of sub-prefectures with a population between 5 000 and 45 000 inhabitants.

Night of the census: 6-7 April 1975.

- Third period: the census in rural areas.

Night of the census: 17-18 August 1975

Five kinds of documents were used for the collection of data:

- the segment register for the counting of buildings and the identification of households, a document for checking and provisional sorting, a basis for post-censal checking;
- the dwelling-household questionnaire for population enumeration;
- the special institutions questionnaire for the enumeration of the population in special institutions;
- the transient population questionnaire;
- the questionnaire for the Malagasy population residing abroad: census carried out by the diplomatic representative of Madagascar.

As far as the design of the "dwelling-household" questionnaire is concerned, the difference between the urban and rural environment ought to be pointed out.

In urban areas, the questionnaire was more elaborate and worded in French whereas for rural areas, the questionnaire was lighter and produced in Malagasy. In both cases, it contained both social and individual data.

The social data concerned housing characteristics (name of dwelling, floors inhabited, number of occupied rooms, means of water supplies, degree of comfort), durable goods (radio, sewing machine, car or other vehicle, plough, ...) and the farming activities of the household.

The collected individual data concerned:

- civil registration details: christian and surnames, kinship, sex, date of birth, marital status, nationality;
- geographical details: status of residence at the place of enumeration (RP, RA, V), previous place of residence (sub-prefecture), with date of arrival or departure, place of birth;
- socio-cultural details: level of education and literacy;
- economic details: type of occupation, job title, principal work, nature of the main activity of the place where the individual works;
- health details: disabilities.

In urban areas, the household questionnaire contained twenty individual pieces of information whereas in rural areas it contained only nineteen of them: "origin" (country of origin for foreigners) or "ethnic group" (for the Malagasy) was the additional question posed in urban areas.

The carrying out of observations in the field consisted of three phases:

- the census of buildings during which, on one hand, all households had to be identified by means of a numbering system, and on the other hand, dwellings had to be listed according to their individual utilisation (detached houses, apartments, ...), economic (industrial, commercial, ...), or social (hospitals, schools, places of worship)
- the census of population and inhabitants which represented the population census proper;
- the post-censal survey conducted on a sample of households originating from a 1/50th survey which was designed for the checking of the results of the census and to obtain data on fertility and mortality.

Finally, it must be noted that particular attention was paid to public awareness and to publicity both at the beginning and during the operation, to which end census commissions at provincial, prefectural, sub-prefectural and cantonal levels, were set up. Among the participants in these commissions were public and religious authorities, technicians, primary school teachers, representatives of private enterprise, etc.

* Organisation

The most marked feature of the organisation of the census was the setting up of a central operations management comprising a technical service, an administrative service and a data processing service.

Located in Tananarive, this body was intended to co-ordinate and supervise the work in the field. It looked after the return of documents, then the exploitation and computer processing of data. It was responsible for the administration, financing, and the material needed for operations.

The organisation was structured on the basis of administrative wards. At the level of each province there was an officer, and at prefectural level a supervisor. The provincial officer and the prefectural controllers had the task of providing for the recruitment and training of zone supervisors and enumerators, and of supervising the carrying out of work in accordance with the schedule of operations. In each sub-prefecture, a team-leader was appointed who was to set up and organise the team composed of zone supervisors and enumerators.

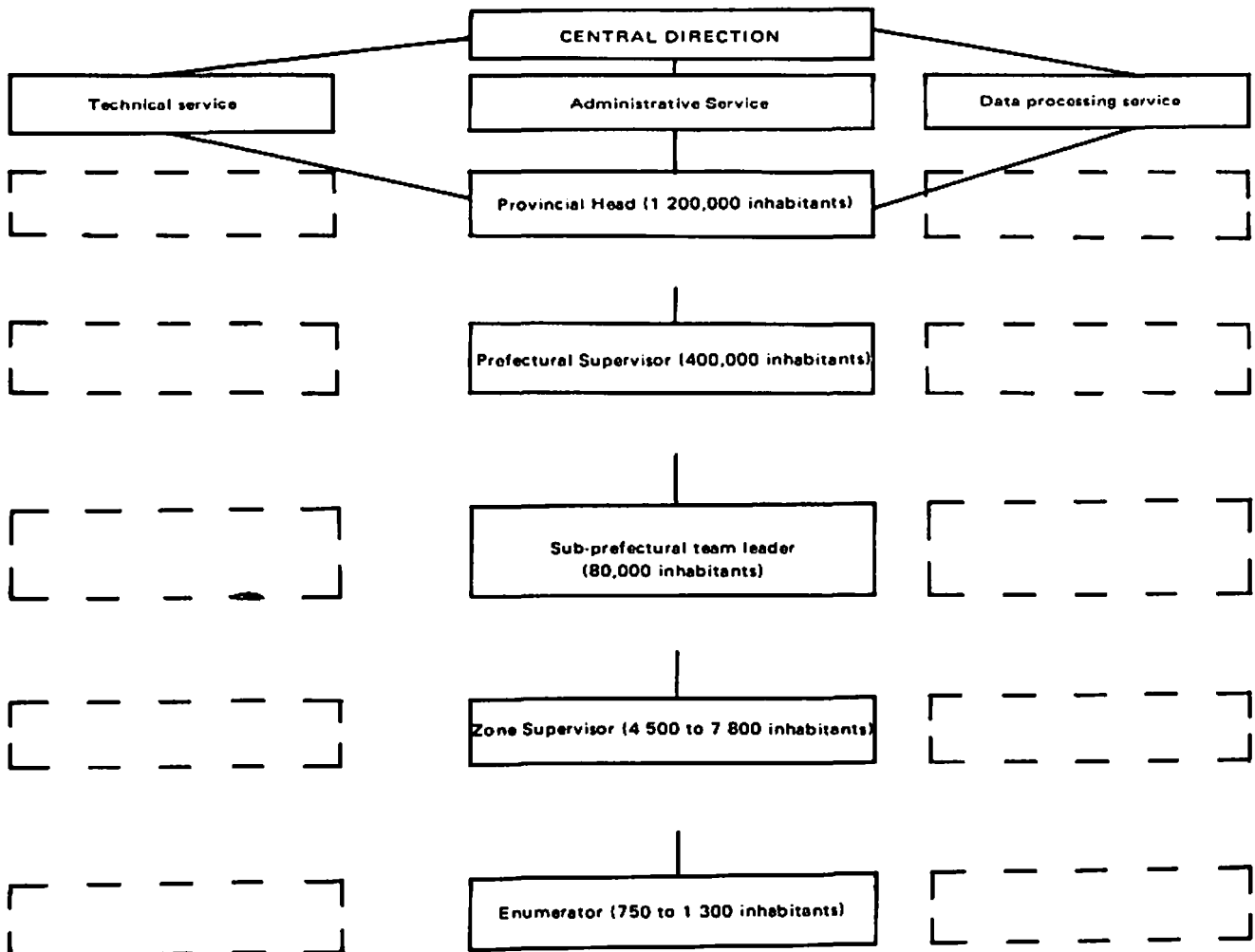
The sub-prefectural team leader played the most important part during operations in rural areas, in the enforcement of instructions. Each sub-prefecture was divided into several zones and each zone into segments. These zones and segments are boundaries drawn for the purposes of the census.

A zone comprises about six segments from 750 to 1 300 inhabitants. The segment constitutes the area to be covered by an enumerator.

The zone supervisor had to carry out specific tasks:

- to carry out the counting of buildings and proceed to the division of the zone into segments;
- to supervise the work of the enumerator during the population enumeration;
- to implement the work of numerical analysis after the checking and correction operations.

CHART 8
MADAGASCAR – ORGANIZATIONAL STRUCTURE OF THE GENERAL CENSUS OF 1975



Officers at the level of the Central Direction and at provincial level were in the main professional statisticians.

In the posts of prefectural supervisors were technical assistants, employees or agents of the statistical office more or less familiar with the implementation of a demographic survey. The management of operations, as far as co-ordination and supervision are concerned, was therefore carried out by qualified personnel, members of INSRE. In contrast, the sub-prefectural team leaders and zone supervisors, as well as the enumerators, were hired on contract, as far as possible on the spot, and possessed a good knowledge of the field and received intensive training.

* Publication of results

Manual processing of the principal demographic data has provided some provisional results: population figures by administrative ward, and according to urban and rural environment, with in particular a breakdown by nationality, sex and age. Processing by computer has necessitated the punching of cards, the transcription of data to magnetic tape and the design of a programme.

At the present time, only the data concerning urban areas has been processed by computer, and has been the subject of official publications.

In addition, the processing of post-enumeration data has been carried out manually. This has provided characteristics of natural movement (mortality, fertility) and an estimate of the total population and its sex and age structure.

Finally, it should be noted that the total figure for the resident population of Madagascar was estimated by the General Census at 30th June 1975 to be 7 568 577 inhabitants.

II. CRITICAL ASSESSMENT OF DATA SOURCES AND STUDY OF VALIDITY OF DIFFERENT ESTIMATES

After this brief review of the four major sources of data relating to estimates of the population of Madagascar, it is of interest to correlate the various results and to test their likely validity in the light of a criticism of the sources.

1) Criticism of Data Sources

In general, four components may be considered in criticising the sources of data:

- the socio-geographical context of the field of observation
- financial and material provisions
- methods of observation
- management, supervisory and executive personnel.

If the socio-geographical environment may seem to play only an indirect role in an evaluation of the quality of sources of data, it nevertheless represents the principal constraint determining the success of operations.

a) The socio-geographical environment of the field of observation

In any survey, the individual who represents the statistical unit plays a basic role; the trustee if not the owner of individual or collective data, he passes it on to the enumerator, who in principle, simply enters it on the questionnaires. It is necessary therefore to consider the survey on a psycho-social plane in order to understand his reactions vis-à-vis the activities related to the collection of demographic data, and then to localise him geographically in order to reach him, contact him, observe him and question him.

The Merina monarchy, as well as colonisation, introduced and established a rift in the Malagasy society: on one hand, an educated minority at the service of the administration and of the authorities, and on the other hand, the illiterate majority in permanent conflict with this administration, seen as a machine of oppression.

The population greatly distrusted the agents of the administration, in particular the cantonal heads who represented the central authority in rural areas. As mentioned, these cantonal heads were the principal element in producing the Sub-Prefectural Reports and represented the pyramidal base of administrative censuses. The colonial authority used these censuses for its own purposes: administrative organisation, tax collection, reviewing boards, imposition of duties, land seizures, etc. The repulsion of the population towards any survey, in particular of a demographic nature, is therefore quite understandable, since they consider them tantamount to a police interrogation probably destined to serve the machinery of repression. This renders likely that the administrative censuses during the colonial period produced underestimations of the total population.

In the neo-colonial period the colonial administrative structure was retained practically intact. The data collection method was not revised, nor were the agents replaced. Nevertheless, new objectives were allocated to the sub-prefectural reports, consisting of: the establishment of electoral lists, the categorisation of communes into rural or urban, and the drawing up of budgetary forecasts. Attention should be drawn to the fact that these objectives were linked to the interests of certain local political and administrative officers who would tend to inflate their own population figures; the higher these were, the more chance there would be of modern socio-economic infrastructure being provided such as hospitals, schools, roads, etc... These political and administrative reasons would seem to point towards an overestimation of population figures by sub-prefectural reports in the neo-colonial period.

Not only do the people mistrust any form of survey, but a significant proportion of the population is illiterate, and therefore not always able to understand the social utility of data collection activities: the Demographic Survey of 1966 estimated that 61% of the total population was illiterate. This percentage increases according to age, while the "information centre" or "information holder" is the head of

household or family, or the mother in his absence. This illiteracy reinforces the mistrust of the subject towards the enumerator because he is unable to check the faithful transcription of his verbal statements, which as far as he is concerned, represent evidence which could be made binding and serve as pretexts for repression on the part of the authorities.

Any collection of demographic data is faced with this social mentality which is far from disappearing.

The marked geographical dispersion of the population which the low demographic density would lead one to expect (10.5 inhabitants per square kilometre in 1966) appears to favour the continuance of this social state of mind. Furthermore, the inadequacy of communication lines and the state of roads requires considerable mobility on the part of executive personnel, and means of transport. This was a serious problem which faced enumeration activities. In certain regions, particularly those in the western part of the island where population density was less than six inhabitants per square kilometre, problems of access and checking were considered to be practically insurmountable. Delimitation criteria for census zones and segments based on the demographic size of a group of settlements seemed inadequate, for they did not take into account the physiography of the area the personnel in the field would have to cover. In 1962, the density of population in rural areas was eleven inhabitants per square kilometre as against 124 inhabitants per square kilometre in urban areas [9]; assuming a uniform distribution of population on the ground, an urban zone supervisor would be in charge of 52 square kilometres as against 559 square kilometres for a rural zone supervisor and an urban enumerator would cover 8 square kilometres against 93 square kilometres for his counterpart in rural areas.

It is therefore important to take into account not only population figures, but also its geographical dispersal in an evaluation of the financial and equipment costs involved in collection activities.

b) Means of finance and equipment

Administrative sources and statistical collections must be distinguished on the basis of their methodology and organisation in this chapter.

Administrative sources are permanent and depend on the structure and policy of the administration. It is therefore difficult to evaluate the costs of collection which in fact are subsidiary to the general running of the administration; cantonal heads and sub-prefects are not paid specifically for the compilation of the sub-prefectural reports.

However, the assessment of means of finance and supply takes on a great significance in the field of statistical collections.

In Madagascar, problems of finance were among the causes of the repeated postponements of the first general census of population.

Placed in the global context of national development, the costs incurred by the activities of a statistical collection can be considered as indirect investments because, by providing information, they help to bring about better social organisation by the more effective planning of human resources and a more rational utilisation of material resources and means available.

Unfortunately, the politicians responsible and certain officials do not see things in this way. The first difficulties in the realisation of a large scale statistical collection, such as the general census of population, lie in persuading the policy-makers and officials of the necessity and usefulness of such an operation in the formulation of development plans.

In the course of the demographic survey of 1966, the financing was subject to administrative regulations and, therefore, out of the control of the technical directors of activities, who thus found themselves caught up in bureaucratic complexity and inertia. Through the setting up of a central direction of activities, the implementation of the general census took on an autonomous character and escaped from these constraints.

The establishment of "advance funds" although not available during the 1966 Demographic Survey, resolved numerous problems in the context of the general census. Besides, the utilisation of order coupons delayed the delivery of certain goods which could affect the schedule of activities. Petrol coupons were normally refused in rural areas, which sometimes held up the progress of the collection.

Requests for the extension of financial provisions greatly handicapped the progress of activities and threatened to bring about the failure of the collection as a whole. It would seem to be important to ensure well in advance the availability of funds for paying the salaries of enumerators (both zone supervisors and enumerators) and to build in a good margin of "unforeseen circumstances" in the face of the current inflationary situation. In addition, the maintenance cost of equipment acquired should be specifically accounted for in the budget. The ordering of goods and equipment imported from abroad should be done well before the start of activities in the field, so that their delivery at the required time can be ensured.

Finally, in discussing means of finance and equipment, it is always tempting to compare the costs and advantages of a demographic sample survey and a general population census. The ratio of costs between the Survey of 1966 and the General Census of 1975 is roughly in the order of 1:25. A simplification of the household questionnaire used for the general census in rural areas would have facilitated the implementation of collection, coding and copying and would have significantly improved the quality of data. Certain financial and supply problems would have been simplified.

But, if the sample survey offers obvious advantages in comparison with a general census, particularly in the area of incomplete statistics, it is nevertheless incapable of providing an accurate estimate of the total population.

c) Methods of observation

Methods of collection must take account of the socio-geographic environment of the field of observation and of the financial and material means available. The methodology of administrative censuses is not defined in a clear-cut way for the whole territory. No instructions are given to local administrators regarding the method of collecting data. The notion of residence is not defined, households are not identified and the timing of activities is not constant throughout the country. The members of households are not interviewed and no base questionnaire (e.g. household form) is used. Duplications and omissions often occur.

On the other hand, registration of vital statistics and international migrations are regulated by official documents. There are base questionnaires and their completion seems to pose no problems. However, the administrative machinery tends to seize up when there is a shortage of vital statistics' forms, as copies are not supplied in sufficient numbers.

The under-registration of vital events would also result from the difficulty experienced in reaching registration offices by a substantial part of the rural population because of the lack of roads and of their bad conditions during the rainy season. Furthermore, the degree of under-registration varies according to the nature of the event (births, deaths, marriages): in 1966, 80% of births were registered against 50% of deaths [11].

In short, administrative sources cannot yet provide satisfactory estimates of the size of the population.

Some of the results can however be very useful in the context of specific studies such as the compilation of partial data in order to estimate the population of Madagascar during the year 1962. Remember that this was a collection of results from three different sources:

- the statistical censuses of urban communes (centres of 5 000 inhabitants or more);
- the administrative censuses of pre-urban centres (2 000 to 4 999 inhabitants) grouping 3% of the total population;
- the budget-consumption survey of rural households with a sampling fraction of 1/200 encompassing 87% of the total population.

"We can therefore surmise that the global estimate of the size of the Malagasy population in the middle of 1962 results from a national survey, in which urban centres (settlements of 2 000 inhabitants or more) have been submitted to exhaustive enumeration and the rural areas (settlements of less than 2 000 inhabitants) to a light survey with a sampling fraction of 1/200" [9].

Two weaknesses in the results obtained by this method may be emphasised: on one hand, the population figures for urban centres were projected for 1962 by growth rates deduced from administrative figures, and on the other hand, a confidence interval was not determined for the estimate of total population.

Another very valuable use of the results of the administrative censuses can be made in carrying out sample surveys. In the absence of a general census of population, the administrative censuses of 1965 provided the sampling frame for the demographic survey of 1966. The imperfections of this sampling frame must have to some extent influenced the quality of the results.

The methodology used in the survey of 1966 met the aims defined for this operation in a satisfactory manner. It should be noted however that the observation period corresponded to exceptional circumstances following the cyclone "Iris" which caused a massive decrease in agricultural production.

The efficiency of the methodology of the survey of 1966 facilitated prompt publication of the results (August 1967).

Finally, what can be said of the observation methods used in the general census of population?

First of all, it must be pointed out that, four years after it was carried out, the definitive results of the general census have not yet been published.

The carrying out of operations in three periods (census of provincial capitals, except Tananarive-ville, census of the town of Tananarive and other urban centres, census of rural areas), give rise to several difficulties in the field, although it seemed to cope satisfactorily with material constraints and problems relating to the technical supervision of operations:

- uncontrollable duplications and omissions due to temporary or permanent movements from one place to another between the various periods;
- control staff and supervisors were simultaneously responsible for multiple tasks from the beginning to the end of the operations (coordination and checking of work in progress, the collection of incoming questionnaires, checking and occasional return to the field, and at the same time the preparation of transferring from one area to another with the concomitant training of new enumerators, the setting-up and accommodation of new teams, ...)

The training of enumerators was too rapid, above all in rural areas and the checking of their work was not always enforced.

The surface area was not taken into account when delimiting zones and segments and the household questionnaire proved to be too lengthy for rural areas.

The political events of 1975 were not favourable to the successful progress of activities: "the census took place at a time when an administrative reorganisation of the national territory was in progress" [19].

Table 51

MADAGASDAR - CORRESPONDANCE BETWEEN ADMINISTRATIVE SUB-DIVISIONS BEFORE AND AFTER THE REORGANISATION OF 1975

Before reorganisation	After reorganisation	Numbers	Remarks
Province	Faritany	6	No change
Prefecture	-	-	Suppressed after reorganisation
Sub-prefecture	Fivondronam	110	-
Commune	Firaisampokontany	1 250	-
Village	Fokontany	11 100	"In the present structure the Fokontany has the same status as a village, except for the fact that it has been placed under the authority of an executive committee presided over by the president of the Fokontany. The members of the committee who choose the president of the Fokontany are elected by the people of the Fokontany" [19].

d) Operations and supervisory personnel

The use made of the results of administrative censuses and the traditional methods employed in carrying them out are such that the operations and supervisory personnel do a routine job and are not motivated to improve the collection of data. In so far as statistical surveys have been carried out by INSRE with or without the collaboration of other organisations, it would appear to be quite normal that INSRE should provide most of this personnel.

Nevertheless, other statistical offices could have provided the operations and supervisory staff necessary for the implementation of the general census (e.g. agricultural statistics, school statistics, labour statistics...).

Statistical surveys have shown that the most efficient organisation does not require a cumbersome bureaucratic hierarchy.

The success of the operations depended not on the number of high-level organisational staff but rather on experienced operations and supervisory staff (trained in the field) on good terms with junior field personnel.

The recruitment and training of the latter should be done with the utmost care: recommendations and pressures of any sort whatever should be rejected.

Finally, survey organisers should make provision for substitute staff (buffer agents) in cases of shortage and respect scrupulously contracts of employment (social benefits, amount of salaries, dates of pay...).

2) Study on the validity of various estimates

a) Statistical estimates

Results exist for various dates coming from sources in which statistical methods were employed.

Table 52

MADAGASCAR - ESTIMATES OF POPULATION SIZE BY STATISTICAL METHODS

Method of assessment	Date	Population size in '000s			Sex ratio
		Male	Female	Total	
Compilation of partial data [9]	30.6.1962	2 871	2 912	5 783	93.6
Demographic survey [4]	30.6.1966	3 049	3 151	6 200	96.8
General Census of Population	30.6.1975	3 745	3 824	7 369	97.9

The sex ratio for the total population in 1966 seems too low. The results supplied by the general census corroborate the conclusions of the analysis made in the study of the compilation of partial data: "it is apparent that the method used in 1962 (exhaustive enumeration in urban areas and two-level sample survey in rural areas) better reflects the breakdown by sex of the population in so far as it can take into account rural emigration which consists of surplus male population; which is not the case for the demographic survey of 1966 where the imbalance in the sex composition of the household caused by rural emigration is more likely to be reflected at the level of sampling" [9]. Having said that, it must be asked if the sex ratio in 1962 agrees with that of 1975.

Independent data is introduced for the purposes of checking; in 1966, the male natural increase rate was estimated at 2.05% against 2.10% for the female rate [4]. These two increase rates allow one to project the sex ratio from 1962 to 1975. In fact:

$$P_t = \frac{M_t}{F_t} = \frac{M_o (1 + r_M)^t}{F_o (1 + r_F)^t} = P_o [1 + t (r_M - r_F)]$$

with P_t = total sex ratio at date "t"
 M_t = size of the male population at date "t"
 F_t = size of the female population at date "t"
 r = natural increase rate

This formula is applicable only if the natural increase rates are consistent and if the population considered is not affected by external migrations. This second condition is confirmed in the case of the population of Madagascar. As far as the former is concerned, we shall assume that there were only very small variations in "r" during the period 1962-1975 with mean natural increase rates very close to those given by the survey of 1966.

By calculating P_{75} we obtain:

$$\begin{aligned} P_{75} &= P_{62} [1 + 13 (2.05\% - 2.10\%)] \\ &= 98.6 [1 - 0.65\%] \\ &= 97.9 \end{aligned}$$

The exact global sex ratio provided by the general census is obtained - a very satisfactory result.

This result encourages the calculation of the mean annual rate of natural increase between 1962 and 1975, and then to check if this corresponds well with the natural increase rate given by the demographic survey of 1966:

$$7\ 569 = 5\ 783 (1 + r)^{13}$$

$$\text{or, } \log 7\ 569 = \log 5\ 783 + 13 \log (1 + r)$$

$$\text{whence } \log (1 + r) = \frac{1}{13} [\log 7\ 569 - \log 5\ 783]$$

giving a value of:

$$r = 2.1\%$$

Indeed, the natural increase rate calculated by the 1966 survey is equivalent at 2.1% to a gross birth rate of 46‰ and gross death rate of 25‰.

In admitting in this way the estimates of 1962 and 1975, the 1966 figures can be corrected. First of all, it should be seen if the female population at the three dates agrees with the mean annual increase rate of 2.1% for the 1962-1975 period.

Table 53
MADAGASCAR - MEAN ANNUAL INCREASE RATE FOR FEMALE POPULATION
BETWEEN 1962 AND 1975

PERIOD	%
1962-1966	2.0
1966-1975	2.2
1962-1975	2.1

It is therefore sufficient to adjust the 1966 male figures:

$$P_{66} = P_{62} [1 + (4 \times (-0.5\%))] \\ = 98.6 \times 0.998 = 98.4$$

Therefore: $M_{66} = 3\ 151 \times 0.984 = 3\ 101$ thousands

The total adjusted population for 1966 is therefore equal to:

$$\underline{3\ 101 + 3\ 151 = 6\ 252\ \text{thousand}}$$

b) The administrative estimates

The available population figures according to the various sources are then correlated for the same dates.

Table 54
MADAGASCAR - COMPARISON OF POPULATION FIGURES FROM
VARIOUS SOURCES

SOURCE	(Unit: '000s of inhabitants)		
	1962	1966	1975
Statistical	5 783	6 252	7 569
Administrative censuses	5 645	6 569	-
Up-dated figures	-	6 490	-

The discrepancy between the figures advanced by administrative censuses and up-dated figures shows that the authorities responsible for the collection of data used in the compilation of sub-prefectural reports do not use the recording of civil registration events for their estimates. There should therefore be a partial independence between the administrative censuses and civil registration. Despite the significant under-declaration of deaths for civil registration purposes compared with births, Table 54 indicates an over-estimation in administration census figures compared with those from annual adjustments. The balance of migration at a national level being zero or negligible, an inflation of population figures by administrative censuses may be deduced; which reinforces the conclusions already presented in criticism of data sources. In fact, this over-estimation of population figures by administrative censuses began, according to Table 54, between 1962 and 1966, soon after Independence; by 1966, this over-estimation had already reached 105%.

III. CONCLUSIONS

Mean annual natural increase rates for the following periods appear to be:

- before 1950 (1) : 1.0% [4]
- 1962-1966 : 2.0%
- 1966 : 2.1%
- 1966-1975 : 2.2%

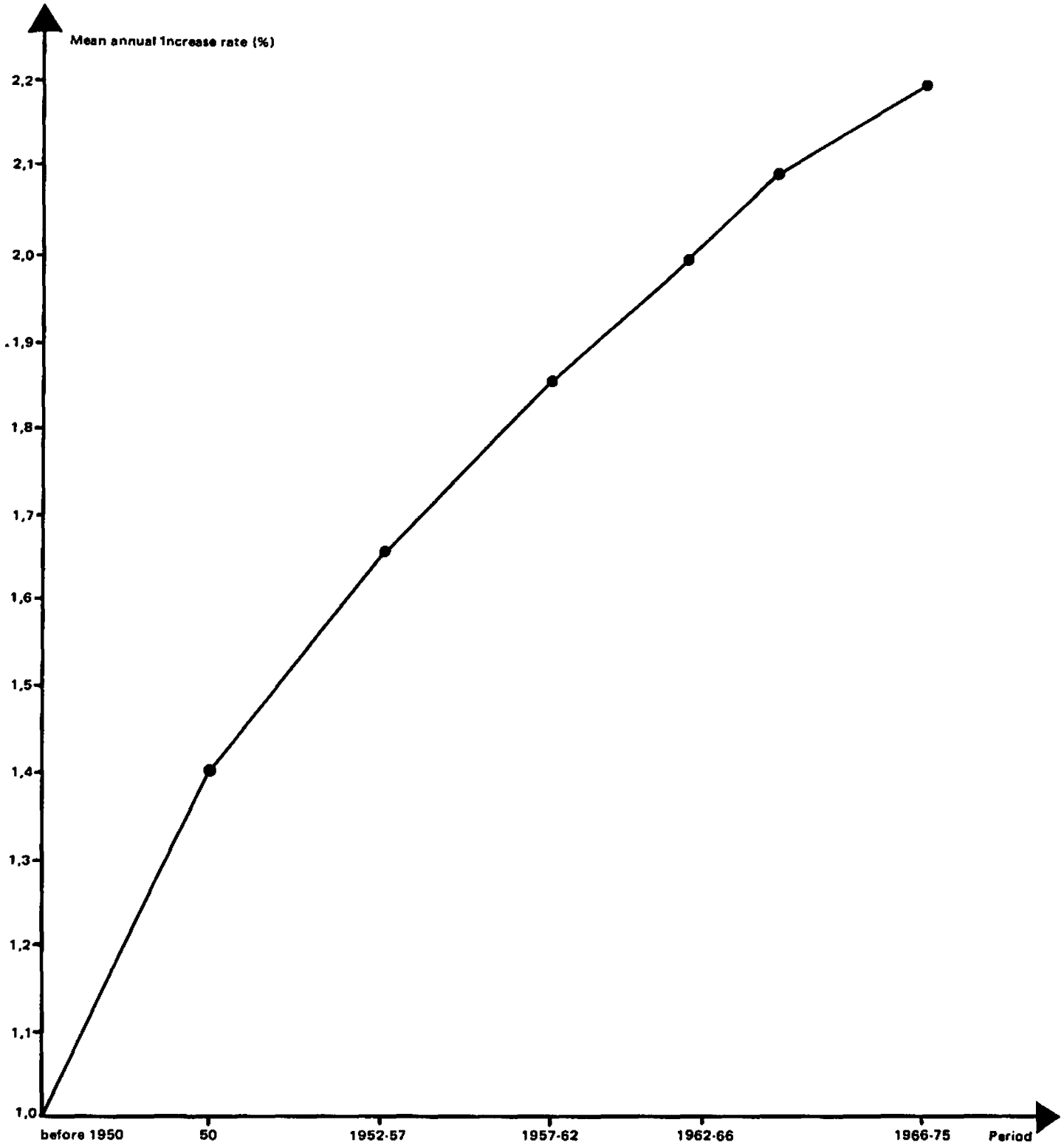
In order to estimate the mean natural increase rate for the period between 1950 and 1962, a curve will be traced freehand on a graph trying to reflect the phenomenon of the acceleration in demographic growth after the advent of contact insecticide spraying (DDT being the prototype) and the introduction of mass medical care, in particular preventative medicine imported from abroad with its latest discoveries. Note that a major DDT spraying campaign was organised in 1949. Furthermore, on referring to Table 49 showing population figures for Madagascar according to administrative estimates at successive January 1, four phases of growth can be distinguished (see Chart 9).

I	before 1950:	= 1%
II	1950-1955 :	= 1.9%
III	1955-1960 :	= 2.6%
IV	1960-1972 :	= 3.5%

If the two latter growth rates are greatly over-estimated for the reasons already described above, the comparison of the first two shows the demographic "boom" after 1950.

(1) This rate can be calculated from the evolution of population given by administrative censuses between 1900 and 1950, and is generally accepted for African population during this period.

CHART 9 MADAGASCAR
EVOLUTION OF THE MEAN ANNUAL INCREASE RATE OF THE POPULATION



By inspection, the respective mean natural increase rates below are obtained:

- 1952-1957 = 1.4%
- 1957-1962 = 1.7%

These different rates permit us to trace the probably evolution of total population figures in the course of the last three quarter centuries.

Table 55

MADAGASCAR - PROBABLE EVOLUTION OF THE POPULATION
FROM 1900 TO 1975

DATE	TOTAL POPULATION (in thousands)	DATA SOURCE
1900	2 941	Estimate
1925	3 772	Estimate
1950	4 837	Estimate
1955	5 140	Estimate
1960	5 569	Estimate
1962	5 783	Survey and compilation
1965	6 123	Estimate
1966	6 252	Survey and adjustment
1970	6 789	Estimate
1975	7 569	General census

In comparing the figures estimated before 1962 to those provided by the administrative censuses for the same dates, the conclusions in the critical analysis of data sources are vindicated, that is to say: "administrative censuses under-estimated the population during the colonial period".

According to Table 55, the population in 1900 doubled in 60 years, that of 1925 in 50 years, and that of 1950 in about 35 years. Note that the 8 million population mark was reached in 1977, and that it can be predicted that there will be a half million inhabitants by 1980.

At the end of our study, what proposals are indicated as regards the improvement of demographic data sources in Madagascar?

First of all, the new administrative structure seems to have done nothing to increase the effectiveness of collection or recording systems: administrative censuses and the publication of their results have been given low priority since 1972 whereas the recording of vital events displays disturbing weaknesses.

Will there be an indefinite running-in period for the new system or should the existence of bad organisation, or more simply a general lack of interest in the collection of demographic data be acknowledged? This is all the more regrettable as the improvement of administrative sources seems to be the most viable strategy in the context of an action plan for the short or medium term.

Following the suppression of minimum tax levels or capitation duty since 1972, the administrative censuses have had to start afresh on new foundations. It would be interesting to integrate them in the global context of the preparation of regional plans. Their principal utility should be the permanent collection of socio-economic data: elaboration of methodology, preparation of base questionnaires, publication of survey instructions, training of territorial administrative officers.. [2]. It is desirable that demographers and statisticians should be involved in the organisation of administrative censuses. For the processing and publication of data, the INSRE should collaborate with the ministers concerned.

Furthermore, administrative censuses must be kept up-to-date with vital event recording by the holding in each "fokontany" of a notebook or permanent register.

In fact, administrative censuses and the recording of vital events ought to be linked.

Finally, socio-economic development remains the dominant component in the improvement of data sources, for, in the final analysis, the information carrier is the individual as a social being and economic unit, who must deliver this information in good faith and without any reservation.

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