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Madagascar Population and Health Sector Review

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CURRENCY EQUIVALENTS

Currency Unit: Malagasy Francs (FMG)

Exchange Rate at the Time of Field Mission and
Used in Report (unless otherwise noted)
1US\$ = FMG 650

FISCAL YEAR

Fiscal Year is the Calendar Year

STANDARDS

Weights and Measures are based on metric system

ABSTRACT

Madagascar's population is estimated to have reached 10.3 million in 1985 with a current rate of growth of 3.0 percent. Assuming unabated growth, population would increase to over 20 million by 2015 creating extraordinary constraints on the country's development. Demographic and economic projections demonstrate that these constraints can over the longer term be eased by reducing the high level of fertility. This, however, does not happen automatically. It requires sustained efforts on the part of the Government to develop a population policy and to set up action programs with particular attention to strengthening and expanding the family planning structure in conjunction with maternal and child health programs.

Contrary to common belief, recent statistical information indicates that the pattern of morbidity and mortality, particularly infant mortality, is not better in Madagascar than in many sub-Saharan African countries. Malnutrition in children appears to have worsened with the deterioration of economic conditions. The rapid expansion of the primary health care network could not prevent further deterioration of the population's health status due to lack of resources and quality of health personnel primarily in the area of preventive care. In light of the health system's limited absorptive capacity and severe financial constraints, the Government faces difficult choices in reconciling the substantial oversupply of medical and paramedical graduates with the needs for physical resources such as drugs and medical supplies and improvement in in-service training and in managerial skills of existing personnel. Consequently, the development of a health strategy and long-term health plan on the basis of an improved health statistics system is of critical priority. Moreover, alternatives to the existing financing of health services in the public and private sectors need to be studied.

This report is based on the findings of a PHN mission which visited Madagascar in February/March 1986. The mission was composed of Richard Heaver (mission leader), Herbert Boehm (senior project economist), Judith Edstrom (organization/management specialist), Dr. Jean Lecomte (public health specialist consultant), Alain Marcoux (population specialist consultant), and Jean-Bernard Rasera (health economist consultant). The report was written by Herbert Boehm.

MADAGASCAR

POPULATION AND HEALTH SECTOR REPORT

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ABBREVIATIONS

ADB	African Development Bank
ASFR	Age-specific fertility rates
AVS	Association for Voluntary Sterilization
BNI	Banque nationale de l'Industrie (National Bank for Industry)
CBR	Crude birth rate
CDR	Crude death rate
CPR	Contraceptive prevalence rate
CRS	Catholic Relief Service
CSSP	Centres de soins de santé primaire (Primary health care center)
CUS	Centres urbains secondaires (Secondary urban centers)
EBM	Enquête Budget Ménage (Household Budget Survey)
EDF	European Development Fund
EEC	European Economic Community
EPC	Enquête post-censitaire (Post-Census Survey)
ESD	Enquête socio-démographique (Socio-Demographic Survey)
FAO	Food and Agriculture Organization
FARMAD	Laboratoires pharmaceutiques malgaches
FISA	Fianakaviana Sambatra (Association for Family Well-Being and the Health of the Mother)
FP	Family planning
FTK	Association of Malgache Christian Union
GCU	Grands centres urbains (primarily urban centers)
GDP	Gross domestic product
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IEC	Information, education and communication
IMF	International Monetary Fund
IMR	Infant mortality rate
INSRE	Institut national des Statistiques et de la Recherche économique (National Institute for Statistics and Economic Research; Now called State Data Bank)
IPPF	International Planned Parenthood Federation
IUD	Intra-uterine device
MCH	Maternal and child health
MOH	Ministry of Health
NGO	Nongovernmental organization
NRR	Net reproduction rate
OFAFA	Pharmaceutical corporation
PHC	Primary health care
SSSD	Service des statistiques sanitaires et démographiques (Service for sanitary and demographic statistics)
STD	Sexually transmitted disease
TFR	Total fertility rate
TWE	Tonnes of wood equivalent
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UNFPA	United Nations Fund for Population Activities
URGD	Urban-rural growth differential
USAID	United States Agency for International Development
WHO	World Health Organization

GLOSSARY

- Crude Birth Rate:** The number of births per 1,000 population in a given year.
- Crude Death Rate:** The number of deaths per 1,000 population in a given year.
- Total Fertility Rate:** The average number of children that would be born alive to a woman during her lifetime if she passed through her childbearing years conforming to the age-specific fertility rates of a given year.
- Gross Reproduction Rate:** The average number of daughters that would be born to a woman during her lifetime if during her childbearing years she were to bear children at each age in accordance with prevailing age-specific fertility rates.
- Net Reproduction Rate:** The average number of daughters that would be born to a woman (or group of women) if during her lifetime she were to conform to the age-specific fertility and mortality rates for a given year.
- Life Expectancy at Birth:** The average number of years a newborn would live if age/sex-specific mortality trends prevailing at the time of birth were maintained.
- Infant Mortality Rate:** The number of deaths of infants under one year of age in a given year per 1,000 live births in that year.
- Dependency Ratio:** The ratio of the economically dependent part of the population to the productive part, arbitrarily defined as the ratio of the young (under 15 years of age) and the elderly (those 65 years of age and older) to the working age population (those 15-64 years of age).
- Parity:** The number of children previously born alive to a woman.
- Rate of Natural Increase.** The rate at which a population is increasing (or decreasing) in a given year due to a surplus (or deficit) of births over deaths, expressed as a percentage of the total population.

Rate of Population Growth:	The rate of natural increase adjusted for (net) migration, and expressed as a percentage of the total population of a given year.
Contraceptive Prevalence Rate:	The percentage of married women in reproductive ages who are using (or whose husbands are using) any form of contraception at any given point in time.
Family Planning:	The conscious effort of couples to regulate the number and timing of births.
Morbidity Rate:	The frequency of disease in a population in a given period.
Mortality Rate:	The frequency of death in a population in a given period.
Malnutrition:	Deficiency or excess of nutrients that produce disorders within cells, tissues or the whole body, which are sufficient to interfere with a person's health, genetic potential for growth, normal physiologic functions and ability to interact with other individuals and with his physical and social environment. When it is due to dietary inadequacies, the malnutrition is termed <u>primary</u> . When it is due to anorexia, malabsorption or metabolic alterations, it is termed <u>secondary</u> .
Low Birth Weight:	Infant weight at birth less than 2,500 grams.
Weight-for-Age Malnutrition:	A common method of assessing child nutritional state, based on the deficit in <u>weight-for-age</u> compared to a reference standard.
Stunting:	A method of assessing a person's nutritional state, based on the deficit in <u>height-for-age</u> compared to a reference chart.
Wasting:	A method of assessing a person's nutritional state, based on the deficit in <u>weight-for-height</u> compared to a reference chart.

EXECUTIVE SUMMARY AND RECOMMENDATIONS

A. Population

1. Since its first census using modern demographic standards in 1975, very little data have been gathered on a national basis to track trends in Madagascar's population growth. Consequently, in order to project present population levels and trends, the sector mission had to derive estimates for the current fertility and mortality rates from various different statistical surveys. These estimates show that Madagascar's population increased from 7.6 million at the time of the 1975 census to 10.3 million by 1985 reflecting a very high growth rate of 3.0 percent per annum, against the Government estimate of 2.8 percent.

2. Based on this estimate, and various assumptions about future fertility, the sector mission prepared long-term population projections. The results of these projections (see following table) may have most serious implications for the country's future development.

MADAGASCAR: PROJECTED POPULATION SIZE AND GROWTH

	<u>1985</u>	<u>2000</u>	<u>2015</u>
<u>Total Population</u> (in millions)			
No Fertility Decline	10.3	16.7	28.1
Gradual Fertility Decline	10.3	15.6	22.2
Rapid Fertility Decline	10.3	15.1	19.8
<u>Average Annual Growth Rate</u> (percent)			
No Fertility Decline	3.01	3.31	3.54
Gradual Fertility Decline	3.01	2.65	2.18
Rapid Fertility Decline	3.01	2.34	1.46

Source: World Bank projections.

If Madagascar's population continues to increase at the same rate as it has over the last ten years, there could be almost 17 million people in the year 2000 and over 28 million in 2015. Population growth would accelerate to a rate of 3.5 percent, allowing a further doubling to 56 million within the following 20 years. If, however, rapid fertility declines are achieved--and they can be achieved through effective population policy and programs--the population would increase to 15 million in 2000 and close to 20 million in 2015 with a continuing fall in the growth rate down to 1.5 percent. These projections show that the potential for growth in Madagascar's population is massive and needs to be of serious concern to the country's policy makers and health officials. It must be emphasized, however, that the issue is not whether Madagascar could ultimately support a population of this size, but

the effects of the rate of population growth on development in the medium term. Rapid population growth threatens steady, long-term social and economic development, because it virtually negates economic advances, thus perpetuating unsatisfactory living standards and having critical implications for the adequacy of agricultural and energy production and the financing of the social sectors.

3. The future growth of population in Madagascar has important implications for the standard of living of the individual families and for progress in development of the society in general. The World Bank estimates under certain assumptions that Madagascar's gross domestic product (GDP) in real terms would grow long term between 3.0 and 3.6 percent. Since real advances in per capita income and living standards are only possible if the annual population growth remains below national output gains, this scenario is only foreseeable if fertility rates decline in the future. Conversely, continued rapid population increases will have severe and unprecedented implications for job creation, food and energy consumption and improvements in social services.

4. If fertility continues unabated, it is estimated that the "active age group" (the population aged ten years and over) will grow from the present 6.9 million to 18.5 million in 2015. At present labor force participation, additional employment opportunities for 200,000 job seekers per year over the period 1985-2000 and for 360,000 over the period 2000-2015 will have to be created. Rapid population growth would also create enormous pressures on the country, in terms of food energy and protein requirements. Without resorting to imports, food production may have to triple over the next thirty years requiring improvements in agricultural yield and development of as yet uncultivated land which is constrained by a number of factors including an intractable land tenure system. To improve yields, inputs, such as fertilizers and better seeds, as well as irrigation systems and distribution networks, would be needed. To expand the cultivated area utilizing the remaining, increasingly marginal land, would not only require more development investment in order to obtain the same yields, but land used for food crops would then not be available for industrial and export crops, the country's major foreign exchange earners. It also must be noted that this situation is made worse by the deterioration of international exchange terms due to the decline of the price of agricultural products in comparison to imported products.

5. About 80 percent of Madagascar's total energy consumption is in the form of fuelwood and charcoal. While the long-term sustainable annual yield of forests is estimated at 6.5 million tonnes of wood equivalent (twe), and gross national demand in 1985 amounted to 5.6 million twe, large deficits occurred in the highland provinces creating serious deforestation. Over the long term, the projected fuelwood demand under any population growth assumption would by far outstrip its supply and may accelerate the deforestation process to catastrophic proportions. Without significantly slowing population growth, even measures such as increased plantation

development, demand management and wood substitution would most likely not be sufficient to resolve the energy crisis.

6. Population growth may also affect the adequate provision of social services such as education and health services. The results of projections of school age children indicate that, between the rapid and no fertility decline scenarios, there would be a difference of 460,000 additional first-graders and three million additional compulsory school students in 2015. Not only would a less rapidly growing population permit annual savings in educational expenditures estimated at FMG 70 billion (about US\$110 million), but it could also keep primary education expenditures in line with the recurrent budget, facilitating the maintenance of universal primary education and affording improvements in the quality of the education system.

7. A large part of the health services in Madagascar is devoted to maternal and child health services (MCH). If fertility does not decline, the potential MCH clients would increase from the present 4.6 million to 12.6 million in 2015, a number larger than the current total population of Madagascar. Over the same period, deliveries at health facilities would increase from 450,000 to 1.2 million per year. In contrast, rapid fertility decline would translate into a drastic reduction in client population realizing substantial comparative savings (estimated for the year 2015 alone at FMG 40 billion or US\$60 million) which could be used to improve the quality of health services.

8. Madagascar has neither an explicit policy on population nor a formal government family planning program. Nevertheless, Government awareness about population issues is increasing. The main non-governmental organization involved in family planning, FISA, is gradually gaining recognition; but with only 84 service locations, primarily in urban areas, the coverage of services is still very limited. The contraceptive prevalence rate is estimated at 1%, placing Madagascar very close to the bottom of the list of developing countries.

Recommendations

9. Population growth presents Madagascar with its most serious threat to steady, long-term social and economic development. Government action toward fertility reduction is therefore justified and necessary to safeguard the future welfare of its society. A second justification for public support to population-related programs is that with family planning services, the Government would increase freedom of choice as well as encourage responsible parenthood; or, inaction on the population issue by the Government could effectively curtail individuals' rights to choose the size of their families, could in the future foster economic stagnation and possibly lead to more drastic actions in the future.

10. It is therefore recommended that a high level government committee, supported by a strong technical secretariat consisting, inter alia, of the new population unit of DG Plan, be created to develop a multi-

sectoral population policy with explicit demographic objectives and a plan of action for the next five years. The development of a population policy in Madagascar would need to address the following:

- (a) The capability of the Government to undertake demographic analyses and projections including the collection of reliable data on population size, fertility and mortality;
- (b) The potential for coordination with UNFPA regarding the assistance to the Statistical Data Bank (Banque des Données de l'Etat) for the planned 1990-91 census;
- (c) Mobilization of sustained Government commitment for proposed population policies; and
- (d) Proposals for an institutional framework capable of carrying out the planning and implementation functions of these policies.

11. Madagascar still has a law in its books dating back to colonial times (May 30, 1933), which prohibits the distribution of contraceptives. Although it is no longer enforced, the Government may wish to repeal it as a first active step in the direction of an increasing commitment to a population policy.

12. On the basis of available information on fertility, field visits and meetings with Government officials, the sector mission gained the clear impression that unmet demand for family planning services does exist. Consequently, immediate efforts should be directed towards strengthening the existing family planning structure and rapidly expanding family planning activities within MCH services to all health outlets. This would as a first phase not only entail financial and administrative support to FISA, a private family planning organization which was set up with IPPF's support, but also a program of FP activities for a as large number of public health facilities as possible. To achieve the widest knowledge of family planning services, it is recommended that the Government develop IEC programs with the assistance of experienced specialists in this field. Furthermore, in-service training in family planning for existing health personnel, provision of the required supplies and equipment, and strengthening curricula and practical training programs in family planning of medical and paramedical students are recommended.

B. Health

13. Even before the 1978 International Conference on Primary Health in Alma-Ata, Madagascar had already placed great emphasis on the creation of a primary health care network, expanding it to a current 1,950 facilities. To accommodate this expansion, the number of health personnel was increased from 3,900 in 1975 to over 8,200 in 1984. As budget allocations to the Ministry of Health (MOH) were not raised to take account of this expansion,

non-personnel expenditures had to be severely cut resulting in serious shortages of medicine, technical equipment and supplies. The Government, as most recently reflected in its 1986-1990 Development Plan, correctly continues to give high priority to rehabilitating and completing the primary health care system, together with improvement of management and supervision.

14. The institutional framework of the health sector, with the MOH as the most important modern health service provider, is generally adequate; the degree of decentralization to the provinces and medical districts is reasonably effective; and the distribution of health facilities among the primary, secondary and tertiary tiers appears sound. Management weaknesses at lower levels, however, are major contributors to poor provision of health services. Long distances to the health facilities, difficult terrain and frequent severe shortages of transportation, communication and materials aggravate these weaknesses. Insufficient supervision, inadequate training in management, and the absence of tools for good management, such as job descriptions, performance targets and incentives, are the primary causes for managerial deficiencies.

15. The sector mission estimates that probably 65 percent of the total population has easy access to modern health care services in the form of basic curative care--a very favorable ratio by African standards. Nevertheless, the extensive primary health care network, plagued by lack of resources and skilled personnel, experiences extremely low utilization rates since it has been unable to properly carry out its expected responsibilities, particularly with respect to preventive care. Frequently, no more than one day per month is devoted to outreach activities for health and hygiene, education, house visits or community health involvement. Health education appears limited with scant use of mass media such as radio, posters, and video. Operations of the health facilities in Madagascar are severely affected by the chronic shortage of medicine, vaccines and medical equipment. Although quite a large number of private pharmacies and dispensaries exist in the country, prices of pharmaceuticals can be very high. As a result, the poorest segment of the population often remains without modern medication.

16. It is important to note, however, that with its solid foundation for a physical and manpower health infrastructure, the country's health system has the potential for considerable improvements in efficiency and productivity. As Madagascar's mortality (infant mortality has been estimated at 125 per 1,000 live births) and morbidity conditions are less favorable than previously thought, significant declines should be achievable through improvements in preventive interventions and modest increases in medical supplies and pharmaceuticals.

17. Pre-service training for health aides, nursing staff and physicians is severely hampered by the lack of textbooks, teaching materials, and often inadequate command of the French language. Enrollment of students in the Faculty of Medicine at the University of Madagascar totalled 5,340 with an estimated output of over 400 graduates in 1985/86.

Since the health sector has no systematic, long-term manpower plan, the supply-driven recruitment process to a large extent ignores the actual long-term need for more health personnel as well as the implications for the recurrent budget.

18. At the present time, no organizational structure, policy or specific budget allocation exists for in-service training or personnel development. MOH increasingly recognizes the need for more continued training. The proposed National Center for Health Development could play an important role in this context.

19. Total health care expenditures in 1985 are estimated at FMG 49.2 billion or US\$76 million, representing 3.2 percent of GDP or US\$7.40 per capita. While in nominal terms MOH total expenditures have increased by 7.2 percent per year from 1977 to 1985, in real terms they declined by an annual rate of 3.4 percent. Total funds allocated to MOH as part of the total Government budget have also declined steadily from about 9.2 percent in 1976 to an estimated 6.7 percent in 1986, a level which is still well above most sub-Saharan African countries. The material decline of funding, particularly during the recent economic crisis years, coinciding with a period of rapid expansion of health infrastructure, led to a significant shift in resource allocation and almost certainly constrained improvements in morbidity and mortality conditions.

Recommendations

20. Program Changes. As future spending on health services will most likely be restrained by continued budget stringency, the Government could take advantage of a number of cost-effective program changes in health care provision. This would include assigning higher priority to preventive interventions such as immunization programs, pre- and postnatal care, vector control, health education, and at the same time strengthening simple curative care as well as establishing an essential drug program. In most of these areas, increased emphasis on outreach activities and the development of community-based programs can yield substantial returns over passive, clinic-based health care as is currently almost exclusively practiced in Madagascar. An added benefit of developing a strong outreach system is that it also can serve as a distribution basis for family planning which has proven to be very effective in many African countries to increase contraceptive prevalence.

21. Planning. Development of a health strategy and medium-term plan (five years) that goes beyond the annual budget preparation are basic prerequisites for the strengthening of Madagascar's health sector. A management/forward planning approach needs to be introduced at all management levels of MOH. To this end, the newly created Department for Studies, Planning and Programming in MOH is being strengthened with the assistance of the African Development Bank (ADB). The ADB assistance

could be most effective if key studies that will have an impact on future strategies and expenditures were accelerated.

22. More specifically, a cohesive health strategy should include health sector objectives based on desirable and feasible morbidity and mortality improvements, and it should provide guidelines to allocate available resources responding to the epidemiological situation. The strategy should also define the roles and specify the extent of coordination between the main health care providers; i.e., central and provincial governments, village communities, and NGOs. The mechanisms for coordinating and utilizing foreign assistance should also be defined as part of the health strategy. The medium-term plan should be developed in accordance with the health sector strategy, specifying health targets and geographic and functional distributions of recurrent and capital expenditures and establishing priorities on the basis of demographic, epidemiological and operational information as well as on the basis of cost-effectiveness considerations. The plan should be approved at top government levels, updated annually on a rolling basis, and it should serve as basis for the annual budget preparation.

23. Each year, MOH's budget requests are substantially inflated and then cut back by the Ministry of Finance, thus making the preparation and approval of the budget a time consuming process. Availability of a strategy and plan as recommended in para. 3.19 would rationalize the process of allocating limited resources. In addition, as part of the improvement of MOH's planning process, particular attention must be devoted to investment planning. Investment projects must be justified on technical and financial grounds, prepared so that they are consistent with established standards, and prioritized. It is recommended that appropriate technical expertise be contracted to develop the necessary procedures including analysis of recurrent cost implications; train the pertinent staff, and participate jointly with the trained staff in the actual preparation of alternative investment proposals.

24. The new, integrated health statistics system will be an important complement to both planning and management. However, at the present time, the system is cumbersome, untimely and suffers severely from underreporting. The present system does not contain cost information or performance targets. Since the system could provide comprehensive and reliable information if properly amended, it is recommended that a review is made of the progress and results achieved so far and proposals are prepared as to how the deficiencies could be corrected. Specialist inputs will be needed for this task. It is further recommended that these specialists identify data collection needs which a health statistics system cannot handle adequately; e.g., non-facility related epidemiological and nutritional status data.

25. Nutrition. This report deals with nutrition only to the extent that nutrition affects Madagascar's health status. Despite weak statistical data, the sector mission's findings seem to indicate that malnutrition in the country is high and getting rapidly worse in the wake of severe economic

adjustment measures. Poor feeding practices of children and adequate access to food by the poor appear to be the two key areas which need to be addressed. In order to understand the underlying constraints, it is recommended that a thorough nutrition study be carried out as soon as possible. This study would review the causes for the present situation; determine on the basis of a food balance the past and future trends in the nutritional value of the diet; make proposals for upgrading nutrition status data; and develop a nutrition plan including the required institutional and financial arrangements. Moreover, the surprisingly high degree of infant malnutrition calls for close monitoring and study. Such a study would, inter alia, design a weaning strategy to promote improved breast-feeding and weaning practices. A nutritional surveillance study began in July 1985 with the aid of UNICEF. This study covers two centers in every of the six provinces. It would be important to follow the results.

Organization and Management

26. Supervision and in-service training deficiencies and problems in logistics reduce the effectiveness of the health sector. While the need to improve these critical areas is already recognized and supported by MOH's top management and some progress has been made, efforts need to be intensified and accelerated. It is recommended that MOH, with initial expert assistance, establish management training and consulting capacities within the Ministry in order to analyze these problems, develop the necessary supervisory and logistic structures, and formulate and undertake training programs for high and mid-level supervisory staff. The proposed National Center for Health Development, which will be financed by ADB, should play an important role in this context. In the ADB project, it is planned to improve health management, to introduce new methods of work and equipment at the central level, and to assure the training of Malagasy cadres in matters of management.

Manpower

27. In order to more accurately match actual job requirements with job levels, encourage higher performance and improve staff motivation, MOH's personnel administration needs to be modernized. The preparation of job descriptions for the various kinds of positions requires priority attention. Improved personnel planning over the short and medium terms is also essential to better manage placement and recruitment needs. Assistance from ADB is foreseen in this area.

28. Especially the imbalance between supply and demand of medical and paramedical personnel—a surplus of 3,000 medical doctors, 330 dentists and 1,850 paramedical graduates has been estimated over the next ten years—needs to be addressed immediately and effectively. Because of the large number of students already enrolled and graduated, an immediate, serious surplus of medical and paramedical graduates cannot be avoided. To improve

the situation over a longer term, a reduction in output from health training institutions should be considered as a matter of high priority. As part of the proposed health plan, the future requirement for medical and paramedical personnel should be determined. Subsequently, the intake and output of new students from the Faculty of Medicine, the School of Dentistry and the paramedical training schools should be adjusted accordingly. Expert assistance in developing alternative proposals is recommended.

29. For recruitment of medical and paramedical personnel, the Ministry should review its policy of recruiting graduates in the order in which they applied since, once a backlog arises, this means recruiting staff who have completed their training several years earlier, and may have outdated knowledge and skills. Staff should instead be selected from the best students graduating in recent years, and the others should be informed that there is little or no chance that they will be recruited into the public service, encouraging them to look elsewhere for employment.

Financing Issues

30. The constraints on the recurrent budget have severely affected the delivery of health care in Madagascar resulting in serious shortages of pharmaceuticals, medical equipment and support infrastructure. While communities make a considerable contribution to the construction and maintenance of primary health infrastructure, foreign assistance has been a comparatively weak source of finance. Fortunately, the decline in provision of pharmaceuticals has been partially offset by the expansion of drug supplies from the private sector. But since prices at pharmacies and private dispensaries have been high, the poor segment of the population has been affected most. With few exceptions, health services in the public sector are free of charge. As the recurrent health budget is not expected to increase significantly in real terms from present levels, alternative possibilities for raising finance must be identified. Accordingly, studies are proposed to focus on (a) the existing financing of health services in the public and private sectors and the expected effects of alternative changes in prices on demand for service; (b) the current policy of free medical care and its alternatives; (c) the present system of pharmaceutical procurement, distribution and manufacture, and its alternatives to current practices in these areas; and (d) increased development of the private health care sector. The ADB project foresees an analysis of financial constraints in the delivery of medical services.

MADAGASCAR

POPULATION AND HEALTH SECTOR REVIEW

I. ECONOMIC AND SOCIAL SETTING

1.01 Madagascar, the "Great Island," comprises the world's fourth largest island and several smaller island dependencies. About the size of France and the Netherlands combined (587,000 square kilometers) it is located 400 km from the southeastern African coastline in the Indian Ocean. The island is characterized by rugged topography and substantial regional variations in climate and ecology. The central plateau region enjoys temperate to subtropical climate with favorable soils. The south has to cope with an arid climate and infertile soils. The eastern region possesses subequatorial climate with rich agricultural resources. In the west, rainfall decreases from north to south. During summer, violent cyclones cause widespread damage to large parts of the country.

1.02 With a population estimated to have reached 10.3 million in 1985, Madagascar is one of the least developed countries in the world. Its record of economic development since independence from France in 1960 has been disappointing. Since the early 1970s when the Government adopted highly dirigistic economic policies, per capita income has declined almost consistently, dropping to US\$235 in 1985, which in real terms amounted to only 80 percent of the 1980 level and 50 percent of the 1970 level. The present Government, which took power in 1975, had initially implemented policies aimed at nationalization and expansion of the public sector and the "Invest to the Hilt" program of 1978-80, resulting in a profound financial crisis. Poor project selection did not realize the expected benefits, and heavy commercial foreign borrowings could not be serviced from project-generated funds. This exerted further pressures on budget expenditures already strained from falling agricultural output, heavy rice importation and high oil prices. Consequently, budgetary and balance of payment deficits rose precipitously, and despite comprehensive price controls inflation accelerated.

1.03 With the support of International Monetary Fund (IMF) standby programs, the Government initiated in the early 1980s five severe demand management programs. In addition, several violent cyclones devastated large parts of the island and added to the already massive economic problems. Currently, a sixth program is in preparation and should run through the end of 1987. The stabilization efforts and economic reforms pursued under the standby programs have also been supported by International Development Association (IDA) sector adjustment lending aimed at removing structural constraints from the economy, as well as by consultative group meetings through successive debt reschedulings and additional concessional assistance. Progress has been achieved in the tightening of credit ceilings, curbing of domestic and external demand pressures, reducing import volumes, controlling budgetary expansion, holding down inflation, decreasing most consumer subsidies, and adjusting the country's exchange rate to more realistic levels. Moreover, the Government started to rationalize its investment program, encourage private sector interest and put emphasis on

the rehabilitation of existing productive resources and infrastructure. While these considerable efforts achieved an economic turnaround and appear to have initiated a recovery phase, the country's gross domestic product (GDP) growth rate remains below its population growth, per capita consumption continues to decline and productive activities remain severely restricted by foreign exchange scarcity and hampered by internal and external trade regulations. In order to ensure continued and sustained progress, the Government must implement a host of difficult policy measures to reform the economy. To this end, the Bank has expressed willingness to help the Government in its efforts to halt the economic decline and achieve real development.

1.04 Providing 35 percent of GDP and 85 percent of employment generation, agriculture dominates Madagascar's economy. Agricultural products account for about 80 percent of the country's foreign exchange earnings. While the long-term development potential of the agricultural sector is considered to be excellent, growth in agricultural production over the past decade has been sluggish with an average annual growth rate of less than 2 percent. Particularly disconcerting is the development of the sector's predominant commodities, rice and livestock, which constitute the population's primary food supply. Export crops (coffee, cloves, vanilla, etc.) and industrial crops (cotton, sugar, etc.) as well as the supply of raw materials to the predominantly agriculture-based industrial sector have experienced serious problems since the mid-1970s. As the economy began to falter, the country even had to import rice as price subsidization of rice created significant shifts in dietary patterns and further fueled its demand. While the Government has, since 1982, as part of its economic recovery program, embarked on far-reaching agricultural reform programs, including the development of a short-term food security strategy, a key question over the longer term will be what pressures high rates of population growth will exert on the agricultural production system (see paras. 2.20 - 2.24).

1.05 Despite its size and significant potential energy sources (hydropower, oil, coal, uranium, etc.), Madagascar is facing considerable energy problems primarily as a result of a growing fuelwood shortage arising from overuse of its forest resources (which are the dominant energy supply), as well as its total dependence (except a small domestic coal production for its commercial energy needs) on oil imports. As the household sector accounts for over 83 percent of the country's net energy consumption almost entirely in the form of wood fuels, Madagascar's population growth would undoubtedly have serious repercussions on the country's future energy situation (see paras. 2.27 - 2.29).

1.06 The Malagasy population is descended solely from immigrants. No remnants of any prehistoric culture have been found. The first settlers, the mysterious Vazimba, arrived from Asia in the third century. From the fifth to the eight centuries, migrants originated mainly from Indonesia, followed by Arabs, and from 1500 onward, also by Portuguese, French, British and East African settlers. After a long succession of regional and national monarchies, the French assumed control over the country in 1884. The colonial period ended in 1958, and Madagascar gained full independence in

1960. The present Government adopted a Charter of Malagasy Socialist Revolution which initiated massive reform policies resulting in nationalizations, expansion of the public sector and decentralizing Government authority to the six provinces, the Faritany, and 11,500 village communities, the Fokontany. These reform policies included the promise to offer free medical services and education to all Malagasy.

1.07 With its insular location close to Africa and its Polynesian-emanated immigration, Madagascar possesses a unique blend of culture and customs rooted deeply in the long history of well functioning monarchies and missionary activities. In addition to the principal eighteen tribes, communities of Indians, Chinese and Arabs exist primarily along the northern and eastern coastline. Inter-marriage between the groups occurs frequently. Despite its diversity of racial background, a single language, Malagasy (derived from the Malayo-Polynesian group of languages) with regional dialects, is spoken throughout the country. The 1975 census recorded 24 percent of the population as Catholic and 21 percent as Protestant. In the capital and in the coastal cities, Islam and other religions can also be found.

1.08 The family and its well-being form the primary focus of the Malagasy society. As shown later in this report with more specificity, the Malagasy family is large and close relationships with other families within the same village frequently exist. Deep respect for family ancestors (the Razana), fear of breaking taboos (Fady) and love for children are characteristic features of the Malagasy culture. Sterility is considered to be a curse. Children help their parents from a young age, planting, collecting fruit, harvesting, shepherding and selling agricultural products.

II. POPULATION

A. Present Demographic Situation and Trends

Sources and Quality of Data

2.01 While population counts have been conducted in Madagascar since almost the beginning of this century, the recording of vital statistics over the last decade has deteriorated rapidly to the point where it no longer serves demographic needs. The first census using modern demographic standards was held in 1975. It was followed by a post-census survey. Since then, very little data have been gathered on a national basis to depict trends in fertility and mortality, and consequently estimates of the current size of the population and its growth rate rely on estimates derived from several other statistical surveys, such as the 1980 Household Budget Survey and the 1984 Socio-demographic Survey. The still unpublished Household

Budget Survey, which was conducted, like the 1975 census and the post-census survey, by the National Statistical Institute (INSRE), covered the rural areas and smaller urban centers as follow-up to a 1977/78 survey of the seven major urban centers. The Socio-demographic Survey was conducted as part of a United Nations Educational, Scientific and Cultural Organization/United Nations Fund for Population Activities (UNESCO/UNFPA) population education project. With UNFPA assistance, the Ministry of Health (MOH) established in 1983 a demographic unit to set up and maintain information on birth, death, and total population for a permanent health data collection system based on a sample of 1,439 communities (12.5 percent). The first returns for the year 1984, however, included only 340 communities (3.0 percent) and suffered from a considerable variation in statistical quality.

2.02 Thus, the regular, ongoing demographic data collection in Madagascar is not able to readily supply information such as the country's population size or its growth trends. Nevertheless, analyzing the various existing surveys, the mission was able to produce updated estimates for fertility and mortality rates and consequently project the present population levels and trends starting from actual 1975 census data. The methodology used for these projections is described in Annex I.

Population Size and Growth

2.03 At the turn of the century, an administrative head count put the population of Madagascar at about 2.2 million people. Over the next fifty years, population grew on average at a modest one percent rate per year including several periods of actual decline caused by epidemics and hostilities. From 1950 onward, population growth accelerated with official records putting it at an average 2.3 percent per annum between 1950 and 1960, and at an average 3.5 percent per annum between 1960 and 1970. At the time of the 1975 census, Madagascar's population had increased to 7.6 million. Using this figure as a projection base without adjustment for possible undercounting, the population appears to have increased to 10.3 million by 1985 with a current growth rate of 3.0 percent per annum as against the Government estimate of 2.8 percent. At a continuing growth rate of 3.0 percent, the population would double in 24 years.

Fertility and Mortality

2.04 The 1985 population estimate is based on a crude birth rate (CBR) of 45.6 per 1,000 population and a crude death rate (CDR) of 15.5 per 1,000 population. (See Annex I for source of data.) The total fertility rate (TFR) has increased slightly from 6.4 children per woman in 1975 to the present estimate of 6.6 children. The gross reproduction rate currently is about 3.3 daughters born alive per woman while the net reproduction rate is considerably lower; i.e., 2.4 due to the high mortality rates.

2.05 Life expectancy at birth has improved significantly over the last twenty years; in 1966, it was given at 38 years. The 1975 census reported

an increase to 45.4 years, and while further advances were achieved up to 1980, a slight decline has reduced the hitherto achieved progress. The current estimate prepared by the sector mission--primarily dependent on the 1984 Socio-demographic Survey--shows life expectancy to be 51 years with a differential of about three years in favor of females. At considerable variance from past Government statistics, the present infant mortality rate (IMR) has been conservatively estimated by the sector mission to be about 125 per 1,000 live births as against the 68 per 1,000 figure estimated from women's report in the 1975 census and the 75 per 1,000 current figure implied in "Population de Madagascar," a booklet published in January 1985 by the Ministry for Scientific Research and Technology for Development. As infant mortality is widely viewed as an important indicator for a population's health status and closely linked to economic and social welfare, the current high level of the IMR must give rise to serious concern. While some people in the Government suspect that the IMR has been deteriorating since the past surveys, they are of the opinion that Madagascar's IMR would still be considerably better than those in the rest of sub-Saharan Africa. The mission's IMR estimate of 125 per 1,000, however, would point to infant mortality conditions which are not much different from the many sub-Saharan African countries (Ghana, 97; Kenya, 81; Mozambique, 109; Zaire, 106; and Ethiopia, 135).

Age and Sex Structure of the Population

2.06 The mission has derived an age structure for mid-1985 on the basis of the above fertility and mortality estimates. No external migration was assumed. As can be expected in view of the high fertility and mortality rates, the age structure is youthful with 46 percent of the population under 15 years of age; and only 3 percent of the population over 65 years of age. The dependent population, that under 15 and over 65 years of age, is almost equal in size (96 percent) to the potentially economically active segment of the population aged between 15 and under 65; i.e., a dependency ratio close to one. Age structure and dependency ratio are similar to those in Eastern African countries.

2.07 The sex distribution of the 1985 population estimates gives a sex ratio of 98.5 males per 100 females, which is in the normal range. Nevertheless, in the 25 to 69 years age group, Madagascar's women exceed the number of men. The average age at marriage is 19.6 years for women and 22.9 years for men. Female marriage is thus not particularly early by African or Asian standards. The number of married women without children (zero parity) is high. For example, seven to eight percent of married women in rural areas between the age of 25 to 34 have had no child. As this may either be linked to insufficient data or indicate a possible sterility problem, future investigation of this subject is warranted.

Population Density and Spatial Distribution

2.08 With only 17.6 inhabitants per sq. km, Madagascar is still sparsely settled. However, only 20 years earlier in 1966, there were just

10.6 inhabitants per sq. km; ten years later, 13.0. Results from the 1975 census exhibit a considerable variation in density of settlement between the six provinces with Antananarivo showing 37.2 inhabitants per sq. km, Toliary and Majahanga 6.4 and 5.5 respectively and the other three provinces close to the overall country average. Antananarivo province, where the capital is located, accounts for 28.5 percent of the population, but occupies less than one tenth of the country's territory.

2.09 Madagascar is still a predominantly rural country with 83.6 percent of its population living in rural areas according to the 1975 census. At that time, 47 urban centers with more than 4,000 people existed. The capital city, Antananarivo, alone accounted for about 430,000 inhabitants in 1975 or 34.8 percent of the country's total urban population. Although the 1975 census provided this valuable information, virtually no data are available on trends in the regional distribution of Madagascar's population. Only a modest flow of internal migrants to nearby urban centers has taken place. And even the capital city, where the inflow of the unemployed has been consistently discouraged, has seen only a relatively modest growth rate of less than five percent per annum, which is modest compared to overall growth rate of the country's total population. Therefore, net growth rates for urban and rural populations do not differ greatly. Consequently, the sector mission estimates the current rural proportion of the total population still to be as high as 80 percent. Similarly, external migration data are practically nonexistent. With the exception of some overseas students who remain abroad after their education, emigration seems to be extremely limited. Due to Madagascar's insular location, the same holds true for immigration.

B. Population Projections

Construction of Projections

2.10 The sector mission prepared a set of three population projections for the period 1985-2015 using the 1985 population estimate of 10.3 million as their base. For all three cases, it was assumed that future mortality rates would decline at a moderate rate resulting in higher life expectancy; i.e., an additional 1.5 years for females and about 1.4 years for males for each five-year period. Different assumptions as to expected fertility trends over the 30-year projection period were applied. The first trend alternative assumes constant age-specific fertility rates at the levels estimated for the period 1980-1985. As fertility appears to have been relatively stable over the last ten years, this no-change scenario becomes a distinct possibility if a national family planning program is not implemented and if factors conducive to fertility declines (e.g., improvements in education and living conditions) are offset by factors conducive to fertility increases (e.g., improvements in maternal health care resulting in better health for women and better nutrition). Based on the

World Bank's "standard projection,"¹ as defined in the "World Development Report 1984," the second trend alternative assumes a moderate and continuous fertility decline beginning in 1985 reaching replacement fertility between 2030 and 2035. Hence, the TFR is assumed to fall from 6.6 in 1985 to 4.0 during the 2010-2015 period. The third trend alternative assumes rapid declines in fertility to achieve replacement fertility by 2015-2020; i.e., 15 years earlier than in the second trend alternative. The TFR would in this case fall to 2.8 during the period 2010-2015. This maximum decline was modeled on countries which have achieved a rapid fall in fertility over the recent past after their successful implementation of strong government policies and programs in family planning and substantial strides in areas such as adult literacy, health services and alleviation of poverty. Details of the projections are given in Annex 1.

Results of Population Projections

2.11 Table 1 (on the following page) summarizes the projected size of the population of Madagascar over the next 30 years.

2.12 Demographic projections should not be treated as forecasts; they only serve as illustrations of possible effects of selected assumptions on future population growth. The results in Table 1 indeed paint a dramatic picture of the potential for future population growth in Madagascar. If fertility remains at the past ten-year level, the country's population would grow by 62 percent by the year 2000, and more than two-and-one-half fold by 2015. At that time, 28.1 million people would occupy the island and the population growth rate would have accelerated at a rate of over 3.5 percent. At this rate, the country's population would double again over the next 20 years. Such rapid growth would probably make it increasingly difficult to continue the assumed mortality decline due to inordinate pressures on the country's resources just to keep up the same level of per capita expenditures for social services. The dependency ratio would remain very high—at around 97 percent. As shown later in this chapter, the prospects of uncontrolled fertility under this assumption are extremely serious.

2.13 Especially over the longer term, fertility declines could alter the picture significantly. A gradual fertility decline would yield a total population of 22.2 million at the end of the projection period, i.e., almost

¹For the standard projection, the assumed year for replacement-level fertility in Madagascar was regressed on several predictors: the current total fertility rate for each country, the change in this rate over the previous ten years, the proportion of couples using contraceptives, and the current female life expectancy.

Table 1: POPULATION PROJECTIONS FOR MADAGASCAR

	<u>1985</u>	<u>2000</u>	<u>2015</u>
<u>Total Population (in million)</u>			
No Fertility Decline	10.3	16.7	28.1
Gradual Fertility Decline	10.3	15.6	22.2
Rapid Fertility Decline	10.3	15.1	19.8
<u>Crude Birth Rate (per 1,000)</u>			
No Fertility Decline	45.6	45.4	44.8
Gradual Fertility Decline	45.6	38.2	30.8
Rapid Fertility Decline	45.6	34.9	23.5
<u>Crude Death Rate (per 1,000)</u>			
No Fertility Decline	15.5	12.3	9.5
Gradual Fertility Decline	15.5	11.7	9.0
Rapid Fertility Decline	15.5	11.4	8.9
<u>Average Annual Growth Rate (percent)</u>			
No Fertility Decline	3.01	3.31	3.54
Gradual Fertility Decline	3.01	2.65	2.18
Rapid Fertility Decline	3.01	2.34	1.46

Source: World Bank projections.

6 million people fewer than without fertility change. The growth rate would have come down to 2.2 percent implying a further doubling of the population in 36 years. The dependency rate would show a significant reduction to about 68 percent, because the proportion of children in the population would be considerably lower. If rapid fertility declines can be achieved over the next 30 years, total fertility would drop from the current 6.6 live births per woman to 2.8 at the end of the projection period. This would result in a total population in 2015 of 19.8 million or 8.3 million less than without fertility change. The growth rate would then be 1.5 percent, lengthening the doubling time to 46 years, and the dependent ratio at the projection end would be only 55.4 percent as a result of a more moderate birth rate.

Urban and Rural Population Growth Projections

2.14 For the three trend alternatives, the relative proportion of rural to urban population was projected, using the Government's definition of an urban center; i.e., a concentration of more than 4,000 inhabitants. However, the possible effects of alternative fertility assumptions on the urbanization process have not been taken into account. As indicated above, very little information is available on historic trends of urban versus rural population growth in Madagascar and assumptions regarding urbanization are in general considerably more subject to volatile factors than most other demographic events. The sector mission's projections are therefore merely an attempt to illustrate one likely scenario, in which the urban/rural growth differential was assumed to remain at a constant two percent over the

next 30 years. Thus, the following projections are generated:

Table 2: URBAN POPULATION PROJECTIONS FOR MADAGASCAR
(in '000)

	<u>1985</u>	<u>2000</u>	<u>2015</u>
No Fertility Decline	1,984	4,060	8,500
Gradual Fertility Decline	1,984	3,790	6,700
Rapid Fertility Decline	1,984	3,680	6,000
Proportion of urban to total population (in percent)	19.2	24.3	30.2

Source: World Bank projections.

2.15 Accordingly, without change in fertility, about 8.5 million people would live in urban centers by the year 2015--a more than fourfold increase. Over the same period, people in rural areas would increase from 8.3 million to 19.6 million and their share of the total population would fall from about 80 to 70 percent.² While the urban/rural proportion would evolve the same, under declining fertility assumptions, the urban population would grow at slower rates, reaching 6.7 million under the moderate decline hypothesis and 6.0 million under the rapid decline hypothesis. Yet, even under the latter hypothesis, the urban population would triple over the next 30 years.

Implied Contraceptive Prevalence

2.16 In order to provide an idea as to the magnitude of change in the overall reproductive behavior required to achieve the fertility decline assumed under the gradual and rapid fertility decline alternatives, the implied contraceptive prevalence rates were calculated. They are given for five-year intervals in Table 3.

2.17 These projections assume roughly the same relative composition of contraceptive methods in the future as presently used in Madagascar. The present contraceptive prevalence rate is estimated to be in the neighborhood of one percent. This would need to increase to 21-30 percent in 1998 and to 42-60 percent in 2013 under the gradual and rapid fertility decline assumptions. It must be noted that contraceptives are used at the present

2 The United Nations' project Madagascar's urban population to increase to 24.44 percent in 1990 and to 31.46 percent in 2000. See Patterns of Urban and Rural Population Growth, 1980.

Table 3: TOTAL FERTILITY RATES (TFR) AND IMPLIED CONTRACEPTIVE PREVALENCE RATES (CPR)

<u>Year</u>	<u>Gradual Fertility Decline</u>		<u>Rapid Fertility Decline</u>	
	<u>TFR</u>	<u>CPR</u>	<u>TFR</u>	<u>CPR</u>
1988	6.2	8%	6.0	11%
1993	5.7	15%	5.4	21%
1998	5.3	21%	4.7	30%
2003	4.9	28%	4.1	40%
2008	4.4	35%	3.5	50%
2013	4.0	42%	2.8	60%

Source: World Bank projections.

time in sub-Saharan Africa by less than 10 percent of married women and that the level of contraceptive use implied in the projections for 1998 would then be about the same as the current level in South Asia. The proportion implied for 2013 under the rapid fertility decline assumption would be close to the current usage in countries such as Thailand, Sri Lanka or Indonesia.

C. Socio-economic Consequences of Population Growth

2.18 As shown in the previous chapter, even if fertility declines rapidly, Madagascar's population is likely to increase by almost 50 percent over the next 15 years and double over the next 30 years. By then, almost unavoidably, it would reach 20 million and may even be as high as 30 million. This chapter shows that this will not only have important implications for the individual families and for society in general, but will also represent an awesome challenge for planners and the country's policy makers.

2.19 Empirical evidence has shown that population growth above two percent "acts as a brake on development." ³ However, wide differences can be expected among countries as to what extent population growth affects their economies and their efforts to improve their citizens' welfare and at the same time reduce social inequalities. Even in countries with large unexploited natural resources, progress in development may be held back by limited availability of financial resources for investments and recurrent expenditures for projects and associated infrastructure as well as by the need for human skills to construct and operate these projects. This chapter investigates how the anticipated population growth could affect capital formation, labor force and food consumption in Madagascar.

³ See Chapter 5, World Development Report 1984.

Implications for Economic Growth

2.20 From 1970 onward, Madagascar's economy has been growing at a slower pace than its population. The GDP for 1985 amounted in real terms to only 80 percent of its 1980 level. The Bank estimates⁴ that, under the assumption the Government would successfully implement a far-reaching set of accelerated structural adjustment policies, GDP could improve in real terms at an annual rate of 3.1 percent for the rest of the 1980s. The alternative population growth projections for 1985-1990 made by the sector mission are 3.1 percent for no fertility change, 2.9 percent for moderate decline, and 2.8 percent for rapid decline. The population growth would, consequently, to a large extent negate any advances in per capita income and living standards. For the subsequent five-year period, modest advances could be possible if the economy would grow at the projected rate of 3.6 percent. Beyond that time, the prospects for Madagascar's economy are still quite uncertain, but in view of the continued pressure of population increases, substantial gains in national output would be required to realize net advances in per capita income. However, if GDP over the long term (1995-2015) grows only at 3 percent per year, advances would only be achievable under declining fertility trends, as the following table illustrates.

Table 4: TOTAL AND PER CAPITA GDP PROJECTIONS
IN REAL TERMS

	<u>Est. 1985</u>	<u>2000</u>	<u>2015</u>
GDP (Billions of FMG)	1,399	2,245	3,495
GDP Per Capita ('000 FMG)			
No Fertility Decline	136	134	124
Gradual Fertility Decline	136	144	157
Rapid Fertility Decline	136	148	176

Source: World Bank projections.

These figures, however, do not provide any insight as to how the projected economic and population growth would influence income distribution within Madagascar, particularly whether there would be a future decrease or increase in poverty. Increases in per capita income alone--projected for the next 30 years under declining fertility assumptions--may be too modest to lift a substantial proportion of the population out of poverty. Undoubtedly, if economic development increased substantially, the per capita income could improve.

4 Country Economic Memorandum for Madagascar, March 1985.

Implications for Active Age Group

2.21 If fertility continues unabated in Madagascar, the "active age group"--the population aged ten years and over--would grow from the present 6.9 million people to 18.5 million in 2015; i.e., at a rate equal to the total population increase over the next 30 years. Under declining fertility assumptions, the proportion of the active age group over the same period would increase, thus reducing the dependency burden. The following table shows that even in the declining fertility scenarios the yearly need for additional jobs for both sexes would remain substantial, albeit less pronounced than without marked fertility changes. As these projections presume the same labor force participation rates as prevalent in 1985, additional employment opportunities would need to be created if more people are looking for jobs.

Table 5: "ACTIVE AGE" POPULATION AND ANNUAL GROWTH OF MALE AND FEMALE LABOR FORCE

<u>Active Age Population (in million)</u>	<u>1985</u>	<u>2000</u>	<u>2015</u>	<u>Percent Increase 1985-2015</u>
No Fertility Decline	6.9	11.1	18.5	169.6
Gradual Fertility Decline	6.9	10.9	16.5	140.0
Rapid Fertility Decline	6.9	10.8	15.6	127.3

<u>Annual Labor Force Increase (in 000)</u>	<u>1985-2000</u>	<u>2000-2015</u>
No Fertility Decline		
Males	+112	+197
Females	+ 90	+159
Gradual Fertility Decline		
Males	+108	+147
Females	+ 87	+119
Rapid Fertility Decline		
Males	+107	+126
Females	+ 86	+101

Source: World Bank projections.

Consequently, in order to just maintain productivity, the country's investments or stock of capital would have to be increased commensurate with the labor force. If this could not be achieved, productivity and thus income would fall. At the same time, wages would decline in proportion to profits and rents, and income inequalities would be exacerbated, particularly since the additional job seekers may be expected to be relatively young, uneducated and unskilled. Unless the urbanization process accelerates beyond expectation, which in turn could create massive urban un- or underemployment in the urban centers, the labor force in agriculture would grow significantly. How to employ these job seekers productively in the future is of critical concern to Madagascar.

Implications for Agricultural Production

2.22 While agriculture is the mainstay of Madagascar's economy, its food crop production for domestic consumption (rice, manioc, potatoes, maize, etc.) has been insufficient since the mid-1970s and had to be supplemented at times by heavy food imports. The importation of rice, the staple preferred by most people in Madagascar, peaked in 1982 with about 350,000 tonnes but declined sharply from about 185,000 tonnes in 1983 to 106,000 tonnes in 1985. While systematic data regarding the nutritional status on a national or regional basis are not routinely collected in Madagascar, several surveys, studies and clinical reports suggest that a serious food shortfall exists at the present time (for details see Annex II).

2.23 The following table portrays mission estimates of the growth in food demand in terms of food energy and protein requirements over the next 30 years under the three population growth alternatives, but not taking account of other relevant determinants such as rising income, which could raise food demand further. Even with rapid fertility decline, food production would have to double over the next 30 years. Moreover, with no fertility decline and taking real income growth into consideration, food production may have to triple to meet requirements without resorting to food imports. These are, by any standard, formidable challenges.

2.24 Clearly, unchecked population growth would create a severe strain on the country's capacity to feed itself. In order to entirely eliminate shortfalls, domestic production would, without fertility decline, need to increase by 4.6 percent annually up to the year 2000 and 3.5 percent thereafter. It must be noted that only a few countries have ever been able to sustain agricultural growth of more than 3.5 percent per annum over more than two decades (e.g., Mexico, Thailand and the Philippines). Under the rapid fertility decline assumption, domestic production would need to be raised by 4.0 percent annually to the year 2000 and 1.8 percent thereafter.

2.25 For demonstration purposes, this would mean that if all additional food would come from rice production and if no productivity increases are assumed, the presently cultivated area for paddy production (paddy

production grew at less than 0.5 percent a year over the past decade)5 would have to be almost doubled within thirty years in the rapid fertility decline scenario and expand almost threefold if fertility remains at a constant level. Depending on the different scenarios, the area of rice paddy production would thus have to increase between 1.2 and 2.2 million hectares over the next 30 years assuming a national average production of 1.8 tonnes per hectare. In the worst case, this would require 40 percent of the yet unused cultivable land, estimated at 5.5 million hectares. However, new lands for paddy production are increasingly marginal in the densely settled areas of the country, requiring more development investment and yielding less per hectare. Other factors would improve prospects for better rice productivity, but it is uncertain whether they could prevail in Madagascar in the future. For instance, overall yield improvements would reduce the amount of land that needs to be devoted to rice production. Advanced projects using water controls, fertilizers and pesticides obtain as much as four tonnes per hectare, while small holder paddy fields on average yield no more than 1.5 tonnes of paddy per hectare. Of course, other food sources; e.g., maize, cassava, beans, potatoes, could also be developed and may provide substantial economic advantages over rice production. To

Table 6: PROJECTED TOTAL FOOD ENERGY AND PROTEIN REQUIREMENTS

	<u>1985</u>	<u>2000</u>	<u>2015</u>
<u>Energy Requirements</u>			
(in billions of kcal/year)			
No Fertility Decline	7,256	11,745	19,753
Moderate Fertility Decline	7,256	11,138	16,114
Rapid Fertility Decline	7,256	10,937	14,728
<u>Protein Requirements</u>			
(in 000 tonnes of protein)			
No Fertility Decline	89	145	243
Moderate Fertility Decline	89	137	199
Rapid Fertility Decline	89	135	182

Source: World Bank projections based on latest Food Administration Organization (FAO)/World Health Organization (WHO) method for assessing nutritional requirements.a

a Depending on sex/age, protein requirement expressed in egg protein varies between 23.7 and 25.2 grams per day and energy requirement between 1,926 and 2,036 kcal/day.

5 It is assumed that three units of paddy produce two units of rice and that 16 percent of the rice is used for non-human consumption.

improve crop yields nationwide, inputs, such as fertilizers and better seeds, as well as irrigation systems and distribution networks, would need to be used extensively. Also, resettling farmers in relatively unpopulated areas of Madagascar entails high costs and is impeded, over the short- and medium-terms by socio-political factors, including intractable land tenure problems.

2.26 The agricultural statistics available may serve to indicate a general order of magnitude. At the present time, about five percent of the country is cultivated. Only an additional nine percent or 5.5 million hectares could still be potentially cultivated as the rest of the area comprises pastures, forests, water areas and uncultivable land. If 40 percent of the remaining area is used for food crop production and taking fallow into consideration, only about two million hectares would remain for growth in industrial and export crops, the country's major foreign exchange earners. Even if reasonable productivity increases can be achieved in food crop production in the future, additional land needed to grow sufficient food for a rapidly growing population would reduce the remaining area for industrial and export crops. Whether the presently uncultivated land can be used for food crop and whether sufficient water is available for the required irrigation, needs to be investigated further. In any case, the required land reclamation would substantially exceed the historic trend (e.g., paddy production grew at less than 0.5 percent a year over the past decade) and would be increasingly time-consuming and costly. Similarly, intensifying the use of existing land requires additional skills, investments and foreign exchange, all of which are in short supply in Madagascar.

Implications for Fuelwood Requirements

2.27 With only a per capita use of 215 kg of oil equivalent, Madagascar's energy consumption is very low. Yet, although the country possesses an abundant hydroelectric potential and a considerable surplus in its current generating capacity, it faces serious energy problems. In addition to increasing import needs of petroleum for transportation and for diesel-fired electric power generation, over-exploitation of forest resources for fuelwood has assumed crisis proportions.

2.28 About 80 percent of Madagascar's total energy consumption is derived from fuelwood and charcoal. The contiguous forest cover, including plantations and mangroves, is estimated to amount to 13.1 million hectares with an annual long-term sustainable yield of 6.5 million tonnes of wood equivalent (twe)⁶. While gross national demand in 1983 amounted to 5.3 million twe creating an overall surplus on a national basis, large deficits occurred in the highland provinces of Antananarivo and Fianarantsoa, which have more than half of the population of the country but only about 12

⁶ 6 Tonne of wood equivalent at 25 percent moisture content wet basis (mcwb) per unit weight. twe = 0.31 tonnes of oil equivalent.

percent of the forest cover. Since wood surpluses in other areas cannot economically be transported to these provinces, except for a limited amount from the Toamasina province, the net fuelwood deficit from the highland provinces has been estimated at about 1.9 million twe per year. The consequences are that the existing forest stocks in the deficit areas, and to a serious extent particularly in the hinterland of Antananarivo, are increasingly being depleted. According to the FAO Tropical Forest Resources Assessment Project, the annual rate of deforestation is estimated at 150,000 hectares. At this rate, erosion problems and economic and social impact may become catastrophic over the long term.

2.29 Table 8 shows the projected fuelwood requirements on the basis of the 1983 per capita consumption of 680 kg wood equivalent for the highland population and 397 kg wood equivalent for the lowland population.

Table 7: PROJECTED FUELWOOD REQUIREMENTS
(in twe)

	<u>1985</u>	<u>2000</u>	<u>2015</u>
<u>Consumption</u>			
No Fertility Decline	5,632	9,140	15,419
Moderate Fertility Decline	5,632	8,534	12,199
Rapid Fertility Decline	5,632	8,275	10,876
<u>Surplus/(Deficit) Over Supply</u>			
No Fertility Decline	+ 718	(2,790)	(9,069)
Moderate Fertility Decline	+ 718	(2,184)	(5,849)
Rapid Fertility Decline	+ 718	(1,925)	(4,526)

Source: World Bank projections.

These projections assume constant supply. If shortfalls are, however, not satisfied by other means of energy, the deforestation process would reduce the forest stock and invalidate the constant supply hypothesis. Nevertheless, the table depicts the magnitude of the ensuing deficits under the three population growth assumptions. In the case of no fertility decline, the deficit in the year 2015 would reach 9.1 million twe; i.e., nearly 2 1/2 times the current annual sustainable nationwide fuelwood production. In the case of rapid fertility decline, the deficit in the year 2015 would be only half as large as in the former case but still exceed the annual sustainable fuelwood production by a substantial margin (about 71 percent).

2.30 One theoretical solution of course would be to increase the fuelwood supply particularly in the highest shortfall areas through plantation development and encouragement of rural tree plantations which, even if fast growing and productive eucalyptus trees are used, will have

little impact on the supply situation before ten years hence. The next table demonstrates the acreage needed for additional tree production (eucalyptus) in the two highland provinces, Antananarivo and Fianarantsoa.

Table 8: PROJECTED FUELWOOD DEFICITS AND RESULTANT TREE PRODUCTION AREAS NEEDED

	<u>Projected Deficit</u> (<u>'000 twe</u>)	<u>Resultant</u> <u>Acreage</u> (<u>'000 hectares</u>)
<u>Year 2000</u>		
No Fertility Decline	4,420	679
Moderate Fertility Decline	3,020	618
Rapid Fertility Decline	3,850	592
<u>Year 2015</u>		
No Fertility Decline	8,640	1,328
Moderate Fertility Decline	6,500	1,000
Rapid Fertility Decline	5,620	864

Source: World Bank projections.

The table includes only the limited wood fuels transport from Toamasina province to Antananarivo province since other transfers seem economically not feasible. Without fertility decline, the acreage which has to be readied for production in 2015 (1.3 million hectares) would require an 86.4 percent expansion over the present total forest cover of these two provinces. The rapid fertility decline scenario, however, would result in substantially less expansion, but still require a 56 percent increase in acreage.

2.31 Clearly, in addition to reduction of population growth, other strategies must also be pursued to overcome the already presently serious energy crisis. To this end, the World Bank has made detailed recommendations.⁷ But without slowing down significantly population growth, measures such as improved demand management and wood substitution would most likely not be sufficient to resolve this crisis.

Implications for Social Services

2.32 As a country's population grows, increased investments and recurrent expenditures are needed for education, health and developing job skills just to maintain existing levels of development. The implications

⁷ Report on Madagascar: Issues and Options in the Energy Sector, November 1985.

under the three population trend alternatives for the education and health sectors are illustrated in terms of projected demand for such services and estimated in public expenditures.

Education

2.33 In 1975, the Government introduced a policy of free primary school education. The primary course was reduced to five years, and agriculture studies were introduced to make education more relevant to the rural population. As a result, primary school enrollment has increased from 88 percent in 1975 to almost 100 percent at the present time. School attendance is compulsory between 6 and 14 years of age. Table 10 shows the projected number of children entering the compulsory school system in 1985, 2000 and 2015 and the projected total primary school enrollment for children age 6 to 14 years for the same years.

Table 9: PROJECTED POPULATION REACHING AGE 6 AND
PROJECTED TOTAL COMPULSORY SCHOOL ENROLLMENT
(in '000)

	<u>1985</u>	<u>2000</u>	<u>2015</u>
<u>Population Aged 6 Years</u>			
No Fertility Decline	329	526	901
Moderate Fertility Decline	329	454	574
Rapid Fertility Decline	329	423	440
<u>Population Aged 6 - 14 Years</u>			
No Fertility Decline	2,507	4,113	6,969
Moderate Fertility Decline	2,507	3,708	4,829
Rapid Fertility Decline	2,507	3,534	3,931

Source: World Bank projections.

Declines in fertility and infant and child mortality affect future enrollment of primary schools after only a few years. The implications of slower or more rapid fertility decline are consequently readily evident. With no fertility decline, there would be about 460,000 more first-graders and about three million more compulsory school students in 2015 than if the rapid fertility decline were to take place. The estimated reduction in enrollment under the rapid fertility decline alternative would be greater than the present size of the primary school system.

2.34 A less rapidly growing population would produce considerable financial savings in education expenditures. Using IBRD/UNESCO estimates in

constant prices for educational costs per student⁸ and under the assumption

Table 10: PROJECTED SIZE OF MCH TARGET POPULATION
('000)

	<u>1985</u>	<u>2000</u>	<u>2015</u>
<u>Women Aged 12-49 Years Plus</u>			
<u>Children Under 5 Years</u>			
No Fertility Decline	4,567	7,510	12,558
Moderate Fertility Decline	4,567	6,843	9,350
Rapid Fertility Decline	4,567	6,556	8,183
<u>Annual Number of Deliveries</u>			
No Fertility Decline	452	722	1,194
Moderate Fertility Decline	452	577	671
Rapid Fertility Decline	452	515	464
<u>Delivery Related Days in</u>			
<u>Health Centers</u>			
No Fertility Decline	1,017	2,272	4,297
Moderate Fertility Decline	1,017	1,818	2,416
Rapid Fertility Decline	1,017	1,624	1,669

Source: World Bank projections.

that the private sector will continue to educate 13 percent of the primary student population, real recurrent educational expenditures without a fertility decline would double to FMG 80 billion by the year 2000 and quadruple to FMG 160 billion by 2015. In the moderate and rapid fertility decline scenarios, expenditures would grow to FMG 69-72 billion by the year 2000 and to FMG 90-110 billion by 2015. The potential annual financial savings between the highest and lowest hypotheses amount to almost FMG 70 billion (about US\$110 million). Furthermore, assuming that the Government recurrent budget would increase in line with economic growth at 3 percent per annum, only the rapid fertility decline alternative would keep primary educational expenditures (2.7 percent per annum) in line with the recurrent budget. Rapid fertility decline can thus ease the pressures on the education system by reducing government spending on school construction, materials and supplies and teachers' training. This may facilitate the maintenance of universal primary education and permit improvements in the quality of the educational system.

Health Services

2.35 A large part of the health services in Madagascar is devoted to

⁸ FMG 18,500 in 1985; FMG 22,400 in 2000; and FMG 26,300 in 2015.

mothers and children under five years of age. Estimates of future demands for maternal and child health (MCH) services provides a strong indication of differentials in volume, health manpower and costs of health services under the various fertility decline assumptions. Table 11 presents such estimates for Madagascar.

2.36 Without fertility decline, the target MCH group would increase from the present 4.6 million to 12.6 million in 2015—a number larger than the current total population of Madagascar. Under the rapid fertility decline assumption, the target MCH group would almost double. Although this would still represent a considerable increase in service requirements, it would be a more manageable increase from the present levels. Annual deliveries would increase without fertility change to 1.2 million in 2015, but with moderate fertility decline there would be only 670,000 in 2015. With rapid fertility decline, there would first be a modest increase in deliveries by 2000, but then a decrease in 2015 reading almost the current level. The latter scenario would realize substantial comparative savings that could be used to improve the quality of health services. The same holds true for the total number of days spent in hospitals and health centers due to delivery.⁹

2.37 The impact of the projected population growth on total health expenditures in constant terms is shown in the following table.

Table 11: PROJECTED HEALTH EXPENDITURES IN REAL TERMS
(in billion of FMG)

	<u>1985</u>	<u>2000</u>	<u>2015</u>
<u>Total Health Expenditures</u>			
No Fertility Decline	49.2	79.6	133.9
Moderate Fertility Decline	49.2	74.4	106.0
Rapid Fertility Decline	49.2	72.1	94.5
<u>Government-Financed Health Expenditures</u>			
No Fertility Decline	19.5	31.6	53.1
Moderate Fertility Decline	19.5	29.5	42.0
Rapid Fertility Decline	19.5	28.6	37.4

Source: World Bank projections.

⁹ Projections assume hospital/health center deliveries to increase from the present 50 percent to 65 percent beginning in 1995 and to 80 percent beginning in 2010.

These projections exclude inflationary increases and assume that total health expenditures per person remain at the--unsatisfactory--1985 level (US\$7.50 per person) and are financed about 40 percent from all public sources. In both fertility decline alternatives the annual growth rates of Government funding could remain below 3 percent (moderate decline, 2.6 percent; rapid decline, 2.2 percent). To maintain the present situation of health services without fertility decline, funding would need to increase by 3.4 percent or above the long-term economic growth projections. This would require that either the share of health expenditures in the national and local health budgets increases from 8.1 percent in 1985 to 21.9 percent in 2015 at the expense of other sectors or that the proportion of Government funding for health care be reduced. Depending on the size of Madagascar's future population, it would be increasingly difficult for the Government to even maintain the present insufficient levels of health services and it would be highly unlikely that health care could be extended and improved adequately if population growth persists at current levels.

D. Population and Family Planning Activities

General Attitudes

2.38 Except among an educated, urban minority, the predominant view of the people towards having children is that they are a gift of God, bliss to a family and fortune for the country. For an important proportion of the population, children represent social security for old age. For men, they are proof of continuing virility. The traditional wish made at Malagasy weddings is that the couple be blessed with seven sons and seven daughters. In a past survey, carried out in 1974, only seven percent of the wives interviewed in urban centers and in rural areas mentioned difficulties in educating, raising and feeding a large family. Among women with more than four children, 61 percent wanted to have more children and only 25 percent preferred no more children. More than half (54 percent) opposed family planning, while 28 percent favored it for health reasons. The husbands almost unanimously preferred large families. While no more recent surveys exist, it appears that the recent economic recession has hastened the slow change in traditional values associated with a large family. Anecdotal evidence for this trend is the increasing number of abortions and the recent rise in abandoned children.

2.39 Official health statistics, most probably incomplete, give an induced abortion rate of 4.5 per 1,000 women of childbearing age (2.3 percent of live births). Since many abortions are conducted outside the official health system, the numbers may be much higher. According to one report¹⁰ about 8 out of 1,000 women admitted for various illnesses in health

10 "Service de Médecine de Soins" rapport annuel, 1982.

care facilities die as result of abortions. Another study¹¹ carried out in the maternity hospital of Befelatanana reports that one out of six maternal deaths was the consequence of abortions. Probably the most useful study to date on abortion-related questions was carried out by Fianakaviana Sambatra (FISA, meaning "Happy Family")¹² comprising 8,331 patients in the Antananarivo and Fianarantsoa provinces; among them 1,375 (16.5 percent) admitted to having had at least one abortion.

2.40 These figures require cautious interpretation. Compared to sub-Saharan African countries, the problem in Madagascar still appears to be less pronounced. The International Planned Parenthood Federation (IPPF) estimates the clandestine abortion rate in Zaire, for example, to be between 5 and 20 percent of live births. In a large hospital in Zaire, some 40 percent of gynecological cases admitted were found to be the result of induced abortion and 75 percent of maternal deaths were caused by induced abortion. A study carried out at a major urban hospital in Ghana reported that one third of women with one previous pregnancy had terminated it by abortion.

Population Policy and Programs

2.41 Madagascar has neither an explicit policy on population nor a formal government family program. Nevertheless, Government awareness is increasing as evidenced by statements made by the Minister of Population, Social Affairs, Youth and Sports during the 1984 World Conference on Population in Mexico, "In Madagascar we are certainly aware of the difficulty to break the vicious circle of underdevelopment--high fertility, rapid demographic growth, underdevelopment--but it remains that the Malagasy perception regarding development and population problems is based on the conviction that economic and cultural emancipation must have priority over demographic solutions." By January 1985, the concern had increased as indicated in the booklet "Population de Madagascar" published by the Ministry of Scientific Research and Technology for Development: "...it is clear that in the present economic situation, a rapid or even moderate growth of the Malagasy population jeopardizes the country's food self-sufficiency in the year 2000. A population education project financed by UNFPA and executed by UNESCO is implemented by the Ministry of Education. The project is aimed at introducing population issues into the curricula of primary and secondary schools. Finally, it appears that the integration of the population variable amongst the explicit factors of economic and social development is a real necessity for Madagascar."

¹¹ "A propos de la Planification familiale à Madagascar" by M.P. Ramakavelo, 1983.

¹² See paragraph 2.45.

2.42 The following actions on population related matters undertaken by the Government indicate further evolution on this subject:

- (a) founding of a 12-member parliamentary group on population in December 1984 following the Mexico World Conference on population;
- (b) a government-approved and UNFPA-funded mission in 1985 to four foreign countries to observe their family health programs of representatives of the Planning Directorate, the Ministries of Health and of Population, Social Affairs, Youth and Sport, and of the National Assembly;
- (c) a request by the head of the Planning Directorate to United States Agency for International Development (USAID) to finance a Resources for the Awareness of Population Impacts on Development (RAPID) analysis demonstration (a computer-based demographic model) to be presented at a seminar on population and development, planned for late 1986/early 1987;
- (d) participation of senior officials of the Ministry of Health in a regional conference in Rwanda in August 1986 on family health organized by the International Planned Parenthood Federation (IPPF) and financed by the World Bank;
- (e) gradual recognition and limited support of FISA, the main private sector organization involved in family planning in Madagascar; and
- (f) the establishment of a Population and Development Unit in the Planning Directorate, with the assistance of UNFPA, to study implications of demographic growth for macro and sectoral planning and, if warranted, to prepare population policy recommendations.

Recommendations Concerning Population Activities

2.43 If current fertility levels in Madagascar remain unchanged, the country's population will grow over 60 percent by the year 2000, reaching more than two-and-a-half times its current size by the year 2015. At that time, the present population of 10.3 million will have increased to over 28 million. By then, more than 8.5 million or 80 percent of the island's present population are likely to live in urban centers. The issue is not whether Madagascar could ultimately support a population of this size, but the effects of the rate of population growth on development in the medium term. Rapid population growth threatens steady, long-term social and economic development, because it virtually negates economic advances, thus perpetuating unsatisfactory living standards and having critical implications for the adequacy of agricultural and energy production and the financing of the social sectors.

2.44 Government action toward fertility reduction is justified to safeguard the future welfare of society. A second justification for public

support to population-related programs is that with family planning services, the Government would increase freedom of choice as well as encourage responsible parenthood. By contrast, inaction on the population issue on the part of the Government would effectively curtail individuals' rights to choose the size of their families and would in the future foster economic stagnation.

2.45 It is therefore recommended that a senior level Government committee be created to initiate and oversee the study of the population issue in order to propose explicit demographic objectives, develop specific programs and recommend a clear plan of action for the next five years. The development of a population policy in Madagascar would need to address the following:

- (a) The capability of the Government to undertake demographic analyses and projections including the collection of reliable data on population size, fertility and mortality;
- (b) The potential for coordination with UNFPA regarding the assistance to the Statistical Data Bank (Banque des Données de l'Etat) regarding the planned 1986/87 census;
- (c) Mobilization of sustained Government commitment for proposed population policies; and
- (d) Proposals for an institutional framework capable of carrying out the planning and implementation functions of these policies.

The United Nations Fund for Population Activities (UNFPA) has identified similar needs in the population sector and proposes an action program containing projects which are directed toward (i) development of health and family planning; (ii) improvement of demographic data collection and analysis; (iii) provision of information and research as basis for political population decisions; (iv) integration of education on population into the curricula; (v) creation of increased communication programs on population; and (vi) integration of population activities into development issues affecting women.

2.46 Madagascar still has a law in its books dating back to colonial times (May 30, 1933) which prohibits the distribution of contraceptives. Although it is no longer enforced, the Government may wish to repeal it as a first active step in the direction of an increasing commitment to a population policy.

Family Planning Activities

2.47 The main organization involved in family planning in Madagascar is FISA, a non-governmental organization (NGO) affiliated with IPPF. FISA was founded in 1967 and over time gradually has gained recognition. With its staff of about 60, it has assisted the Ministry of National Education with the introduction of a family education program; the Armed Forces, with

supplies of contraceptives and the Ministry of Finance with contraceptive imports. The Ministry of Population, Social Affairs, Youth and Sports oversees FISA's activities and provides some budgetary support. In 1984, FISA began to provide family planning services in 56 MOH health facilities.

2.48 Overall family planning services are offered in 84 locations, of which 12 clinics are operated by FISA alone; 69 by FISA in conjunction MOH, the Ministry of Health, the military and social centers; and 3 by parastatal companies. Thus, with only one facility for 27,500 women aged 15-49 years, the coverage of services is still very low. The 56 MOH facilities in which FISA provides family planning services represent only about 2 percent of the total MOH service outlets, but this represents an important first step by the Ministry in accepting family planning as a health intervention. The women of reproductive age (about 2.3 million) who were using modern contraception in 1985 are estimated at 40,000 (15,000 by FISA, 5,000 by public enterprises and 20,000 by pharmacies); i.e., a contraceptive prevalence rate of about 2 percent. This rate of contraceptive use undoubtedly puts Madagascar very close to the bottom of the list among developing countries, as against Kenya at 18 percent, Zimbabwe at 27 percent and Ghana at 10 percent.

2.49 The proportion of the various contraceptive methods practiced are as follows: oral contraceptives (pill) 51.4 percent; injectable contraceptives 43.4 percent; intra-uterine devices (IUD) 0.6 percent; and condom 4.6 percent¹³. The pill and the injectable contraceptive are the most commonly used methods of birth control in Madagascar. This has changed little over the past seven years. Geographic distribution of contraceptive use closely follows the concentration of dispensing facilities in the different regions. Accordingly, with 26 of 81 FISA operated facilities in primarily urban areas of Antananarivo province, 53.3 percent of all FISA acceptors live in this province. Fianarantsoa and Toamasina provinces each share about 13 percent also mostly in urban areas. The rural population has practically no access to information or to services of modern contraceptive methods. The discontinuation rate of FISA clients is said to be low compared to usual experience in Africa.

2.50 Due to the country's past predominantly pronatalist attitudes, FISA had to expand its operations cautiously imposing strict criteria on client eligibility. While these have been gradually relaxed, FISA still requires in most locations that clients present proof of marriage and spousal consent. To obtain services, membership at a nominal fee is required. Contraceptive services are provided against payment, but prices are on average about half of those charged by pharmacies.

2.51 FISA's activities in information, education and communication (IEC) are handled by 16 specialists with audiovisual support. Regular seminars on family planning education are conducted in almost all provinces.

¹³ A propos de la planification familiale à Madagascar by M.P. Ramevelu, 1985.

FISA's budget in 1985 amounted to FMG 166 million (about US\$255,000) of which FMG 90 million (54.2 percent) came from IPPF and the remainder from local sources including contributions in cash or kind from provincial governments. It received a US\$21,000 contribution in 1985 from the Association for Voluntary Sterilization (AVS) for training of medical and paramedical personnel. UNFPA also provided assistance in 1985 in the amount of US\$142,000 for the purchase of contraceptives, materials, equipment and transport.

2.52 This UNFPA assistance to FISA is part of a two-year (1986/87) project, whose total cost will be US\$ 200,000. UNFPA will fund a US\$680,000 project with MOH. This program will include services for pregnancy spacing. Under the overall objective of reinforcement of the MCH programs, the project also aims at enhancing the knowledge of medical personnel in MCH/Family Planning techniques and will provide family planning services in 48 additional health facilities. This project took five years to be agreed upon. Its finalization after such a long gestation period is probably a reflection of a changing climate towards family planning as a health intervention.

2.53 The Ministry of Population, Social Affairs, Youth and Sports has a multitude of responsibilities including a Department of Population and Social Affairs. The Ministry's organizational chart is included in Annex III (page 4). To date, the Department's resources have been devoted primarily to disaster relief. The demography unit is not staffed to undertake research and make policy recommendations. Institutional capacity would need to be developed to provide information and education to leaders, health workers and the public concerning the population situation and the availability of family planning services. The functions, staffing requirements and job descriptions would need to be reviewed and redefined as necessary so that the Department may play its role in assisting in the implementation of population and family planning activities. This ministry is responsible for the supervision of FISA.

2.54 The Catholic Church operates its own family life education service, the Association of Malgache Christian Union (FTK), which promotes natural family planning methods and informs participants (1,000 couples since 1978) about responsible parenthood.

Recommendations Concerning Family Planning Activities

2.55 On the basis of the available information on fertility, field visits and meetings with Government officials, the sector mission gained the clear impression that unmet demand for family planning services does exist. Consequently, immediate efforts should be directed towards strengthening the existing family planning structure and rapidly expanding family planning activities within maternal and child health services to all health outlets. This would, as a first phase, entail a program of FP activities for as large a number of public health facilities as possible. In order to achieve the widest knowledge of family planning services, the Government is recommended to develop IEC programs with the assistance of experienced specialists in

this field.

2.56 With the existence of its large health infrastructure, Madagascar is in a favorable position to deliver family planning services immediately throughout its health network in conjunction with maternal and child health programs. However, it will be necessary to (a) develop a family planning program as part of MCH, working out the details of service modalities and supervision; (b) formulate an in-service training program for existing health aides, nurses and physicians; and (c) provide the required supplies and equipment. Furthermore, the respective curricula and practical training programs of medical and paramedical students should be amended to include skills and knowledge on contraceptive methods to reduce the need for in-service training in the future. This type of program is in the process of being implemented with assistance from UNFPA. It is essential to coordinate future projects with UNFPA.

III. HEALTH

A. Health and Nutrition Status

3.01 Mortality and morbidity data are collected at health facilities. This information gives only a partial picture of disease patterns in the population as a whole. In addition, the quality of data depends on accurate diagnosis as well as on timely and correct reporting by medical personnel in health facilities. The installation of an improved health information system began in 1979; but the system did not become fully operational until 1983, and therefore the first figures available are for the period January-June 1984. Hence, the most recent annual data are for 1982 using the old system. In addition, a few studies and surveys have been carried out, particularly in the area of communicable diseases and nutrition. The available information, although limited, provides nevertheless a broad picture of the levels and trends of health conditions.

Morbidity

3.02 Outpatient morbidity in 1981 were recorded under the following disease categories: respiratory diseases (33.2 percent); infections and parasitic diseases (28.3 percent); digestive diseases (7.2 percent); neurological diseases (5.7 percent); and dermatological diseases (3.6 percent). The residual group of other diseases amounted to 10.6 percent. Detail are given in Annex II, Table 1. The major causes of morbidity in the same year were the same year were acute disorders of the upper respiratory tract, intestinal infections, bronchitis, digestive diseases, flu and malaria (see Annex II, Tables 2 and 3). One third of the patients were less than five years old. Most of these children, weakened by nutritional deficiencies, were affected by infectious or parasitic diseases (72.8 percent), of which many could have been avoided by preventive care.

3.03 Significant variations in incidence and causes of morbidity exist in the six provinces (see Annex II, Table 4). Fianarantsoa appears to have the least morbidity incidence of all five of the leading causes. Respiratory diseases have the highest incidence in Antananarivo province while infectious and parasitic diseases are most prevalent in Toamasina province. These geographic variations are in part due to climatic differences--the colder highlands causing more respiratory diseases and the more humid conditions in the coastal provinces being more conducive to infectious and parasitic ailments.

3.04 Malaria, accounting for 24 percent of infectious and parasitic diseases, is a major public health problem in Madagascar primarily due to inadequate vector control measures and insufficiency of antimalarial drugs. The sector mission estimates the annual incidence of malaria in the range of 8 to 11 percent compared with 19 percent in Zambia and 8 percent in Ethiopia. About six percent of the population suffer from schistosomiasis with a high potential of further spread of the disease. With regard to sexually transmitted diseases, particularly syphilis is on the rise with Toliary province recording a disturbing 41 percent of all cases reported in 1984. Antananarivo province also reports considerable increases in sexually transmitted diseases. Tuberculosis, leprosy (there are 30 leprosariums and about 30,000 cases in the country) and plague (about 500 to 1,000 cases per year) are endemic in Madagascar and present a major public health concern to the authorities. Annex II provides details on these major communicable diseases in Madagascar with mission estimates on disease incidence and prevalence and also describes the lack of environmental sanitation which constitute a major health risk.

Mortality

3.05 As described in Annex II of this report, the CDR has been estimated at 15.5 per 1,000 population, life expectancy at birth at about 51 years for both sexes, and infant mortality rate at 125 per 1,000 live

births. The leading causes of mortality in 1982 were intestinal infections (12.2 percent), bronchitis (7.5 percent), malaria (5.1 percent), measles (4.9 percent) and bronchopneumonia (3.9 percent).

3.06 The health facilities' records show that in 1982 45 percent of the deceased were under five years of age with about half of the victims under one. Infants died primarily from infectious and parasitic diseases (31 percent), respiratory ailments (24 percent) and perinatal disorders (19 percent). Over the period 1978 to 1984, fetal mortality remained relatively constant at about 30 per 1,000 births. However, both neonatal mortality (from 5.8 to 8.6 per live births) and maternal mortality (from 140 to 520 per 100,000 live births) increased considerably. This development is particularly disappointing since over the same time span, the primary health care network (CSSPs) was substantially expanded with the specific aim of improving health conditions of mothers and children. However, the system was severely plagued by lack of resources and skilled personnel, and it was thus unable to properly carry out the expected responsibilities, particularly with respect to preventive care including MCH. Hence, vaccination coverage (see para. 3.44 and 3.45 for details) is still low (vaccinations against measles began only in 1985); vector control efforts are inadequate, and malaria prophylaxis is limited by chronic shortage of supplies; knowledge of and access to oral rehydration salts is not widespread; family planning services are just beginning; and nutritional deficiencies are widely prevalent and lower the children's resistance to infectious and parasitic diseases.

Nutrition

3.07 No comprehensive surveys on nutritional status have been carried out to date on a nationwide scale in Madagascar. Several surveys as well as clinical observations in pediatrics provide indications that the nutritional status of Malagasy children is poor. Although malnutrition does not appear in the health statistics as a primary cause of morbidity in children under five years (18 per 1,000 against 56 per 1,000 for measles or 23 per 1,000 for whooping-cough), and according to a 1984 UNICEF analysis, it is directly responsible for less than five percent of child mortality, it is likely to be an underlying factor in deaths due to infectious and parasitic diseases.

3.08 The preliminary results of a nationwide survey in 1983, sponsored by WHO, of 1,855 children under two years of age, equally from rural and urban areas, showed "moderate wasting" (evidence of past malnutrition) in 31 percent of the children; i.e., 31 percent weighed less than 80 percent of the normal weight for their height. The survey also revealed that 14.4 percent of the children had low birth weight (less than 2,500 grams). Other results from this survey, particularly on current malnutrition, are not yet available. A June 1984 survey of 1,000 children up to five years of age in the Antsirabe region, one of the areas most affected by malnutrition, reveals a high degree of "stunting," reflecting past chronic and long-term conditions of undernourishment. Eighty-four percent of the boys and 50

percent of the girls showed moderate stunting; i.e., were 90 percent of the normal height for that age. Moderate malnutrition, less or equal to 80 percent of normal weight-for-age, was found among 34.1 percent of children. Usually, malnutrition rises sharply after one year of age; i.e., during weaning and from the age of two, seven out of ten children are below normal weight-for-height.

3.09 In the case of Madagascar, severe malnutrition occurs less frequently than in African countries, but stunting appears to be exceptionally high, pointing to chronic, long-term food scarcity. The prevalence of malnutrition is also higher in large families with more than six children (35 percent of the families of that size are affected, compared to 27 percent of the smaller families, with fewer than five children). Moreover, birth order appears to affect nutritional status of the infant; in 36 percent of the births of sixth or higher parity the babies showed nutritional deficiencies, compared to 29 percent of infants from first to fifth order of birth.

3.10 The monitoring of about 45,000 children aged between five months and five years by the Catholic Relief Service (CRS) over a six-month period (December 1984 to May 1985) shows similar results (see Annex II for details). The situation appears to have worsened with the deterioration of economic conditions, as indicated by hospital admission records. While, for example, approximately six percent of the children attending the pediatrics department of Befelatanana General Hospital showed some degree of malnutrition in 1978, rising to 9.5 percent in 1984, at the present time virtually all children under six show signs of malnutrition and 15 percent of them are hospitalized for severe malnutrition. Also, the Red Cross in Antananarivo reports a sharp increase in the last year in the number of children requiring supplementary feeding.

3.11 Fortunately, breast-feeding remains the primary method of feeding babies, practiced by 92.7 percent of mothers in urban centers and 98.7 percent in rural areas. On average, breast-feeding extends over 16 months with food supplements consisting primarily of rice given at around four to five months. Thus, the babies' food requirements are reasonably well met during the first year. However, as babies are weaned, protein-caloric consumption drops significantly and causes widespread primary¹⁴ malnutrition among children. Only in the cattle region of the South is cow milk fed to children. Elsewhere, it is too expensive and often unavailable. Consumption of most animal protein, including eggs and fish, is restricted by behavioral factors (Fady). Because of its value as a cash crop, fruit does not form an important part of children's food intake.

¹⁴ Due to dietary inadequacies.

Recommendations Concerning Nutrition

3.12 This report deals with nutrition only to the extent that nutrition affects Madagascar's health status. Despite weak statistical data, the sector mission's findings seem to indicate that malnutrition in the country is high and getting rapidly worse in the wake of severe economic adjustment measures. Poor feeding practices of children and inadequate access to food by the poor appear to be the two key areas which need to be addressed. In order to understand the underlying constraints, it is recommended that a thorough nutrition study be carried out as soon as possible. This study would review the causes for the present situation; determine on the basis of a food balance the past and future trends in the nutritional value of the diet; make proposals for upgrading nutrition status data; and develop a nutrition plan including the required institutional and financial arrangements. Moreover, the surprisingly high degree of infant malnutrition calls for close monitoring and study. Such a study would, inter alia, design a weaning strategy to promote improved breast-feeding and weaning practices.

Micronutrient Deficiencies

3.13 Few data are available on vitamin and mineral deficiencies in Madagascar. Iron deficiencies found during clinical examination of pregnant women have not been quantified. Food fortification programs are not carried out on a broad scale since little processed food is marketed. There is no evidence of Vitamin A deficiency and data on iodine deficiency are not available. In terms of malnutrition and vitamin and mineral deficiencies, the statistical information is fragmented and incomplete. A comprehensive study would be necessary to understand the extent and main determinants of malnutrition and to devise appropriate intervention strategies and programs. To this end, the Central Nutrition Laboratory Department, the Human and Dietetic Nutrition Division of the Ministry of Health, the Ministry of Agriculture and the Ministry of Scientific and Technological Research for Development have expressed interest in further research in these areas. Their efforts are to a limited extent supported by UNICEF but additional technical assistance and funding are required to carry out studies.

B. Health Policies and Strategies

3.14 Even before the 1978 International Conference on Primary Health Care in Alma-Ata, USSR, Madagascar had already placed great emphasis on the creation of a primary health care network. Since 1975, the Government's health policies have accorded priority (a) to the development of rural village-based health services in order to reduce the urban/rural health care imbalance in access to modern health care services; and (b) over the long term, to preventive over curative services. Accordingly, the primary health care network consisting of sanitary posts, nursing posts, maternity posts and primary health care centers (CSSP), has been built up to 1,950

facilities. Also, as described later in this chapter, the number of health personnel was raised from about 3,900 to over 8,200 from 1975 to 1984, which substantially increased the relative share of personnel costs within the health budget (to 70 percent) and consequently resulted in a massive reduction in availability of non-personnel related resources (including pharmaceuticals) as overall health expenditures decreased in real terms.

3.15 As part of its 1986-1990 Development Plan, the Government restated its policy to further pursue its efforts in favor of both the rural population and preventive health activities. In order to complete the network of primary health care centers by 1990, 100 additional health aides (aides sanitaires) per year are scheduled to be trained. To improve management and supervision of these centers, further decentralization is envisaged by creating medical subdistricts. The objectives of the preventive program essentially remain unchanged focussing primarily on vaccination (DPT, Polio and BCG) to arrive at a "satisfactory" coverage; health education; maternal and child health care; combatting against epidemics (malaria, tuberculosis, leprosy, schistosomiasis and plague); and safe water supply and sanitation facilities. On the curative side, the Plan seeks to reinforce the secondary level (surgical hospitals, secondary hospitals and medical centers) to achieve an improved referral system for the primary health care network. For the central health level (general and principal hospitals and specialized facilities), the Plan calls for achieving an adequate level of "software," i.e., rehabilitation or acquisition of specialized medical equipment. To achieve the objectives set out in this Plan, the Ministry of Health has developed a program focussing on:

- (a) Strengthening of human resources and management at various levels in the health sector by
 - (i) adding specialized positions for human resource management (finance, logistics, pharmaceuticals, etc.) and for physical resource management (planning and programming, project implementation, supervision and evaluation);
 - (ii) refresher training of all medical and para-medical personnel; and
 - (iii) development of specialists in clinical practice, public health and research.
- (b) Reinforcement of health infrastructure and equipment by
 - (i) construction of new health facilities at the tertiary level, primarily for the surgical hospitals;
 - (ii) rehabilitation and reequipment of the provincial hospitals; and

- (iii) provision of technical equipment, where appropriate, at various levels.
- (c) Improvement of transport and logistics at all levels; and
- (d) Increase in supply of medicine by
 - (i) increase of local pharmaceutical production;
 - (ii) local manufacture of blood serum and vaccines; and
 - (iii) establishment of an essential drug list.

3.16 While the Government correctly gives high priority to completing the primary health care network and emphasizes in its health programs the improvement of management and supervision and the rehabilitation and maintenance of existing facilities and equipment, the program does not outline targets, lacks adequate project justification and fails to set priorities among the proposed interventions. It also ignores, in certain respects, the health system's absorptive capacity and financial constraints.

Recommendations Concerning Health Strategy and Medium-Term Plan

3.17 Development of a health strategy and medium-term plan (five years) that goes beyond the annual budget preparation are basic prerequisites for the strengthening of Madagascar's health sector. A management/forward planning approach needs to be introduced at all management levels of MOH. To this end, the newly created Department for Studies, Planning and Programming in MOH should be brought to full operational status as quickly as possible, and its personnel would need to be qualified in health sector and management planning. A staff development program on management techniques with special regard to planning, monitoring and evaluation would need to be designed and implemented.

3.18 More specifically, a cohesive health strategy should include health sector objectives based on desirable and feasible morbidity and mortality improvements and it should provide guidelines to allocate available resources responding to the epidemiological situation. The strategy should also define the roles and specify the extent of coordination between the main health care providers; i.e., central and provincial governments, village communities, and NGOs. The mechanisms for coordinating and utilizing foreign assistance should also be defined as part of the health strategy. The medium-term plan should be developed in accordance with the health sector strategy, specifying health targets and geographic and functional distributions of recurrent and capital expenditures and establishing priorities on the basis of demographic, epidemiological and operational information as well as on the basis of cost-effectiveness considerations. The plan should be approved at top government levels,

updated annually on a rolling basis, and it should serve as basis for the annual budget preparation.

C. Health Sector Organization and Management

Institutional Framework

3.19 The major providers of Madagascar's system of health services are the MOH, provincial and communal governments, missions, several foreign funded and operated health facilities, NGOs, private sector (primarily in the form of drug and pharmaceutical manufacturers) and traditional practitioners. By far the most important provider of modern health services is the MOH. It formulates and develops the country's health policy and planning, and provides the overwhelming share of health services at all levels throughout the country. The Minister is assisted by a Secretary General and a number of technical advisors.

3.20 There are five departments in MOH, each headed by a director. A department consists of between three and five services and divisions. The Department of Health and Medical Services is essentially responsible for curative medicine, and includes services for health care, communicable disease control, border health control, health and demographic statistics and personnel training. The operation of the two main hospitals (the so-called general hospitals) and several specialized health centers in Antananarivo is also supervised by this department. Preventive health activities fall under the responsibility of the Department of Community Health through its services of maternal and child health care, immunization, sanitation and hygiene, and a central nutrition laboratory. Procurement and distribution of drugs, pharmaceuticals and technical supplies for primarily the public health sector are under the Department of Pharmacies and Laboratories. This department also coordinates the laboratories of the Ministry. The Department of Studies, Planning and Programming prepares health plans and investment programs, and carries out special studies; in addition, it supervises programs and also supervises externally-financed investments. Finally, the Department of Administration and Financial Affairs handles the entirety of the Ministry's support activities including personnel, logistics and finance. Annex III (page 1) includes the current organization chart of the MOH.

3.21 In each of the six provinces, all MOH clinical services and their administrative support are under the direction of the Chief of Provincial Health Services who reports to MOH's Secretary General. These provincial chiefs have supervisory authority and responsibility over all staff, activities and public and private health facilities within their provinces. Their budgetary authority extends to all public sector health facilities with the exception of principal hospitals and surgical hospitals which enjoy budgetary autonomy. The provincial chief also serves as the director of the Provincial Paramedical School. Support staff at each provincial

headquarters typically number 70 to 80 and include about 3 to 5 professionals. Annex III (page 2) depicts a sample organization chart of a provincial health headquarters.

3.22 The provincial health service regions are in turn divided into 30 medical districts (circonscriptions médicales). The medical districts do not necessarily correspond to the official administrative districts (Fivondronampokontany). Depending on a number of factors such as population density, homogeneity of population and accessibility of health facilities within the medical districts, they may embrace one or several administrative districts. The medical inspector, always a physician who heads the medical districts, is responsible for the operation of typically about 50 to 70 health facilities which serve a population of between 200,000 to 500,000 support staff. Annex III (page 3) shows a representative organization chart for a medical district. As already mentioned, due to the expanding responsibilities of the medical inspectors in overseeing the increasing number of health facilities in their medical districts as well as administering such services as mobile vaccination teams, anti-vectorial and communicable disease programs, ambulatory services, sanitation brigades, record keeping and health aides training, the Government is in the process of creating medical subdistricts. It is not contemplated at this time to give these subdistricts budgetary autonomy.

Management

3.23 MOH's Minister and some of his top managers at both the central and provincial levels have been in office for a long period of time, particularly in comparison to many other countries in the region. Within MOH and by colleagues outside the Ministry, they are respected for their high level of competence. The Ministry of Health has expressly stated the importance of good management as the key requirement for Madagascar's health system.

3.24 The organizational structure and lines of authority of the MOH are well defined and provide an adequate institutional framework for delivering health services to the population. The overall departmental alignments at the central level appear to be sound. Inter-departmental communications at the central level are satisfactory as most directors and division chiefs have worked together for many years, channels of communication are well established and procedures are generally followed. Within the departments, however, there is a proliferation of small organizational units: departments are divided into services which are again divided into divisions. While the large number of hierarchical levels may be justified at the central level, the same breakdown is also maintained at the provincial and medical district levels. Especially at the district level, this can lead to particularly cumbersome organizational structures where there may be as many as 15 organizational units, each employing an average of two persons and most headed by a clerical staff.

3.25 The delegation of considerable management authority to the chiefs of provincial health services is reasonably effective. A potential weakness in the organization structure could be the dual line of responsibility of the personnel in the health facilities since they report to the provincial chiefs on administrative matters, but on professional matters, they are supervised by the central staff of the Department of Health and Medical Services. However, this form of matrix management is not uncommon in the health sector and both supervisors and supervised staff appear comfortable with this system.

3.26 Management weaknesses at lower levels are major contributors to the poor provision of health services. Supervision of the primary health care facilities by medical district or provincial administrators is weak and often nonexistent. Long distances, difficult terrain and frequent severe shortages of transportation, communication and materials only explain in part this problem. Insufficient quality and poor motivation of some provincial and district administrators, coupled with their inadequate training in management, are also contributing factors. These weaknesses in the field are exacerbated by the absence of tools for good management, such as job descriptions, performance targets, and an adequate incentive system (para. 3.46-3.67).

Recommendations on Program Changes

3.27 As future spending on health services will most likely be restrained by continued budget stringency, the Government could take advantage of a number of cost-effective program changes in health care provision. This would include assigning higher priority to preventive interventions such as immunization programs, pre- and post-natal care, vector control, health education, and at the same time strengthening simple curative care as well as establishing an essential drug program. In most of these areas, increased emphasis on outreach activities and the development of community-based programs can yield substantial returns over passive, clinic-based health care as is currently almost exclusively practiced in Madagascar. An added benefit of developing a strong outreach system is that it also can serve as a distribution basis for family planning which has proven to be very effective in many African countries to increase contraceptive prevalence.

Management Information/Health Statistics System

3.28 With UNFPA assistance, MOH introduced a new integrated health statistics system in 1983, following a test period in a number of medical districts and a major training effort of staff at all levels of the health system. Based on standardized registers differentiated by type of consultation (prenatal, postnatal, general) and health facility, each health center sends a monthly report to the district headquarters where the reports are manually consolidated into a district report. District reports are in

turn manually consolidated into provincial reports which are submitted to the Health Statistics Service at the central level for publication of a national annual report. Financial or management information is not included in this reporting system. Due to a host of technical and administrative difficulties, no annual report has been produced since 1982. The publication of the 1984 report is scheduled for mid-1986. There continues to be massive underreporting: at least one-third of all health institutions¹⁵ fail to meet this reporting requirement. Thus, the benefits of the new health statistics system have yet to be assessed. Nevertheless, in the sector mission's opinion, the system when fully operational has the potential of contributing significantly to a management information system. In at least one province, the chief of provincial health services has already begun to publish epidemiological analyses of the data in a monthly newsletter to all staff in his region.

3.29 When the reporting and completion delays are reduced to reasonable levels and the data begin to provide a more accurate picture of the health situation in Madagascar, decisionmakers should be able to set viable quantitative objectives for performance of the health system. What is then required is the development and incorporation of financial and management indicators for monitoring and assessing performance against objectives at national, provincial and district health facility levels.

Recommendations Concerning the Health Statistics System

3.30 The new, integrated health statistics system will be an important complement to both planning and management. However, at the present time, the system is cumbersome, untimely and suffers severely from underreporting. The present system does not contain cost information or performance targets. Since the system could provide comprehensive and reliable information if properly amended, it is recommended that a review is made of the progress and results achieved so far and proposals are prepared as to how the deficiencies could be corrected. Specialist inputs will be needed for this task. It is further recommended that these specialists identify data collection needs which a health statistics system cannot handle adequately; e.g., non-facility related epidemiological and nutritional status data.

D. Distribution and Utilization of Health Facilities

3.31 The Government at the central, provincial and medical district level operated 2,082 medical facilities in 1985; i.e., 878 more than it did

¹⁵ Indicative reporting rates are: 58% of CSSP,
64% of secondary hospitals,
68% of surgical hospitals, and
75% of maternity hospitals.

in 1978. The structure of this system can be depicted as a pyramid with the complexity of medical interventions increasing toward the top (on the following page).

3.32 The lowest level of facility-based care comprises 1,904 basic health care facilities of which 1,323 are "primary health centers" (centres de soins de santé primaire--CSSP). A primary health center is staffed by a health aide with five years of general education and 14 months of specialized training. The villages nominate a health aide from their midst and construct and maintain the center, a delivery room and a two-room house. The Government pays the salary and provides medical supplies and medicine. Since 1978, when 476 primary health centers were available, 120 additional such centers were added to the system each year. In contrast, the number of the other types of facilities of the basic health care system--340 "health posts" (postes sanitaires), 144 nursing posts (postes d'infirmiers)

General Hospital	
Provincial Hospital	Third Tier
Medical/Surgical Hospital	
Simple Secondary Hospital	
Medical Centers	Second Tier
Health Posts, Nursing Posts, Maternity Posts, Primary Health Centers	First Tier

The distribution, number and development of these facilities are given on page 1 of Annex IV.

and 97 maternity posts (postes d'accouchements)--increased only marginally over the period 1978-85. These facilities are staffed by a nurse/paramedical and/or midwife who must have a minimum of nine years of general education and three years of specialized training. There is little difference in the type of service offered by the four different types of basic outpatient and inpatient health care, namely simply curative treatment, vaccinations, and pre- and post-natal consultation and child

deliveries. Frequently, no more than one day per month is devoted to outreach activities for health and hygiene, education, house visits or community health involvement. On average, the health aide of a primary health center handles about 150 consultations per month, the paramedics of the other facilities see about 400 patients monthly. Few patients are referred to facilities at a higher level (5-10 per annum).

3.33 While buildings are generally in good condition, medical equipment is often obsolete or in disrepair, technical manuals and educational aides missing and transport unavailable except for the odd bicycle provided by UNICEF. Operations of all facilities are, however, most affected by the chronic shortage of medicine and vaccines. They are supplied in insufficient quantities semiannually and often are depleted already after one to three months. In these cases, the patient receives a prescription which can be filled at the village drug dispensary or pharmacies. Although quite a large number of such private dispensaries (1,428) and pharmacies (74) exist in Madagascar, which usually are in close proximity to the health centers, prices for pharmaceuticals are very high: officially 1.6 times the equivalent price in France, and often, contrary to regulations, inflated substantially more by the rural dispensaries. As a result, the poorest segment of the country's population must, when seeking modern health care, depend almost exclusively on medicine from the public health facilities. In addition to lack of resources, the sector mission found supervision inadequate to maintain and develop staff skills and to foster staff morale (visits often no more than once a year). Inspections are hampered by lack of transport, constraints on vehicles operating budgets, lack of roads (many centers are 10 to 20 km from the nearest road) and long distances to referral centers. Regular in-service training is not provided at any level.

3.34 The second tier of health service consists of 99 "medical centers" (centres médicaux) and 58 "simple secondary hospitals" (hôpitaux secondaires simples); their number remains virtually unchanged since 1975. Serving the political subdivision of a "canton," or sometimes also a whole district, both types of facilities offer similar medical service including curative health service, MCH care, maternity service, and short-term hospitalization. The typical medical center has 10 to 20 hospital beds, is staffed with one physician, three to four paramedics and does not provide food for patients. Simple secondary hospitals have 15 to 20 hospital beds, are staffed with one to three physicians and provide food for hospitalized patients.

3.35 The facilities of the second tier can only barely perform their intermediary role because of severe resource shortages. Due to lack of medicine and supplies, often not even minor surgical procedures can be carried out. The hospitals visited by the sector mission had little medication and lacked such basic equipment and material as sterilizers, microscopes, reagents, alcohol and sometimes even soap. They are therefore often unable to provide adequately for their patients and, despite an average of 1,090 consultations monthly per facility, the resident physicians are underemployed and often demoralized.

3.36 Without change since 1978, the tertiary tier of health service comprises 14 medical/surgical hospitals which operate at the district level, five "provincial hospitals" and two "general hospitals" in the capital city. As there are not as many medical/surgical hospitals as demand would seem to dictate, the provincial hospitals are clogged with urgent operations, unnecessarily extending hospital stays. This situation is further exacerbated by a shortage of diagnostic equipment and, in spite of enough medical and paramedical personnel in general, by a shortage of specialists in the areas of pathology, anesthesiology, cardiology, pediatrics, dentistry and surgery.

Recommendations on Organization and Management

3.37 Supervision and in-service training deficiencies and problems in logistics reduce the effectiveness of the health sector. While the need to improve these critical areas is already recognized and supported by MOH's top management and some progress has been made, efforts need to be intensified and accelerated. It is recommended that MOH, with initial expert assistance, establish management training and consulting capacities within the Ministry in order to analyze these problems, develop the necessary supervisory and logistic structures, and formulate and undertake training programs for high- and mid-level supervisory staff. The proposed National Center for Health Development should play an important role in this context.

Coverage and Utilization of the Public and Private Service Network

3.38 On the basis of available statistics, the sector mission calculated that about 56 percent of the Malagasy population has relatively easy access to either public or private health facilities meaning that they live either in urban communities or are in rural areas within 5 km to the closest health facility (see Annex IV, Table 2). With the highest population concentration in Antananarivo province, 71.4 percent of the people have easy access whereas on the other extreme, in the Mahajanga province, only 35.1 percent of the population enjoy such an amenity. Table 2 of Annex IV gives estimates on a provincial and national basis. As the calculation presumes that the rural population is evenly distributed over the land area, the health facility coverage is most likely even better. Consequently, the sector mission estimates that probably 65 percent of the total population has easy access to modern health care services in the form of basic, curative services.

3.39 Largely due to the rapid expansion of primary health centers, there is now one health facility per 4,246 inhabitants--a very favorable ratio by African standards. With about 19,700 hospital beds available in public and private health facilities, there is one hospital bed per 452 people. This also compares favorably with African countries, such as Kenya 620, Tanzania 500, Ghana 660, and Malawi 740. Similarly, the number of

physicians (1,560) and paramedical personnel (7,200 in public and private institutions) serving the population (one physician for an average of 6,333 inhabitants and one paramedic for an average of 1,370 inhabitants) is near the top of the range for Africa.¹⁶

3.40 By far the largest health provider, the public sector accounted for about 19,000 hospital beds and 17.7 million consultations during 1981, or about two consultations per inhabitant. Since the number of consultations had increased by 70 percent from 1978 to 1982 and the service has been expanded since then, this ratio has probably improved further although no more recent statistics were available during the sector mission. The bed occupancy rates for hospitals varied from 50 to 80 percent, which is about average for African countries. But the utilization rates for the 1,904 primary level facilities are at 9-10 consultations per day, which is extremely low due to lack of medicine, equipment, supervision and training. Thus, despite Madagascar's extensive health service physical infrastructure which in terms of physical and human resources exceeds most developing countries, the population's health status is no better than in sub-Saharan African countries. Unfortunately, the country's rapid expansion of its health system coincided with its severe economic crisis in the early 1980s, which prevented the allocation of the required resources. It is important to note, however, that since Madagascar has now established a solid foundation for its physical and manpower health infrastructure, it is the sector mission's opinion that this relative strength provides the potential for considerable improvements in efficiency and productivity if better logistics, management and supervision could be put into place and more recurrent budget resources could be found and put to work quickly and efficiently. This is especially the case since Madagascar's mortality and morbidity conditions are still at a stage where a reasonable input into the health sector will yield substantial returns. Significant declines in morbidity and mortality should be achievable through improvements in both preventive interventions (vaccinations, vector control, malaria prophylaxis) and modest increases in medical supplies and pharmaceuticals.

3.41 The private health sector consists of 241 health facilities primarily operated by catholic missions and private and parastatal enterprises. While this represents about 10 percent of the total health network, the private sector may account for as much as 30 percent of all consultations. In 1982, 746 private hospital beds were available with a bed occupancy rate of about 79 percent. In the whole country, only about 50 physicians have established private practices. Medical doctors and dentists have encountered great difficulties in importing medical equipment and supplies to set up private practices due to the country's severe foreign exchange shortage. All other medical doctors are employed by the Government

¹⁶ Population per physician: Kenya 1 : 7,900; Tanzania 1 : 17,600; Ghana 1 : 7,600; Malawi 1 : 40,950. Population per paramedic: Kenya 1 : 550; Tanzania 1 : 3,000; Ghana 1 : 800; Malawi 1 : 3,830.

but may also conduct private consultations. The role of the private sector is especially important in pharmaceutical distribution and manufacture. There are four drug wholesalers, 74 pharmacies and 1,428 dispensaries. The wholesale houses purchase about 75 percent of the pharmaceutical products from France, the remaining 25 percent from domestic producers, primarily FARMAD and OFAFA. From 1976 to 1985, the share of private sector drug sales has increased from 63 to 80 percent primarily as a result of the acute drug shortages of the public health facilities. While the majority of the pharmacies are located in the Antananarivo province (46), dispensaries are more evenly distributed across the country. At the present time, no concrete plans on the part of the Government exist to expand the role of the private sector (but see para. 3.79 and 3.80).

3.42 Traditional Medicine still plays an extremely important part in Madagascar's health care. Most of the 11,000 villages have a wide range of practitioners, including: a healer who is supposed to heal common ailments; an astrologer for mysterious or supernatural illnesses; a sorcerer who supposedly can heal offensive illnesses; a masseur to remedy exhaustion; a tromba who heals through trances; a bilo in the south of Madagascar heals through dances; and a matron for deliveries and abortions. In rural areas, persons with health complaints generally seek assistance from the village healer first in those cases where either the cause of the illness is unknown or the illness appears mysterious to them. Only when the condition continues to worsen do people seek modern health care. However, it is not uncommon for patients to be simultaneously undergoing traditional and modern treatment. Unfortunately, no systematic study of the distribution, costs and effects of traditional medicine and its relationship with modern medicine has been made. A limited survey of a few villages carried out in the south during 1980 indicated that 32 percent of people preferred to go to traditional rather than modern practitioners. There are tensions in the relationship between modern and traditional medicine. The Ministry of Health, in an attempt to formally improve this situation, has added a service for "Traditional Pharmacopoeia" to its organization; but the unit has not become operational. The Ministry of Scientific Research already has a laboratory for traditional pharmacopoeia. Furthermore, the Ministry of Higher Education has established several years ago a center for research (Tzimbazaza) on traditional medicinal plants.

Maternal and Child Health (MCH) Services

3.43 While Government's primary aim for establishing the CCSP network was to improve MCH, the results regarding MCH services are disappointing. Prenatal consultations included about 70 percent of pregnant women during the first six months of 1984. Little more than half (56 percent) of these consultations were conducted in primary health facilities, the rest (44 percent) were done in urban facilities although the urban population accounts for only 19.2 percent. Since infant and maternal morbidity and mortality rates are still relatively high in spite of the high proportion of mothers and children seen in health facilities, the quality of prenatal care

and other MCH services needs to be carefully assessed with a view to improving it. This is further borne out by the facts that (a) only about 40 percent of the women receive complete tetanus toxoid vaccination; (b) rarely more than two prenatal visits are made; (c) many women delay these visits until after their sixth month of pregnancy; and (d) there is a severe shortage of obstetric equipment and limited knowledge of potential risk pregnancies at the health facility level. The percentage of deliveries conducted in health institutions has increased nationwide from 42 percent in 1978 to about 54 percent in 1984. Only three percent of the deliveries are by cesarian section. In the face of Madagascar's difficult geographic and economic conditions, the proportion of institutionalized deliveries compares quite favorably with African countries. Mothers rarely come for postnatal consultations although the information on such visits is unreliable. Likewise, nutrition education, an important part of MCH care, is conducted only minimally by public health facilities averaging less than one session per month per facility. Both the Red Cross and the Catholic Relief Service (CRS) have active food programs for children and pregnant and lactating women. Information about a "Committee Against Hunger in Madagascar," encompassing several ministerial departments, NGOs and other organizations is not complete and details about their programs, sources of funds and actual achievements could not be obtained during the sector mission.

Other Services

3.44 Although Madagascar has a well-established structure for the implementation of a malaria control program, only 14 percent of preschool children and 18 percent of pregnant women were covered according to the latest available data (1982). This is primarily due to the shortage of the required prophylactic drugs (chloroquine)¹⁷ and to the inadequate implementation of the program. An estimated 8,000 malaria control centers have been established in the country, which, in order to avoid overlap, have to be at least four kilometers from a health facility and to a large extent are built and operated by the village communities (Fokontany). The prophylactic drug should theoretically be furnished by the MOH, but for the last five years has had to be almost entirely purchased by the communities. Actual records are not available, but it is estimated that the operational centers could cover about 60 to 70 percent of children under one year of age. A token fee (10 to 15 FMG per dose) is assessed. Here again, despite extensive efforts to build up a solid structure to reduce the worst effects of malaria, the programs are primarily stifled by lack of resources to assure effective operation, management and supervision.

3.45 The immunization program's achievements are considerably short of its goals. Although the program calls for total vaccination coverage of all infants and 80 percent of children of 1 to 2 years of age with respect to

¹⁷ Equivalent to the French nivaquine.

tuberculosis, DPT and polio, and annual tuberculosis vaccinations of 20 percent of all children between the age of 2 and 15, actual results are much more modest: in 1984, the coverage of infants amounted to 18.8 percent against DPT and 12.5 percent against polio. Details per province/district and for the years 1982-84 are given in Tables 5 and 6 of Annex IV. Vaccinations are almost exclusively conducted at the health facilities, but only four out of ten facilities participate because there are no vaccines, transportation or refrigeration (only 20 percent are equipped with refrigerators). In addition, the health personnel is not properly trained and supervised for these tasks. Mobile vaccination units have been provided to each medical district, but due to breakdown or reallocation for other uses, only in one district is the equipment used for the intended purpose. These problems need to be addressed with improvements in human resources, such as staff training, management and supervision, as well as with adequate provision of physical resources such as vaccines, transport, refrigeration and rehabilitation of mobile vaccination units.

E. Manpower and Training of Health Personnel

Current Manpower and Personnel Management Situation

3.46 Physicians, nurses and health aides are the key health care providers in Madagascar. The following table shows increases in health care personnel in the public sector over the last ten years.

Table 12: INCREASE OF MEDICAL AND PARAMEDICAL STAFF
1975-85

	<u>1975</u>	<u>1985</u>	<u>Percent Increase</u>
Physicians, dentists and pharmacists	595	1,325	122.7
Nurses/midwives	3,015	4,969	64.8
Health aides	-	1,387	
Others (lab technicians, etc.)	<u>247</u>	<u>533</u>	<u>115.8</u>
TOTAL	<u>3,857</u>	<u>8,214</u>	<u>113.0</u>

Source: Compiled from Ministry of Health statistics.

3.47 MOH has deliberately limited the types, seniority and competence levels and training programs of its health personnel to achieve uniformity in training and to simplify personnel administration. Job grading is almost exclusively based on the level of education. Health aides are graded at level 1, nurses and midwives at level 3 and physicians at levels 8 and 9. Although a token annual performance evaluation is prepared, in-grade promotions are generally automatic. There is a need to modernize the personnel administration system by developing a more accurate scale of job requirements and grade and in-grade levels, encouraging higher performance and improving staff motivation. Probably the most urgent action required would be the establishment of a job evaluation system on the basis of job descriptions for different positions. (Job descriptions do not exist at the present time.) Further improvements in the management of health services could be achieved by abandoning the current recruitment principle of "first come, first served." In view of the considerable oversupply of graduates, selective recruitment of the best qualified applicants would be highly desirable. In addition, improved personnel planning is required to overcome placement difficulties, particularly of female personnel who cannot be posted to isolated locations or often are bound by their husbands' assignments. Placement is also frequently restricted by the lack of appropriate social infrastructure.

Pre-Service Training

3.48 The last of three groups of 500 health aides completed a 14-month training program in 1982 at the headquarters of their medical districts. Courses were under the overall responsibility of the district medical inspector and were taught by practicing medical and paramedical staff. The curriculum corresponds to the requirements for a community health worker with about 25 percent of the course work devoted to MCH, but without any instruction in family planning, communication techniques or community participation. Beyond their initial training, no refresher courses or upgrading programs have been offered, nor are they currently envisaged. MOH intends to train an additional 500 health aides at the rate of 100 per annum. For this, approvals are needed from the Federal Assembly and from the Ministry of Finance.

3.49 Under the direction of the chiefs of provincial health services, training of nurses in a three-year program takes place in six training schools in each of the provincial capitals. In 1985, 15,300 persons applied for 275 entry places. Enrollment totalled 760 students in 1985/86 which permits an annual output of about 245 nurses and 25-40 paramedical specialists. Due to the highly competitive selection, dropout and repeater rates are very low (2.3 percent per annum). Because of the already mentioned difficulties in placing females, the separate midwife training program was abandoned in 1984 and all nurses receive identical training including instruction in midwifery. Following the first year of the common core nursing program, specialized paramedics, such as X-ray and laboratory technicians, receive their training in a two-year course at the Antananarivo

paramedical training school. The annual cost per nursing student is currently about FMG 500,000 (US\$800), of which 20 percent is used for teaching salaries, 5 percent for overheads and 75 percent for student allowances.

3.50 While there appears to be a reasonable distribution of both theoretical training (40 percent) and practical work (60 percent), the quality and future job specificity of this training could well be further improved. In particular, the usefulness of some courses, such as neurology and surgery, could be questioned. Too little emphasis seems to be put on public health, nutrition/malnutrition, family planning and IEC training. Moreover, no textbooks and few other teaching aids are available. Classes are conducted almost exclusively in French. This drastically weakens the effectiveness of the training since many if not most students have inadequate command of the French language.

3.51 Since 1982, physicians have received their full seven-year training at the Faculty of Medicine at the University of Madagascar, which is under the authority of the Ministry of Higher Education in close technical collaboration with MOH. Enrollment totalled 5,340 in 1985/86, equally divided between men and women, with an estimated output of over 400 graduates by the end of this school year. Based on an entrance examination, up to 1,500 students were admitted annually in the early 1980s; but enrollment has since been reduced to about 500. The past open door enrollment policy and a liberal policy governing class repetitions, coupled with insufficient French language skills caused acute congestion of the lower courses of medical training. Due to the large number of repeaters and dropouts, almost 21 student-years are required to graduate one doctor.¹⁸ Almost all of the 70 full-time professors are nationals. Instruction closely follows the French curriculum and consequently is not always sufficiently adapted to the specific needs of the majority of Malagasy physicians in the field, particularly in the areas of public health and health management. This is so despite the fact that the program contains a sizeable fieldwork and internship component which, however, is still primarily clinically oriented.

3.52 Medical training is severely hampered by the lack of facilities, textbooks and teaching materials. The Medical Faculty is housed in widely-dispersed locations in the capital city, relying on rooms provided by the hospitals and on rented classroom space. In addition to providing free dormitory lodging, 85 percent of the students receive scholarships ranging from about FMG 6,000 to 18,000 (about US\$10-30 per month) to cover materials and food. Interns, in their last year of medical school, receive about FMG 50,000 (about US\$75) per month which is roughly comparable to half the

¹⁸ See Annex V, Table 5 for details. Total costs for training medical doctors in African countries typically range from US\$10,000 to US\$15,000.

starting salary of a medical doctor in the public service.

3.53 Cost figures for training doctors at the Medical Faculty are difficult to estimate due to, inter alia, uncertain distribution of university overheads and heavy use of part-time staff (130). A rough approximation indicates that average cost per student-year amounts to FMG 560,000 (US\$860)--considerably lower than in francophone African countries, such as Benin US\$1,200; Ivory Coast US\$4,000. Due to the high wastage rates and consequent years required to produce one doctor (21 years), the total cost of training one doctor can be estimated at FMG 11 million (US\$17,000).¹⁹

Post-Graduate Specialization and Other Training

3.54 Post-graduate specializations and training of pharmacists are currently not offered in Madagascar. After having served at least two years in public service, an estimated 70 doctors are currently on government-approved scholarships abroad. An additional 50 to 60 graduating students continue studies overseas at their own expense with little likelihood of their return. The Medical Faculty intends, as the highest priority, to set up a postgraduate training program in general surgery, the most common specialization required in Madagascar. Firm plans have not been established.

3.55 MOH plans to intensify retraining of health aides in public health matters. To this end, it has requested assistance from the African Development Bank (ADB) to establish a National Center for Health Development (Centre national de Développement sanitaire). The center would provide a master's degree and refresher training in public health with a strong operational and management emphasis and it would carry out applied research and technical assistance. While the proposed objectives of the center appear to respond to the most pressing needs of the health system, in the opinion of the sector mission there is significant risk that, as the concept is implemented, the center will gradually change its focus to less appropriate areas of training and research and more towards the provision of diplomas and degrees.

3.56 A six-year dentistry program in Mahajanga has just produced its first dentist graduates. Intake into the program has been progressively reduced from 180 per year in the early 1980s to the current 30 in light of budgetary constraints.

¹⁹ Cost per student-year x 21 student-years. See Annex V, Table 5. Total costs for training medical doctors in African countries typically range from US\$10,000 to US\$15,000.

In-service Training

3.57 No organizational structure, policy or specific budget allocations exist in MOH for continued training or personnel development. However, the Ministry increasingly recognizes the need for more systematic training and has initiated it. Cases in point are: a recent short course on budgeting for administrative officers at the provincial and district level; the extensive preparatory training for implementation of the new health statistics system; and a series of short management seminars in late 1985 for senior administrators in cooperation with WHO/UNDP. While these are without question laudable beginnings, staff development over the long term should receive much more systematic attention and encompass health personnel at all levels and in all geographic locations in order to improve and maintain an adequate health delivery system in Madagascar.

9

Future Manpower Requirements

3.58 Madagascar has no systematic, long-term manpower plan for the health sector. As a general objective, MOH refers to the WHO target of one doctor per 5,000 inhabitants. But it bases its annual budget request for additional health personnel positions primarily on (a) new infrastructure; (b) the number of positions authorized in the previous year; and (c) the number of medical and paramedical graduates. Thus, this supply-driven process ignores to a large extent the actual long-term need for more health personnel as well as the implications for the recurrent budget.

3.59 As Madagascar's physical and human health infrastructure is already comparatively well established, the focus will need to be on upgrading the existing structure. Only very few new health facilities will be added--at most 50-60 primary health centers per year. As a result, future manpower needs depend upon (a) staffing the new primary health centers; (b) adding an additional health aide at some centers to meet community demand and permit more preventative care; (c) providing for some medical specializations at secondary and medical-surgical hospitals; (d) replacements for attrition; and (e) funds available for salaries, equipment and materials. Some of these needs could easily be met by posting existing personnel from urban health centers, some of which are overstaffed, to the new rural centers.

3.60 The sector mission anticipates, therefore, that the long-term net requirements for public sector health personnel would not exceed 80 additional positions per year comprising 10 positions for physicians, 8-10 for dentists and the balance for nurses and health aides. In sharp contrast to many African countries, there are almost no vacancies in MOH. In fact, after all new 1986 authorized positions have been filled, there still will be an active waiting list of 200 qualified physicians, 34 dentists and 200 paramedics. Moreover, since there is little attrition due to retirement--MOH's age structure is relatively young--and virtually no one resigns because few alternative employment opportunities exist, MOH expects annual

attrition to fluctuate between 0.3 - 1.4 percent of total MOH staff. The sector mission has assumed attrition replacement over the next ten years to amount to 5-10 physicians and 25-35 paramedical staff per year. As a result of these requirements, total health personnel requirements during the period 1986-95 are projected to be 285 physicians, 94 dentists and 600 paramedical personnel. (See Annex V, Tables 1-3.)

3.61 On the supply side, the Faculty of Medicine is expected to graduate between 3,400 and 3,950 doctors during 1986-95 depending on whether or not it can improve its internal efficiency (see Annex V, Table 4). Although intake into the Faculty has recently been reduced, this reduction, however, will not materially affect output over the next ten years because of the number of years of study (seven years minimum). Of the graduating doctors, 50 may permanently leave the country per year and a handful may find jobs in the private sector. Other employment opportunities for doctors in the medical field are extremely limited. Hence, by 1995, the accumulated surplus of graduated doctors would total around 3,000 as summarized in the following table:

Table 13: PROJECTED SURPLUS OF GRADUATED PHYSICIANS BY 1995

<u>Supply (1986-95)</u>	
Faculty of Medicine	3,385-3,950
(low/high efficiency assumptions)	
Leaving the country	<u>500</u>
NET SUPPLY	2,885-3,450
 <u>Demand (1986-95)</u>	
MOH Requirements	
New Positions	156
Attrition	<u>79</u>
Sub-total	235
Private Sector	<u>50</u>
NET DEMAND	285
 TOTAL SURPLUS BY 1995	 2,600-3,165

Source: World Bank projections.

20 Including 66 new positions authorized for 1986.

3.62 The human and financial costs of this massive surplus will be significant. The human toll and political burden of about 3,000 of Madagascar's brightest youth being unemployed needs little explanation. On the financial side, it can be shown that the university training cost per MOH-employed doctor would be a staggering FMG 180 million (US\$280,000).²¹ Moreover, if the Government decides to hire these doctors even if not needed, the impact on the recurrent MOH budget would be extremely serious.

3.63 The recruitment prospects for graduating dentists are also bleak. Although, as against physicians, additional dental positions are being established at secondary and medical-surgical hospitals, the public sector can only absorb about 8-10 dentists per year given the equipment and support required to establish a new position. Despite a recent sharp cutback in intake, the dental school will graduate, on average, about 65-70 dentists per year over the next five years and 18 per year from 1991 onward. As shown in Annex V, Table 2, there will be a surplus of about 330 dentists by 1995. The alternative opportunity to go into private practice is even more restricted for dentists than for doctors due to the more sizeable capital requirements for foreign dental equipment.

3.64 Unfortunately, the prospects are not much better with respect to the demand/supply situation of paramedics (see Annex V, Table 3). The six nurse training schools have stabilized output at 245 per year as against projected need of about 55-60 graduates per year. In these circumstances, the accumulated surplus for the period 1986-95 would be 1,850 nurses. Despite an existing backlog of 200 nurses waiting for placement, MOH has recently requested that the Ministry of Finance authorize an increase in intake into the program from the current 300 to 540 candidates in 1986.

Recommendations on Personnel Management

3.65 In order to more accurately match actual job requirements with job levels, encourage higher performance and improve staff motivation, MOH's personnel administration needs to be modernized. The preparation of job descriptions for the various kinds of positions requires priority attention. Improved personnel planning over the short and medium terms is also essential to better manage placement and recruitment needs.

3.66 Especially the imbalance between supply and demand of medical and paramedical personnel needs--a surplus of 3,000 medical doctors, 330 dentists and 1,850 paramedical graduates has been estimated over the next ten years--to be addressed immediately and effectively. Because of the large number of students already enrolled and graduated, an immediate, serious surplus of medical and paramedical graduates cannot be avoided. To improve the situation over a longer term, a reduction in output from health

²¹ Table 5 of Annex V gives details of the calculation.

training institutions should be considered as a matter of high priority. As part of the proposed health plan, the future requirement for medical and paramedical personnel should be determined. Subsequently, the intake and output of new students from the Faculty of Medicine, the School of Dentistry and the paramedical training schools should be adjusted accordingly. Expert assistance in developing alternative proposals is recommended.

3.67 For recruitment of medical and paramedical personnel, the Ministry should review its policy of recruiting graduates in the order in which they applied since, once a backlog arises, this means recruiting staff who have completed their training several years earlier, and may have outdated knowledge and skills. Staff should instead be selected from the best students graduating in recent years, and the others should be informed that there is little or no chance that they will be recruited into the public service, encouraging them to look elsewhere for employment.

F. Health Sector Finances and Investment Planning

3.68 Estimates of total health care expenditures in 1985 by type of service provider and by source of finance are presented in Table 14. Total health care expenditures (public plus private and recurrent plus capital) are estimated to have been FMG 49.2 billion or US\$76 million, representing 3.2 percent of GDP or US\$7.4 per capita. This estimate contains all known health expenditure categories, including a rough approximation of in kind or monetary private expenditures for traditional practitioners, for which little concrete financial and other information is available.

3.69 Of the total sources of funds used in the health sector in 1985, the public sector is estimated to have provided almost 40 percent, the private sector 51 percent and foreign donors 9 percent. All health services from the public sector are free. It must be noted that foreign assistance of about US\$0.70 per capita is significantly lower than the average of 23 sub-Saharan African countries which is about US\$1.5 (e.g. Lesotho \$9.3; Botswana \$3.6; Swaziland \$2.4; Zambia \$1.8). Of the total expenditure of funds, Government services at all levels accounted for 47 percent, the private sector for 52 percent and foreign donors for 1 percent.

Trends in Ministry of Health Expenditure

3.70 In nominal terms, annual MOH total expenditures have increased from FMG 8.9 billion (US\$13.7 million) in 1977 to FMG 15.5 billion (US\$23.8 million) in 1985; i.e., by 7.2 percent per year (see Annex VI, Table 1). However, applying GDP price deflators, total MOH expenditures have declined in real terms from FMG 20.5 billion (US\$31.5 million) in 1977 to FMG 15.5 billion (US\$23.8 million) in 1985; i.e., by an annual rate of 3.4 percent (see Annex VI, Table 2). This decline is even more pronounced if the financial resources in real terms which are available on average to each MOH

**Table 14: TOTAL EXPENDITURES AND SOURCES OF HEALTH CARE
FINANCING 1985
(in FMG millions)**

Source of Financing	Service Providers								TOTAL	%
	Government			Foreign Assis- tance	NGOs	Enter- prises	Pri- vate Prac- tices	Tra- ditional Medicine		
	Minis- try of Health	Other Minis- tries	Commu- nities							
Ministry of Health	15,507								15,507	31.6
Other Ministriesa/	100	3,050b/		55c/			394		3,599	7.3
Communities			399						399	0.8
Foreign Assistedc/	2,941	1,108		273		19	111		4,452	9.0
NGOs					934e/				934	1.9
Enterprises						3,420f/			3,420	6.9
Private Practices and Dispensaries				1,033g/	400		12,488h/		13,921	28.3
Traditional Medicine								7,000i/	7,000	14.2
TOTAL	18,548	4,158	399	328	1,967	3,839	12,993	7,000	49,232	100
%	37.7	8.4	0.8	0.7	4.0	7.8	26.4	14.2	100	

a/ Includes an estimated FMG 404 million inter-ministerial fund for hospitalization of civil servants and retired personnel.

b/ Includes expenses for operation of military hospital by the Ministry of Defense, health care expense for all students by the Ministry of Higher Education, and estimated expenses for training of medical students by the same ministry.

c/ Contribution to WHO plus estimated local part of technical assistance.

d/ Estimated on basis of 1984 data plus new 1985 projects. Primary donors: France, China, Italy, Switzerland, Federal Republic of Germany (FRG), UNICEF, ADB, UNDP, EEC, UNFPA and USAID.

**Table 14: TOTAL EXPENDITURES AND SOURCES OF HEALTH CARE
FINANCING 1985 (Continued)**

Notes (Continued)

e/ Expenses relating to 132 dispensaries, 32 leprariums and 8 health facilities operated by religious missions for personnel and medicine.

f/ Includes 103 intercompany (Ostie, Osiem, Omsit, Osief, Smids, etc.) and intra-company dispensaries and health facilities (Jiram, BNI, etc.).

g/ Includes proceeds from medicine sales and medical services by religious missions (950) and non-IPPF revenues from FISA (83).

h/ Includes private sector revenues for drugs and pharmaceuticals (9,888) and rough estimate of doctor fees by private modern health practitioners (full-time) and public sector physicians (part-time).

i/ Very approximate estimate assuming about 22,000 traditional practitioners (two per village) seeing 5 patients per day 210 days per annum charging FMG 300 or the equivalent in kind per visit.

Source: World Bank projections.

employee are taken into account. They dropped from FMG 2.2 million (US\$3.370) in 1978 to FMG 1.2 million (US\$1,800) in 1985 or 14 percent per year. About 71 percent of the total MOH budget in 1986 has been allocated to health facilities in the provinces while tertiary tier hospitals received about 25 percent. Total funds allocated to MOH as part of the total Government budget have declined steadily from about 9.2 percent in 1976 to an estimated 6.7 percent in 1986, a level which is still well above the average of about 5 percent for sub-Saharan African countries. Importantly, not even during the crisis years of 1980 and 1981 did this proportion decline below 6.1 percent in Madagascar. Nevertheless, the material decline in funding during a period of rapid expansion of health infrastructure led to a significant shift in resource allocation and influenced improvements of morbidity and mortality rates, which were intended from the expansion.

Recurrent Expenditures

3.71 MOH operating expenditures in nominal terms other than salaries remained virtually constant at about FMG 4 billion (US\$6 million) over the period 1977-85, while expenditures associated with personnel increased from FMG 4.7 billion (US\$7 million) in 1977 to FMG 9.6 billion (US\$15 million) in 1985, thus raising their relative share from 57 to 70 percent of the total budget. Interestingly enough, the creation of 1,382 primary health care

facilities from 1979 on only explains 14.5 percentage points of the 47.6 percent manpower increase between 1978 and 1985 (from 9,546 to 14,086 MOH employees). The remaining 33.1 percentage points represent increases of physicians, dentists and pharmacists (6.7 percentage points), nursing staff (17.1 percentage points) and administrative staff (9.3 percentage points) indicating that the Government has not only made efforts in expanding health care in terms of manpower at the periphery but at all levels while reducing the relative share of administrative personnel from 55.4 percent in 1978 to 43.8 percent in 1985. However, as the MOH budget allocations were not increased to accommodate the manpower expansion, non-personnel expenditures had to be cut resulting in a shortage of medicine, technical equipment and supplies. This becomes particularly evident when the non-personnel operating expenditures are converted in real terms showing an almost threefold reduction from FMG 11.9 billion (US\$18 million) in 1977 to FMG 4.1 billion (US\$6 million) in 1985. On a per capita basis, MOH operating funds are distributed with little geographic bias--compared to a national average of FMG 1,354 (US\$2.08), for example, Antananarivo province received FMG 1,659 (US\$2.55), Mahajanga province FMG 1,590 (US\$2.45) and Toliary province FMG 1,248 (US\$1.92). Due to less than average health service coverage, Fianarantsoa was allocated only FMG 879 (US\$1.35).

3.72 The provision of pharmaceuticals and drugs, which are given out free of charge to patients by public health facilities, had thus been seriously affected. In real terms, they declined from about FMG 5.4 billion (US\$8 million) in 1977 to an estimated FMG 1.1 billion (US\$1.7 million). On the basis of present consultations, primary health care facilities can cover only 25 percent of their patients' drug requirements. Fortunately, this decline has been partially offset by the expansion of drug supplies in the private sector, whose value has risen by 2.7 times in nominal terms since 1976, giving the private sector about 80 percent of the national drug market as opposed to 63 percent ten years ago. Mainly on account of foreign exchange constraints, the private sector was unable to fully offset the cutback in public drug supplies and, therefore, the real value of the overall drug consumption in Madagascar fell about 30 percent since 1976. The unmet demand has been estimated at 25 percent by pharmacists and dispensary personnel consulted by the sector mission in the field. But with total drug consumption currently at US\$2.5 per capita, there are many countries in Africa who are faring much worse. In order to use its limited funds more efficiently, MOH with foreign technical assistance started to prepare "essential drug lists" for its health facilities. As drugs from the private sector are expensive--1.6 times that in France at the pharmacy level and frequently much more at the dispensary level--and often unnecessarily exceed required standards, considerations are given to further increase domestic manufacture of pharmaceuticals and drugs, which presently accounts for about 25 percent of private sector consumption (primarily FARMAD and OFAFA).

Capital Expenditures

3.73 As shown in Annex VI, Table 1, capital expenditures in nominal terms increased at an annual rate of about 12 percent between 1977 and 1985; in real terms however, they stayed nearly constant. Utilization of the investment budget at the central level improved from 60 percent in 1980 to 99 percent in 1985. But the budget allocated to the decentralized operations (20 percent in 1985) remains significantly underutilized due to administrative difficulties. The lion's share of capital expenditures are for hospital rehabilitation and equipment at the tertiary level (85 percent in 1984 and 62 percent in 1985), but the share of such expenditures for hospitals at the lower levels has increased from 9 percent in 1984 to 25 percent in 1985.

Investment Planning

3.74 The investment planning process of MOH is improving, but it is still not adequate. The upgrading of the Ministry's Studies, Planning and Programming Service to departmental status in 1984 reflects the increasing emphasis of planning in general. While one of the Department's three services is responsible for development and programming of investment projects and supervision of externally-financed investments, to date, it has performed essentially the role of a "project unit" with responsibility for architectural design and supervision work for the MOH's construction projects. The investment program it has prepared and submitted to the Planning Directorate for the 1986-90 public investment plan consists of 14 rudimentary "investment forms" of one to two pages each, of which ten are uncostered, and the four costed proposals make no explicit allowances for inflation or physical contingencies. Further, they are not prioritized.

3.75 The proposed 1986-90 investment program is estimated to total FMG 25.9 billion (US\$40 million) or about FMG 5.2 billion per year (US\$8 million). Details are given in Annex VI, Table 3. No new hospital facility will be constructed. About 47 percent of total project costs will be for rehabilitation of a central hospital and 38 percent for rehabilitation of hospitals at the intermediary level. Smaller portions of total costs are earmarked for primary health facilities, for the National Center for Health Development and for badly needed upgrading of transport. The proposals appear to be reasonable and their recurrent cost implications are not expected to be significant with personnel related expenditures amounting to approximately FMG 140 million (US\$200,000) per year.

Recommendations concerning MOH Budgeting and Investment Planning

3.76 Each year, MOH's budget requests are based on needs and then cut back by the Ministry of Finance, thus making the preparation and approval of the budget a time consuming process. Availability of a strategy and plan as recommended in para. 3.17 and 3.18 would rationalize the process of

allocating limited resources. In addition, as part of the improvement of MOH's planning process, particular attention must be devoted to investment planning. Investment projects must be justified on technical and financial grounds, prepared so that they are consistent with established standards, and prioritized. A program to strengthen MOH's planning capacity is being undertaken with the assistance of ADB. The program will contract appropriate technical expertise to develop the necessary procedures including analysis of recurrent cost implications; train the pertinent staff, and participate jointly with the trained staff in the actual preparation of alternative investment proposals.

Foreign Aid

3.77 As stated in para. 3.69, foreign assistance for health in Madagascar has been low. In terms of technical assistance, the health sector received about 11 percent of total foreign assistance (see Annex VI, Table 4). The most significant contribution financially came from France (69 percent) which has about 25 physicians and advisors in public hospitals and 38 in the military hospital. Other major donors are UNDP, UNICEF, WHO and the governments of Switzerland, China, FRG and Italy. The Swiss and Chinese are, inter alia, involved in drug manufacture and distribution and with the exception of France, all of the other donors are mainly assisting the primary health care system.

3.78 Actual capital assistance is shown in Annex VI, Table 5, which also includes a Bank/AID-financed water supply project. Both the European Development Fund and the African Development Bank, who have in the past funded hospital capital expenditure items, have changed their plans for assistance and in the future will only support facilities at the periphery. This will create a funding gap at the hospital level.

Financing Reform

3.79 Government policy stipulates that health services from the public sector are to be provided free to the population. The full costs of such health care are to be covered from general public revenues. NGO's are permitted to assess a small charge for health care (typically FMG 400 or US\$0.60 per visit). As Madagascar expanded its health system, which coincided with a drastic slow down of the economy, public spending on health had to be curtailed. Critical programs, such as immunizations, vector control, prenatal and postnatal care, basic curative services and provision of drugs had to be cut back severely. In terms of pharmaceuticals, the resulting shortages in the public health facilities could be partially offset by the private sector. However, the poor and rural population undoubtedly has been affected most by this development. As revenue prospects for the future are not promising, the country's health finance crisis calls for a thorough examination as to how a more effective and fairer system could be designed. This would require the rethinking of

prevailing policies and programs and the search for new financing approaches, which may include direct cost recovery from health service users together with a possibly greater role of the private sector.

Recommendations Concerning Health Finance

3.80 The constraints on the recurrent budget have severely affected the delivery of health care in Madagascar resulting in serious shortages of pharmaceuticals, medical equipment and support infrastructure. While communities make a considerable contribution to the construction and maintenance of primary health infrastructure, foreign assistance has been a comparatively weak source of finance. Fortunately, the decline in provision of pharmaceuticals has been partially offset by the expansion of drug supplies from the private sector. But since prices at pharmacies and private dispensaries have been high, the poor segment of the population has been affected most. With few exceptions, health services in the public sector are free of charge. As the recurrent health budget is not expected to increase significantly in real terms from present levels, alternative possibilities for raising finance must be identified. Accordingly, studies are proposed to focus on (a) the existing financing of health services in the public and private sectors and the expected effects of alternative changes in prices on demand for service; (b) the current policy of free medical care and its alternatives; (c) the present system of pharmaceutical procurement, distribution and manufacture, and its alternatives to current practices in these areas; and (d) the development of the private health care sector.

DEMOGRAPHIC SITUATION AND TRENDS: CURRENT ESTIMATES AND PROJECTIONS

A. SOURCES OF DATA

1. Assessing the demographic situation and trends in Madagascar is made difficult by the scarcity of reliable data. The only census taken in accordance with modern standards dates back to 1975, and very little information is available on fertility and mortality after that date. This complicates the task of estimating the present size and rate of growth of the population, for instance. This Annex reviews and appraises the available sources of information and describes how the mission's demographic estimates were arrived at.

The 1975 Census and Post-Census Survey.

2. The Census was taken during the year 1975, in three steps: in the five provincial capitals other than Antananarivo, in January; in the other cities, in April; and in the rural areas, in August. It yielded a total count of 7,603,800 inhabitants. Fortunately the effects of the differences in timing in the three sub-populations offset each other, so that the above figure can reasonably be taken as a general count as of 1 July 1975.

3. The quality of the Census seems fair, considering the main demographic indices of consistence in population structures. Additional information on the demographic situation, as well as additional light on the Census itself, is provided by a post-census survey (EPC for Enquete Post-Censitaire) taken just after the Census.

4. As regards the population count, the EPC gives results which compare to those of the Census in very different ways from one Province to another. In two Provinces (Mahajanga and Toamasina) the EPC count is very close to that of the Census, although smaller in both cases. In two other (Fianarantsoa and Toliary) the EPC count is substantially lower than the Census count--by 14 and 8 percent respectively. Finally, in the remaining two provinces (Antananarivo and Antseranana) the EPC count is higher than the Census count--by 7 and 13 percent respectively. Globally, the EPC gives a total population count of 7,530,000, one percent under that of the Census.

5. It is difficult to accept the idea that the Census would have overestimated the size of the population, as the reverse is true of virtually all censuses, even the best ones. More importantly, the pattern in which double counts (explaining over registration) would prevail in four provinces--sometimes to a notable extent--while omissions--of equally notable magnitude--would be the dominant feature in the other two provinces, would indeed be a strange one. One may think that the EPC was conducted _

This annex was prepared by Alain Marcoux, population specialist consultant.

with greater care in those cases where it detected under registration, but the opposite view may also be held; no consensus is probably possible on this point, and the mission decided to base its estimates on the reported Census population count.

6. As regards age structures, the Census and the EPC yield very similar results, which are also consistent with those of a 1966 demographic survey. The only notable 'accident' in the population pyramid, namely a relatively small 30-34 years age group in 1975, seems to correspond to reality (the most likely explanation would be high child mortality in the early 1940's). However, the Census shows a slightly greater number of men than of women, while the two surveys show the reverse pattern. The latter seems more likely considering that the masculinity ratio at birth is low (103 or even 102) and that female mortality is, by all accounts, lower than male mortality. So the mission decided to use the EPC sex/age distribution. The resulting estimate is presented in Table 1.1

Table 1: POPULATION BY SEX AND AGE GROUP: 1975 MID-YEAR
ESTIMATE FROM CENSUS AND EPC DATA

<u>Age Groups</u>	<u>Population (in thousands)</u>		
	<u>Males</u>	<u>Females</u>	<u>Both Sexes</u>
0- 4	684.3	670.7	1355.0
5- 9	570.3	554.3	1124.6
10-14	467.6	441.0	908.6
15-19	400.7	433.4	834.1
20-24	311.8	346.7	658.5
25-29	234.2	263.9	498.1
30-34	175.6	196.9	372.5
35-39	179.5	205.3	384.8
40-44	158.2	168.8	327.0
45-49	141.4	146.8	288.2
50-54	131.5	119.4	250.9
55-59	108.0	91.2	199.2
60-64	80.6	71.5	152.1
65-69	55.5	44.1	99.6
70-74	43.0	37.1	80.1
75-79	23.2	21.2	44.4
80 & +	12.9	13.2	26.1
Total	3778.3	3825.5	7603.8

1 The available data show (70 years and over) as the open age group. A distribution ending with an 80 years and over group was used here, the upper part of the distribution being taken as identical to that of a stable population with a West type of mortality, Level 14, at $r = 3$ percent.

The EPC also attempted to measure fertility and mortality. We shall examine the results of these attempts in Section 4.1 of this Annex.

Administrative Census

7. The Ministry of Interior of Madagascar has a tradition, inherited from colonial times, of "administrative censuses", that is, of yearly population counts by local administrative authorities. These administrative counts have often provided a basis for estimating total population and its rate of growth in the past. However, the methodology of such operations cannot be very rigorous and their quality is highly dependent on local and individual factors. That quality has been increasingly questioned in the recent period. It is contended, in particular, that the declared size of population may be deliberately inflated at the community level, in view of the fact that the count is used as a basis for rice allocation by Food Supply authorities.²

8. The mission had access to Ministry of Interior population estimates (by province) as of the end of 1984 or 1985, and compared these with 1975 Census figures. The Ministry of Interior figures would imply impossibly high population growth rates from 1975 to 1984/1985, ranging from 3.7 to 5.2 percent at the province level. At the national level, even assuming a 10 percent under registration at the Census, the implicit population growth rate would still be 3.4 percent. Thus, it does seem that those estimates are biased upwards, and they cannot be taken to depict the present situation.

Vital Statistics

9. Registration of births, deaths and marriages exists in Madagascar. The system used to be operated by civil servants, but since 1972 it has been passed on to elected community authorities, at the expense of technical competence. The coverage rates have deteriorated visibly. Since 1976, there has been no processing of vital data—except for global counts of events, which reveal the deterioration of coverage, as in the case of births for instance:

² Direction du Ravitaillement (Ministère des Transports, du Ravitaillement et du Tourisme).

1980	204.6	thousand	births		
1981	187.9	"	"	"	"
1982	133.7	"	"	"	"
1983	99.5	"	"	"	"
1984	47.4	"	"	"	"

10. By comparing these figures to population projections based on estimated fertility rates, one can determine that the coverage rate was about 50 percent in 1980, and it has declined to about 10 percent in 1984 (rate based on incoming statistical forms).

11. Since vital statistics are useless to assess fertility or mortality levels and trends, one must resort to sample surveys for that purpose. We examine these sources of information in the next section.

Sample Surveys

12. We examine here the three surveys which have been implemented at the national level since 1975, namely the EPC, a 1980 budget household survey (Enquete Budgets Menages or KBM) and a 1984 socio-demographic survey (Enquete Socio-Demographique or ESD).

13. Enquete Post-Censitaire 1975. Questions on births and deaths of the last 12 months were asked at the EPC. The responses served to make estimates of the fertility rates and of life tables.

14. Fertility rates (by age of the women at the time of the survey) were calculated and published.³ Table 2 presents the corresponding rates by true age group as calculated by the mission. These rates add up to a total fertility rate (TFR) of 6.389 live births per woman.

³ See Population de Madagascar. Situation actuelle et perspectives d'avenir (by V. Rafrezy and I. Randretsa). Tananarive, M.R.S.T.D. 1985, pp. 67-72.

Table 2: FERTILITY RATES IN 1975, BY AGE OF THE MOTHER AT THE TIME OF BIRTH, BASED ON CRUDE RATES FROM EPC

Age groups	Fertility rates (per 1000)
15-19	154.5
20-24	277.5
25-29	277.9
30-34	228.2
35-39	190.6
40-44	112.6
45-49	36.5
All	195.8

15. No correction was attempted at that time for possible under registration. Actually, data on parity by age group had also been collected at the survey, but the series is obviously flawed⁴ and its use for an estimation by techniques of the Brass type would bring no improvement to the crude estimates. On the other hand, the age structure of fertility seems reasonable.

16. As regards mortality, the data are of uncertain quality. The estimated crude death rate in 1975 is 13.5 per thousand, which suggests some (but not a large) under registration. But the pattern of that under registration seems quite irregular, even beyond age 1.5

17. An adjusted life table for 1975 has been published in Madagascar,⁶ but even here, consistency problems are apparent. While mortality patterns

⁴ See Rafrezy and Randretsa, op. cit., Table 38.

⁵ Because of this, an attempt by the mission to better estimate mortality levels by applying the Courbage-Fargues technique did not yield any sensible results, whether with the West model life tables or with the Brass Standard African table.

⁶ See Rafrezy and Randretsa, op. cit., p. 76.

are fairly consistent beyond age 5 (especially for females), mortality before age 5 seems substantially underestimated, especially infant mortality: while the rest of the table suggests life expectancies of 40 to 45 years, the infant mortality quotients suggest life expectancies of 58 years at least. The combined quotient for both sexes would correspond to an IMR of 75 per 1000. This does seem to be an underestimate, considering the rates prevailing in countries of the region whose levels of living and health conditions are similar to those of Madagascar.

Enquête Budgets Ménages 1980 (EBM)

18. This was a large survey, taken in the rural areas and minor urban centers⁷ as a follow-up to a similar survey taken in 1977-1978 in the major urban centers⁸. Like the 1975 Census and the EPC, it was conducted by the national statistical institute, INSRE.

19. Household size was recorded, so that estimates of total population could be derived. Questions on children ever born, children dead, and live births of the last 12 months were asked from all women aged 15 to 49 years (1,504,000 of them in the rural areas and 129,000 in the CUS). The data have not been published, except for a set of fertility rates.⁹ However, the mission has had access to them and used some of the tables to prepare fertility estimates (see Section 6).

20. An attempt was also made to estimate mortality by indirect techniques from the data on children ever born and surviving, but the results did not seem reliable enough to be reported in full here. It may be interesting though to mention the estimated infant mortality rate derived from this survey, at 109 per thousand. But it is well to stress the point that mortality in general is underestimated in this survey. Even though this may affect the estimate of the IMR less than other indices, the above figure should be considered as a minimum: a 5 or 10 percent higher estimate

7 The "centres urbains secondaires" (CUS) are the urban localities with over 4000 inhabitants, minus the seven major urban centers, 'grands centres urbains' (GCU: see next footnote).

8 Antananarivo, Antsirabe, Fianarantsoa, Mahajanga, Toamasina, Antseranana and Toliary.

9 See Rafrezy and Randretsa, op. cit., p. 70.

would probably be more realistic, as confirmed by the estimate derived from 1984 data.

Enquête Socio-Démographique 1984 (ESD)

21. This survey was conducted as part of a UNESCO/UNFPA population education project; it is meant to provide fresh information on socio-demographic patterns as a factual basis for future population education actions at the province level. Questions were asked on children ever born and surviving, which permits indirect estimates of mortality.

22. A question was also asked on recent births. Unfortunately, the question did not refer to the last 12-month period, but to the last 6 months. The utilization of that information would have been difficult in any case because the seasonal pattern of births is not known, and this would have made the necessary extrapolation a risky exercise. More importantly, though, respondents--in variable proportions according to age and geographical location--had difficulties to relate to this odd reference period, as is apparent from the skewed patterns of fertility yielded by the crude data (particularly for rural respondents). Indirect estimation techniques did not work well in this case, because the fertility data are too inconsistent with parity data. In the end, this part of the survey is not utilizable.

Ministry of Health Demographic Data Collection System

23. In 1983 the statistical unit of the Ministry of Health (Service des Statistiques Sanitaires et Démographiques or SSSD) set up--with UNFPA assistance--a system of demographic data collection. Under this system, births and deaths are to be recorded, and total population is to be counted at mid-year, by local residents in a sample of 1439 fokontany (local communities).

24. The mission has had access to the 1984 returns of this kind of permanent survey. In fact, the SSSD has decided to process only the returns from those communities where all three registers (population count, births and deaths) had been filled out. This concerns about 340 villages (or 24 percent of the sample), and those villages are not necessarily those where the quality of registration is best.

25. At the province level, both crude birth rates and crude death rates seem to be underestimated:

- CBRs range from 31 to 35.2 per thousand in four provinces, and fall to 27.6 and 19.8 in the other two;

- CDRs seem reasonable for the Mahajanga (16.0) and Fianarantsoa (15.5) provinces, but the other reported values are not acceptable, especially the lowest ones (9.1 and 8.1 per thousand). At the level of 'Circonscriptions Medicales', only 5 out of 35 units report sensible values for CBRs and CDRs, although some of these values are amazingly high (like CBRs of over 50 per thousand), almost certainly due to population undercounts.

26. The mission also examined the possibility of using the population counts (by fokontany), comparing them with other sets of population data in order to estimate population growth rates. But the only other source available was a Ministry of Interior administrative census of 1980, and the comparison met with the same problem, namely the defects of Ministry of Interior data: in many cases, the 1980 figure is substantially greater than the 1984 figure. In the end, no practical use could be made of this source of information for the purpose of estimating the current population.

Conclusions on Data Collection

27. It is unfortunate that, of three existing systems geared to permanent or regular demographic data collection, none gives reliable estimates of population size or trends in Madagascar. Vital registration does not seem to work well in many parts of the developing world; in the absence of strong and long-established incentives to register births and deaths, this system probably has little potential for being the staple source of demographic data. Ministry of Interior administrative censuses could become again a major source of data on population growth by administrative unit, on the condition that close supervision be exercised on their technical quality (and that no incentives exist to distort figures one way or the other). The demographic data collection system of the Ministry of Health clearly needs better technical supervision too. Our observations are based on its first year of operation, though, and improvements are by no means precluded. It will be necessary to evaluate the returns of the first two years for each sample unit and to study, in collaboration with the village registrars, ways to improve the completeness of collection. It may be necessary to reduce the size of the sample in order to obtain better fieldwork and supervision.

28. It is vital, for statistical information on the population in Madagascar, that a census be taken as soon as possible. The aim should be to have it implemented during the dry season of 1988, and to produce results in time for the preparation of the 1991-1995 Plan. This is feasible, but requires an early decision and no delays in preparatory work¹⁰. The census itself could very well be "light," and leave special topics such as

¹⁰ The mapping, for instance, will have to be redone, and this is a time-consuming task.

employment and demography up to simultaneous (or immediately subsequent) surveys dealing with samples of households. The demographic questionnaire should aim at collecting appropriate data for fertility and mortality estimates by the available indirect techniques (birth/parity data, child survival, orphanhood and widowhood, etc.). The quality of data will be essential, so close and good supervision (which is hampered by large sample size) should not be sacrificed to exaggerate demands for disaggregative results.

B. DEMOGRAPHIC ESTIMATES

Evaluation of the Growth Rates

29. The mission first reviewed existing estimates of the population growth rates, so as to obtain if possible a framework within which the consistency of subsequent fertility and mortality estimates could be assessed. Having discarded the Ministry of Interior data, the only remaining source was the 1980 EBM, which had produced unpublished estimates of the growth rates of rural and CUS populations in five provinces. These rates refer to the 1975-1980 period.

The rates are the following (in percent):

<u>Province</u>	<u>CUS</u>	<u>Rural</u>	<u>Total</u>
Antananarivo	3.66	2.46	2.49
Antseranana	3.14	2.35	2.48
Fianarantsoa	3.04	1.93	2.04
Mahajanga	4.15	1.68	1.89
Toamasina	4.40	1.78	1.94
Total	3.55	2.06	2.16

Of course, such rates are highly dependent on internal migration patterns. The fact that inter-provincial migration rates are not known, therefore, makes it extremely difficult to interpret the above table. The growth rates given for the CUS seem reasonable: an overall natural growth rate of about 3 percent, and an overall net migration rate of about + 0.5 percent, for instance, would reasonably explain the general pattern, and the variations from that general pattern at the province level would be quite acceptable.¹¹

¹¹ In the Toamasina CUS, for instance, a + 1.5 percent net migration rate during the period considered would have implied a net flow of about 1,000 annual migrants only.

30. The growth rates found in the rural sector seem less acceptable. If the natural growth rate is also assumed to be 3 percent in this sector,¹² the implicit net migration rate will be minus 0.9 percent. As the rural population was about 4.5 times the urban population on the average during the 1975-1980 period, the net migration rate for the whole urban sector would then be plus 4 percent. This in turn would imply a 7 percent growth rate for the whole urban sector. And since the major urban centres made up about two-thirds of that sector in that same period, their growth rate should have been about 8.7 percent per year for the whole pattern to be consistent. But the general opinion is that urban growth rates are not that high; in the capital city itself, they have never been estimated at more than 4.5 percent. It is more likely that the urban growth rate was in the vicinity of 4 percent (possibly a little higher), with a net migration rate of plus 1 percent or a little more, implying a net urban migration rate of about minus 0.3 percent. In those conditions, the overall rural population growth rate must have been of the order of 2.5 percent at least.

31. It is therefore not possible to use the estimated growth rates as a guide to assessing the likelihood of subsequent estimates of fertility and mortality levels. Fertility and mortality will have to be estimated independently, and growth rates will be subsequently estimated as a derived result.

Fertility Estimates

32. While the census provides an indication of fertility levels in 1975, for the subsequent period, the only utilizable source, as we have seen, is the 1980 EBM, which permits estimates of actual fertility rates based on the combined analysis of last-year fertility data and parity data.

33. Parity data are available separately for the rural and the CUS populations, while fertility rates are available for the aggregated population only. This is not a serious problem, since the same set of fertility rates can be used in separate rural and CUS estimations under the assumption that the age distribution of fertility is the same, or sufficiently close, in the two sub-populations. In particular, this should create virtually no bias in the rural estimate, as rural fertility accounts for more than 90 percent of the overall fertility of the studied population, and its age distribution must be very close to the one reported.

¹² Urban and rural rates of natural growth usually are very similar in pre-transitional situations.

34. Table 3 presents the results of the estimation. The total fertility rate (TFR) for the rural population was estimated at 6.748, and that of the CUS population at 6.389 live births per woman. The TFR also had to be estimated for the GCU population in order to produce a weighted average as a national estimate. The assumption was made that the ratio of GCU total fertility to CUS total fertility was the same as that of CUS total fertility to rural total fertility; the TFR for the GCU population would then be 6.049.

35. The estimated aggregate rates are shown in Table 3. The associated total fertility rate is 6.629. The age distribution of fertility, of course, is that of the rural+CUS aggregate.¹³

Table 3: AGE-SPECIFIC FERTILITY RATES (ASFR) IN 1980,
ESTIMATED FROM EBM DATA

Age groups	Fertility rates (per 1000)
15-19	125.2
20-24	282.0
25-29	288.1
30-34	252.0
35-39	209.2
40-44	102.5
45-49	66.8
All	200.6

36. By this estimate, fertility in Madagascar may be lower than one might expect. Could it be that the data or the assumptions made in using the method led us to underestimate fertility levels? Little additional evidence is available; let us look at it. First, average age at marriage is

¹³ A first run of the Brass-Trussell estimation procedure seemed to produce too high correction coefficients, because of the inconsistency between parity at 15-19 years and the low recorded fertility rate for that age group (a factor which, of course, carried over to all calculations for the subsequent age groups). This suggested a possible decline of fertility at these ages, a hypothesis which is supported by informal indications, gathered during the mission, of a recent tendency to increasing ages at marriage. So, in a second run, new correction coefficients were calculated after offsetting the effects of a possible fertility decline at 15-19 years.

not particularly early in Madagascar. An estimate based on 1975 census data yields average ages at marriage of 19.6 for women and 22.9 for men.¹⁴ The proportions of never-married women in the various age groups are not extremely low either:

<u>Age Groups</u>	<u>Percentage of Women Never Married (1975)</u>	
	<u>Rural</u>	<u>Urban</u>
15-19	61	84
20-24	27	47
25-29	13	20
30-34	7	11
35-39	5	8
40-44	5	6
45-49	4	6

37. So Madagascar does not seem to have the pattern of early and universal marriage which is typical of populations which experience a high fertility.

38. Another set of data deserves examination. As mentioned earlier, parities were recorded at the 1980 KBM survey. Let us extract from these data the proportions of women who have had no child (zero parity):

<u>Age Groups</u>	<u>Percentage of Women With 0 Parity</u>	
	<u>Rural</u>	<u>Urban</u>
15-19	75.5	85.6
20-24	31.1	56.8
25-29	20.8	23.1
30-34	14.7	12.7
35-39	12.1	16.0
40-44	15.3	14.8
45-49	13.1	16.9

39. These proportions are high. Of course, never-married women should be subtracted, but there remains an unexplained margin of infertility. In the rural areas, for which we have two sets of relatively comparable data, it seems that 7 to 8 percent of women aged 25 to 34 have been married, but have had no child. The mission has heard no indication of sterility problems in Madagascar, but it might be worthwhile studying the real extent of infertility and its causes.

14 Rafrezy and Ramdretsa, op.cit., pp. 40-46.

Mortality Estimates

40. As explained earlier, the mission's estimates of mortality levels will be based on data from the 1984 ESD survey. These data permit separate urban and rural estimates for males and females, the results being reaggregated afterwards.

41. The main purpose of the estimation work here was to assess the general level of mortality, in order for the mission to have a solid basis for the new population projections required by this report. Since survival rates of children born 10 years and more before the survey had been measured, it was possible to estimate mortality levels for the 1975-1980 period and for the 1980-1983 period as well. Table 4 presents these results, the mortality levels being expressed in terms of life expectancies at birth.¹⁵

Table 4: LIFE EXPECTANCIES FOR THE 1975-1980 AND 1980-1983 PERIODS, ESTIMATED FROM 1984 ESD DATA ON CHILD SURVIVAL

	1975-80	1980-83
MALES	49.95	49.73
FEMALES	52.92	52.35
BOTH SEXES	51.42	51.02

In view of the great interest on the part of local health administrators and population specialists in the infant mortality rate as a synthetic indicator of mortality conditions in the country, it may be useful to indicate that the IMR which corresponds to the recent level of general mortality as reported in Table 4, would be 125 per thousand.¹⁶

¹⁵ After the usual series of trials, the West family of model life tables was found to offer the best fit with Madagascar apparent mortality patterns. Sensible results were also obtained with North tables.

¹⁶ The indirect estimate from survey data would be higher (137.5 per thousand), but this estimate, being based on the survival rate of a group of children comprising a high proportion of first births (more subject to mortality than the average), may be biased upwards. This may also affect the estimate of the general level of mortality in 1980-1983 (although not by a large factor); so it is possible that the life expectancy in that period be a little higher, although the finding of a slightly increasing mortality coincides with the impressions of many local health professionals.

Population Estimate as of 1985

42. Given the above fertility and mortality estimates, it was possible to project the 1975 population (as given in Table 1) to 1985.

43. The series of fertility rates shown in Table 3 was used as it is for the 1980-1985 period. For the 1975-1980 period, the rate at 15-19 years was taken as the average of the rate in Table 3 on the one hand, and of the rate in Table 2 inflated by the same factor as the 1980 series of rates on the other hand. Survival rates were those corresponding to the mortality levels indicated in Table 4 (in the West family of life tables). No external migration was assumed.

44. Table 5 presents the results of the projection. The level indicated in the table for the 1980-1983 period was used for the 1985 projection period.

Table 5: ESTIMATED POPULATION IN MID-1985
POPULATION (in thousands)

AGE GROUPS	MALES	FEMALES	BOTH SEXES
0- 4	949.4	938.5	1887.9
5- 9	791.8	784.5	1576.3
10-14	642.6	629.9	1272.5
15-19	553.1	536.6	1089.7
20-24	449.3	423.5	872.8
25-29	380.0	411.7	791.7
30-34	293.0	326.5	619.5
35-39	218.1	246.6	464.7
40-44	161.2	182.4	343.6
45-49	161.3	188.1	349.4
50-54	137.8	151.8	289.6
55-59	117.5	127.7	245.2
60-64	101.7	98.2	199.9
65-69	74.9	68.5	143.4
70-74	47.4	46.5	93.9
75& +	41.4	39.6	81.0
Total	5120.6	5200.5	10321.1

According to this projection, the population growth rate between 1975 and 1985 would have been 3.05 percent on the average, with an average crude birth rate of 45.0 per 1,000 and an average crude death rate of 15.5 per

1,000. Table 6 gives detailed indicators of population change during the projection period.

Table 6: INDICATORS OF POPULATION CHANGE, 1975-1985,
FROM MISSION'S ESTIMATES

	<u>1975-1980</u>	<u>1980-1985</u>
Birth Rate (0/00)	46.5	45.6
Death Rate (0/00)	15.5	15.5
Growth Rate (0/00)	3.10	3.01
Total Fertility	6.70	6.63
Gross Repr. Rate	3.30	3.27
Net Repr. Rate	2.49	2.44

45. The relative increase in population size over the 10 year period, was 36 percent. The final population size is dependent on the selected base year population figure: had we based our projection on the UN estimate for 1975, for instance, we would have obtained a 1985 estimate of 10,886,000.

C. POPULATION PROJECTIONS

46. Three population projections were run from 1985 to 2015. These projections are used in this report as a basis for illustrating some implications of alternative demographic trends in Madagascar.

47. The assumptions made about future mortality trends are the same in the three variants. A gain of 0.6 mortality "levels" (in the West system of life tables) for each 5-year period is projected for each sex. This implies an increase in life expectancy of exactly 1.5 years per period for females and of about 1.4 years per period for males. Table 7 shows the assumed evolution of life expectancies over the projection period.

**Table 7: MORTALITY ASSUMPTIONS FOR THE PROJECTIONS:
MALE, FEMALE AND GENERAL LIFE EXPECTANCIES,
1985-2015**

	1985- 1990	1990- 1995	1995- 2000	2000- 2005	2005- 2010	2010- 2015
Males	51.09	52.46	53.85	55.24	56.65	58.07
Females	53.85	55.35	56.85	58.35	59.85	61.35
Both Sexes	52.45	53.88	55.33	56.78	58.23	59.69

This is a moderate scenario of mortality decline. Of course, a more optimistic scenario would bring about higher population growth rates.

48. The three projection variants differ by their respective scenarios of fertility decline: one assumes constant fertility, another a moderate fertility decline, and the third a rapid fertility decline.

Variant I: Constant Fertility:

49. In this variant, constant ASFRs are assumed at their levels of the 1980-1985 projection period (see Table 3). Table 8 summarizes the results of this projection in terms of population size and structure.

**Table 8: POPULATION GROWTH, 1985-2015,
UNDER THE ASSUMPTION OF CONSTANT FERTILITY**

	<u>1985</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>2015</u>
Total Population	10,031	12,060	14,160	16,707	19,797	23,545	28,099
Percent Age Distribution:							
0-14	45.9		46.1		46.6		46.9
15-64	51.0		50.9		50.7		50.8
65 +	3.1		2.9		2.7		2.3
Dependency Ratio	96.0		96.3		97.1		97.0

50. Under the assumption of constant fertility, the population would grow by 62 percent from 1985 to 2000 and by 68 percent from 2000 to 2015. Table 9 gives more detailed indices of population change for the projection period.

**Table 9: INDICATORS OF POPULATION CHANGE, 1985-2015:
"CONSTANT FERTILITY" PROJECTION VARIANT (I)**

	1985- 1990	1990- 1995	1995- 2000	2000- 2005	2005- 2010	2010- 2015
Birth Rate (0/00)	45.5	45.4	45.4	45.3	45.0	44.8
Death Rate (0/00)	14.3	13.3	12.3	11.3	10.4	9.5
Growth Rate (0/0)	3.12	3.21	3.31	3.39	3.47	3.54
Total Fertility	6.63	6.63	6.63	6.63	6.63	6.63
Gross Rep. Rate	3.27	3.27	3.27	3.27	3.27	3.27
Net Rep. Rate	2.50	2.55	2.61	2.67	2.72	2.77

51. The birth rate would decline slowly (because population would grow faster than the annual number of births). Yet, the growth rate would increase because the death rate would decline faster than the birth rate 17. The gross reproduction rate (that is, the mean number of girls a woman would give birth to in the absence of mortality) would be constant by hypothesis. But the net reproduction rate (that is, the mean number of girls a woman would actually give birth to given the actual mortality conditions) would increase, because of the mortality decline.

Variant II: Moderate Fertility Decline

52. In this variant, ASFRs are assumed to decline linearly from their levels of the 1980-1985 projection period, to reach levels ensuring a net reproduction rate (NRR) of 1 in the 2030-2035 period. The decline would begin in the 1985-1990 period. Table 10 summarizes the results of this projection in terms of population size and structure until the year 2015.

17Declining mortality increases the pro.

**Table 10: POPULATION GROWTH, 1985-2015,
WITH MODERATE FERTILITY DECLINE**

	1985	1990	1995	2000	2005	2010	2015
Total Population	10,321	11,911	13,666	15,601	17,708	19,940	22,230
Percent Age Distribution:							
0-14	45.9		44.2		41.1		37.7
15-64	51.0		52.8		55.9		59.4
65 +	3.1		3.0		3.0		2.9
Dependency Ratio	96.0		89.5		78.8		68.3

53. Obviously, the increase in total population would be much less than in Variant I, especially in the longer run-- there, population would grow by 51 percent between 1985 and 2000, and by 42 percent between 2000 and 2015. As the younger age groups would grow much more slowly than in Variant I, the dependency ratio would decline rapidly (instead of going up as it did in the latter variant).

54. Table 11 gives detailed indices of population change in Variant II.

**Table 11: INDICATORS OF POPULATION CHANGE, 1985-2015:
"MODERATE FERTILITY DECLINE" PROJECTION VARIANT (II)**

	1985- 1990	1990- 1995	1995- 2000	2000- 2005	2005- 2010	2010- 2015
Birth Rate (0/00)	42.7	40.3	38.2	36.1	33.6	30.8
Death Rate (0/00)	14.0	12.8	11.7	10.7	9.8	9.0
Growth Rate (0/0)	2.87	2.75	2.65	2.54	2.38	2.18
Total Fertility	6.19	5.74	5.30	4.85	4.41	3.96
Gross Repr. Rate	3.05	2.83	2.61	2.39	2.17	1.95
Net Repr. Rate	2.33	2.21	2.09	1.95	1.81	1.66

55. The decline in birth rates and growth rates would, of course, also be moderate--the values of these at the end of the period (in 2010-

2015) would still be high by world standards at 31.0/100 for the CBR and 2.2/100 for the growth rate.

Variants III: Rapid Fertility Decline

56. In this variant, the achievement of a NRR of 1 is assumed to happen 15 years earlier than in Variant II, that is, in 2015-2020. Table 12 shows the changes in population size and structures from 1985 to 2015 under this assumption.

**Table 12: POPULATION GROWTH, 1985-2015,
WITH A RAPID FERTILITY DECLINE**

	1985	1990	1995	2000	2005	2010	2015
Total Population	10,321	11,848	13,484	15,126	16,815	18,820	19,819
Percent Age Distribution:							
0-14	45.9		43.3		38.3		32.4
15-64	51.0		53.6		58.6		64.3
65 +	3.1		3.1		3.1		3.3
Dependency Ratio	96.0		86.6		70.8		55.4

57. The total population increase in this variant would be 47 percent in the first 15 years of the projection and 31 percent only in the next 15 years.

58. Our usual indicators of population change are presented in Table 13 for this variant. The birth rate would be moderate, the death rate would be low at the end of the period, yielding a moderate population growth rate.

**Table 13: INDICATORS OF POPULATION CHANGE, 1985-2015:
"RAPID FERTILITY DECLINE" PROJECTION VARIANT (III)**

	1985- 1990	1990- 1995	1995- 2000	2000- 2005	2005- 2010	2010- 2015
Birth Rate (0/00)	41.5	38.0	34.9	31.6	27.8	23.5
Death Rate (0/00)	13.9	12.6	11.4	10.5	9.6	8.9
Growth Rate (0/0)	2.76	2.54	2.34	2.12	1.82	1.46
Total Fertility	6.00	5.36	4.72	4.09	3.45	2.82
Gross Repr. Rate	2.95	2.64	2.33	2.01	1.70	1.39
Net Repr. Rate	2.26	2.07	1.86	1.54	1.42	1.18

59. Total fertility would, of course, rapidly drop to moderate levels, since it would be almost down to the replacement level at the end of the period we consider.

60. A synthetic comparison of these three projections is made in the text of this report itself (see Section A).

Rural/Urban Population Projection

61. The respective proportions of rural and urban populations in 1975, as measured by the Census, were 83.7 and 16.3 percent. It is possible to project these proportions by a variety of methods. A simple and elegant procedure is to assume a constant difference between the two growth rates of the rural and urban populations¹⁸. This produces a decline of the rural share of the population along a logistic curve, which is in accordance with historical observations.

62. The speed of transfers from the rural to the urban population is measured by the URGD, so assuming a higher URGD implies a faster growth of the urban share of the population, for instance. In the case of Madagascar, little hard evidence is available on the patterns of differential growth¹⁹. It seems reasonable to assume that in the recent past the URGD was about 2 percent. For the next 30 years, it is necessarily risky to assume any figure, as these phenomena do not have by far the same degree of inertia as other demographic phenomena, such as fertility or mortality, depending as

¹⁸ This difference is called urban-rural growth differential or URGD.

¹⁹ See Section 3.1 above.

they do on changing economic, social, health, and other conditions. For want of better indications, we shall assume a stable URGD of 2 percent, which is a very moderate one.

63. Under this assumption, the percentages of rural and urban population would be the following:

	<u>1985</u>	<u>2000</u>	<u>2015</u>
Rural Share	80.8	75.7	69.8
Urban Share	19.2	24.3	30.2
TOTAL	100.0	100.0	100.0

Under those conditions, the growth of urban and rural population would be as indicated by Table 14.

Table 14: RURAL AND URBAN POPULATION GROWTH UNDER
THREE FERTILITY ASSUMPTIONS

	<u>1985</u>	<u>2000</u>	<u>2015</u>
1. Rural Population			
- Constant Fertility	8,337	12,646	19,602
- Moderate Decline	8,337	11,808	15,508
- Rapid Decline	8,337	11,449	13,826
2. Urban Population			
- Constant Fertility	1,984	4,062	8,497
- Moderate Decline	1,984	3,793	6,723
- Rapid Decline	1,984	3,977	5,993

HEALTH

1. Sources and Representativeness of Data

Most of the information on morbidity and mortality comes from data compiled by the health centers and as such it is subject to the limitations inherent in that type of source, namely: attendance at the health centers, their accessibility and coverage, and the accuracy of the diagnoses made by the personnel, which in turn depends on their training, expertise, and the technical support received at each level. The new system for the collection of health data, which was introduced in 1979 and became fully operational in 1983, did systematize and streamline data collection, previously the responsibility of the various technical services, but also resulted in delays and constraints in further processing of the data. Thus, 1983 was to all intents and purposes a lost year as regards statistical information; partial data exist for the first half of 1984 and the most recent complete data go back to 1982.

Lastly, a number of studies and surveys, especially on communicable diseases and nutrition, have also been used as sources of information. Thus, while the data on morbidity, mortality and nutrition status in Madagascar do not represent the true picture, the figures given in this report do give an indication of the current situation and discernible trends as regards the people's health.

2. Morbidity

The leading causes of morbidity in 1981 were: diseases of the respiratory system (33.2%); infectious and parasitic diseases (28.3%); ill-defined conditions (10.6%); diseases of the digestive system (7.2%); diseases of the central nervous system and sensory organs (5.7%); and diseases of the skin and subcutaneous tissue (3.6%).

Leading diseases of the respiratory system are unspecified bronchitis, influenza, the common cold, acute bronchitis and bronchiolitis, tonsillitis and acute tonsillitis. Infectious and parasitic diseases predominantly take the form of intestinal infectious diseases, malaria, helminthiasis, measles and ascariasis (see Table 1). More specifically, the six leading causes of morbidity are: acute disorders of the upper respiratory tract (12%); intestinal infectious diseases (9.7%); unspecified bronchitis (9.3%); diseases of the digestive system (7.2%); influenza (6.9%); and malaria (6.8%) (see Table 2). One patient out of three is less than five years old. The two main causes of morbidity, which are essentially infectious and which alone account for 61.5 percent of all

This annex was prepared by Dr. Jean Lecomte, public health specialist consultant.

causes of morbidity, primarily affect children as they are more prone than adults to be weakened by malnutrition. The fact is that 39.8 percent of respiratory ailments and 44.9 percent of infectious and parasitic diseases involve children under 5 (see Table 3).

The geographical distribution of morbidity shows significant variations in the incidence of the major ailments by province (see Table 4). Thus, the province of Fianarantsoa seems at first glance to be the least affected; respiratory diseases, with an incidence of 398 per 1,000 population, are apparently twice as frequent in Antananarivo province than in the country as a whole (210 per 1,000 population); infectious and parasitic diseases are more frequent in Toamasina province (302 per 1,000 population, as against 193 per 1,000 population for the country as a whole); digestive diseases are more frequent in Antananarivo province (77 per 1,000 population as against 49 per 1,000 population nationwide); and diseases of the central nervous system and sensory organs are more frequently diagnosed in Diego Suarez than elsewhere (56 per 1,000 population, as against 34 per 1,000 population for the country as a whole).

Although some of these figures probably do reflect the true situation, such as a higher frequency of respiratory diseases in the colder climes of the central highlands and a predominance of infectious and parasitic diseases in the warmer and more humid coastal provinces, these morbidity rates do not reflect the frequency of the diseases within the population; rather, they show the frequency of the diagnoses made by the health centers. The geographic variations in morbidity should thus be viewed with all due caution, as they can just as well reflect provincial disparities in terms of diagnostic facilities (health infrastructure, accessibility, health personnel, etc.) as true regional variations in morbidity.

3. Communicable Diseases

3.1 Malaria

Malaria, caused mostly by the Plasmodium Falciparum, is endemic on the eastern coast, in the northeast and northwest. It is seasonal in the south, where outbreaks occur during the rainy season (October to March) and is beginning to return to the central highlands where it had been virtually eradicated. The inadequacy of vector control efforts, the insufficiency of antimalarial drugs to treat victims, population movements, and certain changes in vector behavior are all factors that together make malaria a major public health problem in Madagascar.

Malaria accounts for 24 percent of infectious and parasitic diseases¹ -the second cause of morbidity--and in 1984, 2,663 deaths were attributed to it.² Prior to 1984, the statistics on malaria represented only cases reported by health centers having a staff physician. From 1981 to 1984, an average 420,000 new cases of malaria were reported annually; i.e., a clinical incidence of 5 percent per year. However, the SSSD (Department of Health and Demographic Statistics) report for the first half of 1984 indicates that 441,300 cases of malaria were reported by all health personnel (doctors and paramedics); i.e., an annual incidence of 9.2 percent. Of course, some were "suspected" cases, of which only a small number were confirmed by laboratory tests. Of the 400,000 annual cases from 1981 to 1984, 30,000 were subjected each year to blood tests and one-third of those were found to be positive. In other words, many patients with ill-defined fever symptoms were erroneously diagnosed as having malaria, resulting in overreporting of the disease. Without accurate data on the conditions under which the blood samples were taken and the reliability of the microscopic examinations, the positive-test rates from the slides examined cannot be applied to all suspected cases to extrapolate the number of "confirmed" cases. Moreover, only 62 percent of the health centers³ sent activity reports for the first half of 1984, which suggests an underreporting of malaria cases. With the incidence of malaria overestimated on the one hand and underestimated on the other, and with no way of accurately pinpointing the magnitude of these two factors, it is difficult to derive precise data on the incidence of the disease.

A reasonable estimate would be within a range from 8 to 11 percent.⁴ These figures are of course higher than those based on the annual

1 Ministry of Health (MOH), Department of Health and Medical Services, Annual Report, 1982.

2 Six monthly bulletin of Health Statistics, Feedback, first quarter, 1984.

3 Primary health care centers, nurse stations, birthing clinics, health posts, medical centers, basic secondary hospitals, medical and surgical hospitals, major hospitals and general hospitals.

4 - Number of cases of malaria recorded for the first quarter of 1984:
441,380
- Number of health centers submitting reports: 62%
- Estimated number of cases of malaria at all health centers
 $\frac{441,380 \times 100}{62} = 1,423,806$

reports of the Communicable Disease Control Office (5%) which, as stated earlier, included only those cases of malaria reported by health centers with physicians on their staff. The increase from 5 to 8 or 11 percent is therefore based on an estimate of the number of cases likely to be reported by all health centers. Because of a lack of past data, it is impossible to assess the extent to which discontinuation of the chloroquine program for school children and the inadequate vector control efforts may have led to a genuine increase in the incidence of malaria. The parasite is still highly sensitive to clinical treatment: 90 percent of cases are cured by chloroquine, to which a 10 percent type-R1 resistance has been reported.⁵

3.2 Schistosomiasis

The two forms of schistosomiasis, urinary and intestinal, are present in Madagascar. Urinary schistosomiasis is rampant in the south and on the west coast where 1.2 million people live in infested areas and where 500,000 more could be threatened by the disease.⁶ In 1978 there were 175,580 theoretical cases, based on infestation rates taken from various epidemiological surveys. This was an incidence of 2.1 percent for the population as a whole and 14.2 percent for the population at risk. In recent years, with continued surveys and explorations, new foci of urinary schistosomiasis have been discovered, particularly in the south where there is a correlation with worker migration in connection with the development projects in the Mangoky region. In 1986, there may be between 220,000 and 250,000 cases of urinary schistosomiasis on the island. Even more persons are threatened by intestinal schistosomiasis, which has spread from within

ANNEX II

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- This figure is overestimated because it assumes that all reported cases are in fact instances of malaria.
 - Assuming 30% false positives: Number of cases of malaria:
 $1,423,806 - (1,423,806 \times 0.3) = 999,664$; i.e., an incidence of 11%
 - Assuming 50% false positives: Number of cases of malaria:
 $711,903$; i.e., an incidence of 7.9%.

⁵ Treatment with chloroquine at a dosage of 25 mg/kg of weight for three days resulting in negative parasitemia after three to four days, followed by reappearance of the parasite within 28 days.

⁶ Les Bilharzioses humaines à Madagascar, by P. Coulange. Archives of the Institut Pasteur, 1978, Vol. 46, Section 1.

Madagascar to the east coast and to the populated areas of the central highlands. The potential for its spread, especially to Antananarivo province, is very real. In 1978, two million people were living in the infested regions and 1.9 million in zones of certain or probable risk. The number of theoretical cases is estimated at 235,170; i.e. an incidence of 11.8 percent for the population living in infested areas and 2.8 percent for the total population. The number of cases of intestinal schistosomiasis is expected to be between 350,000 and 400,000 in 1980.

In summary, between 550,000 and 650,000 people probably suffered from urinary or intestinal schistosomiasis in 1985, an incidence of 5.6 to 6.4 percent. The low incidence of the disease (16,500 cases detected in 1982,⁷ 15,400 new cases per year estimated in 1984⁸) shows the need to step up efforts to identify new foci and improve the detection of suspected cases.

3.3 Tuberculosis

During the first half of 1984, 7,624 new cases of tuberculosis were recorded,⁹ representing an annual incidence of 171 cases per 100,000 population. This figure is underestimated, however, since (i) many cases escape systematic detection and (ii) the number of health centers submitting their activities reports for the first half of 1984 varied from 58 percent for the CSSPs (primary health care centers) to 68 percent for the major, medico-surgical and general hospitals. Without information on the distribution of tuberculosis cases by type of health center, it is impossible to more closely estimate the incidence of the disease, which in any event should be at least 200 cases per 100,000 population. Although this is only an estimated, tuberculosis is certainly more widespread than the figures to date would suggest; i.e., an estimated incidence of 54 per 100,000 population and a reported incidence of 38.5 per 100,000.¹⁰

⁷ Medical Care Department, Annual Report, 1982

⁸ Data available on endemic disease control measures in Madagascar and the activities of the Institute of Social Hygiene in 1985, Directorate of Health and Medical Services, Communicable Disease Control Office.

⁹ Six monthly bulletin of health statistics, feedback, first half of 1984.

¹⁰ Data available on endemic disease control measures in Madagascar and the activities of the Institute of Social Hygiene in 1985, Directorate of Health and Medical Services, Communicable Disease Control Office.

3.4 Sexually Transmitted Diseases (STDs)

While the number of cases of gonococcal infection has remained at about 40,000 per year (45,788 in 1978 and 41,809 in 1984), the number of syphilis cases is on the rise, having increased from 19,808, in 1978 to 25,797 in 1984. In that year, the incidence of syphilis and gonococcal infections was 6.8 per 1,000 population for the country as a whole. The particularly disturbing situation in Toliary province, which alone accounts for 41 percent of all cases of syphilis, should be studied from clinical, epidemiological and socio-demographic standpoints. Because Antananarivo has large populations at risk (students and the military) and an economic situation which allows few alternatives other than prostitution for young girls who leave the countryside to find work in the city, the result is both an increase in cases of STDs and a lowering of the age of the affected population. No information on AIDS was available during the sector mission.

3.5 Leprosy

Of an estimated 30,000 lepers (3 per 1,000 population), 24,000 cases have been officially recorded and are being monitored, 85 percent by public health facilities and 15 percent by religious missions, which run about 30 leprosariums.

About 1,000 to 1,500 new cases are reported each year, an incidence of 1.15 per 1,000 population. Of the 35 medical districts, 12 have specialists in leprology and each province has a leprologist. In 1985, mid-level paramedical personnel received refresher training to improve their skills in the area of early detection and to familiarize them with new approaches to management of the disease. The Leprosy Control Division plans to conduct a sampling survey to update the data on prevalence of the disease.

3.6 Plague

There are foci of plague in the central highlands. Three million inhabitants are at risk. Only cases confirmed by laboratory testing are considered cases of plague and are subject to international reporting.

11 Data available on endemic disease control measures in Madagascar and the activities of the Institute of Social Hygiene in 1985, Directorate of Health and Medical Services, Communicable Disease Control Office.

Fifty to 100 cases are confirmed each year, accounting for about 10 percent of the total number of real cases of plague (500 to 1,000 per year).

4. Environmental Hygiene¹²

In 1982, it was estimated that one-fourth of the population (23%) had access to clean potable water. In urban areas, 75 percent had potable water: one-fourth were supplied by private residential hook-ups and three-fourths used public standpipes. Less than 10 percent (8.8%) of rural dwellers (80% of the total population) had access to relatively clean potable water. Although in the 51 large urban centers with an public potable water supply system the chemical quality of the water, is regularly monitored by JIRAMA, bacteriological controls carried out by the Institut Pasteur in the capital city, are much more sporadic. In the secondary cities and rural areas with piped water, quality controls are virtually nonexistent. Fifteen cities, of which six are provincial capitals, have a system for waste water removal consisting of a network of open channels, but no treatment station. The seven treatment stations in Antananarivo—the only city so equipped—are not serviceable for lack of maintenance. Only 3 percent of the urban population have the services of a public system for the removal of solid and liquid waste; 4 percent use individual sanitary facilities (latrines and septic tanks), while the rest have no such facilities. In rural areas, less than 5 percent of the population have latrines, the use of which is still hampered by socio-cultural customs in certain areas of the country.

It is estimated that 30 percent of households are serviced by a public residential garbage collection system and that 70 percent simply leave their garbage outside.

Because of this situation, characterized by a lack of waste water treatment in urban areas, inadequacy and/or lack of solid waste removal systems, especially in rural areas, and the small proportion of the population supplied with clean water, it is not surprising that 35-40 percent of the urban population and 90-95 percent of the rural population

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- 12 - Overview of Sources of Air, Water and Soil Pollution in Madagascar, by M.W.K.G. Wank Pum Sze, WHO, 1985.
- Potable Water Supply and Sanitation in Rural Areas: Sector Study, Madagascar, WHO/World Bank Joint Program, 1982.
 - Updating of the Overview of the Water and Sanitation Sector in Madagascar, WHO Memorandum, December 1983.

are at risk from fecal contamination.¹³ Cases of waterborne diseases; i.e., those spread by ingestion of or contact with polluted water, numbered 713,000 in 1981 (see Table 5); i.e., an incidence of 8 percent for the total population and 18 percent for children 0-5 years of age.

5. Mortality

The mortality rate is 15 per 1,000 population and life expectancy at birth 51 years. In 1982, the major causes of death were intestinal infectious diseases, unspecified bronchitis, malaria, measles and bronchopneumonia (see Table 6). There have been slight changes in the classification of leading causes of death in recent years.

Leading Causes of Death

Cause	Rank Order		% of Deaths	
	1982	1978	1982	1978
Infectious and parasitic diseases	1st	2nd	27.3	21.5
Respiratory diseases	2nd	1st	23.4	32.2
Digestive diseases	3rd	3rd	7.5	8.1
Circulatory diseases	4th	5th	5.5	4.5
Conditions during perinatal period	5th	4th	4.5	5.9

Source: Directorate of Health and Medical Services, Annual Report, 1978 and 1982.

However, in both 1982 and 1978, infectious pathology—whether respiratory or digestive—and parasitic ailments were the leading causes of death.

¹³ Overview of Sources of Air, Water and Soil Pollution in Madagascar.

5.1 Infant Mortality

Infant mortality, estimated at 109 per 1,000 population in 1980, rose to 126 per 1,000 population in 1982/83.¹⁴ Although these are indirect estimates, given the magnitude of the gap between the two figures there has apparently been an increase in infant mortality in recent years. This worsening of one of the major indicators of the health status of the population is all the more disturbing since during that same period a large health network (CSSPs) was responsible precisely for improving mother and child health. However, without adequate human and physical resources, the basic health centers could not fully play their role in preventive care: vaccination coverage is still low; measles vaccine was not introduced until 1985; vector control efforts have not been systematized; health education is not widespread; malaria prevention is constrained by a chronic shortage of chloroquine; oral rehydration salts are not available at all health centers; family planning services are extremely limited; and so on. Lastly, protein-calorie malnutrition, from which many children suffer (see below), makes it more likely that children will die when they are stricken by infectious and parasitic diseases, the leading cause of illness among young children. Of the deaths reported by the health centers, the victims in 45 percent of cases were under five (23% were infants from 0-1 years of age and 22% children 1-4 years of age). Of deaths among infants less than one year old, 31 percent were due to infectious and parasitic diseases, 24 percent to respiratory ailments and 19 percent to perinatal disorders.¹⁵

14 Estimate by World Bank sector mission, February 1986.

15 Directorate of Health and Medical Services, Annual Report, 1982.

Changes in Fetal, Neonatal and Maternal Mortality
(per 1,000 population)

	197816	198215	198417
Maternal mortality	1.4	1.5	5.2
Fetal mortality	28.0	34.0	29.0
Neonatal mortality	5.8	6.8	8.6

Although fetal mortality remained constant at about 30 per 1,000 population, maternal and neonatal mortality increased. These trends have to be considered with extreme caution, however, as they probably are more a reflection of changes in the way the data were collected (SSSD) and short-term circumstantial changes than actual changes in the situation.

Comparison of Mortality Rates in Madagascar and Other Countries

	Madagascar	Rwanda	France	Chile	Australia	U.S.
Maternal mortality per 100,000 live births	520	210	15.5	52.5	9.8	19.6
Fetal mortality per 1,000 live births	29	55	7.9	7.3	5.6	6.5

Source: United Nations Demographic Yearbook, 1983.
Health, Population and Nutrition in Rwanda, World Bank Sector Report.

16 Medical Care Department, Annual Report, 1978 and 1982.

17 Six monthly bulletin of Health Statistics, feedback, first half of 1984.

The high maternal and neonatal mortality rates at both maternity clinics and primary health care facilities are due partly to delayed referrals to the maternity clinics of cases affected by complications, and, at the primary health care facilities especially the CSSPs--to the fact that these first-line structures are not provided with the trained staff or technical resources to deal with the complications of pregnancy and labor.

The profile of morbidity, mortality and other health indicators (infant mortality, maternal mortality, life expectancy and nutritional status) are comparable to those in many sub-Saharan African countries. It is infectious and parasitic diseases, which can be prevented by appropriate programs, and which primarily affect malnourished children, that are the leading causes of morbidity and death.

6. Nutrition

6.1 Nutritional Situation

Although there are no data concerning the nutritional condition of the population on a nationwide scale, it appears from a number of specific surveys and specialized studies and from the clinical observations of doctors in charge of the pediatric services that the nutritional condition of Malagasy children is a matter for serious concern. Even though in children under five the morbidity rate directly attributable to malnutrition is relatively low (18 per 1,000 population against 56 per 1,000 population for measles and 23 per 1,000 population for whooping cough¹⁸) and malnutrition is directly responsible for no more than five percent of child deaths,¹⁹ the fatality rate for infectious and parasitic diseases in children under five is high when the subjects are highly vulnerable; i.e., weakened by malnutrition, which is thus an indirect but significant factor in child mortality.

In June 1984, a nutritional survey of 1,000 children aged 0-5 years was conducted in the Antsirabe region.²⁰ A preliminary analysis of the findings of this survey reveals that a particularly alarming percentage of

¹⁸ Directorate of Health and Medical Services. Annual Report, 1982.

¹⁹ Analysis of the situation of Malagasy children, UNICEF, 1984.

²⁰ Rapport sur l'enquête de nutrition: Antsirabe, by Dr. M.J. Andriamanga, November 1984.

children are below normal height, which bears witness to chronic malnutrition: in 61 percent of cases (84% for boys and 58% for girls) the child's height was equal to or less than 90 percent of WHO's height/age norm, a figure that is especially surprising since the target population lives in one of the country's richest agricultural regions. Up to the age of one year, only 20 percent of the children are below normal height, but the situation rapidly deteriorates at the time of weaning (around 18-20 months) and, from the age of 2 onwards, 7 out of 10 children are too short for their age. Acute malnutrition resulting in weight insufficiency—weight below or equal to 80 percent of the norm for the age—affects 34.1 percent of the children. The prevalence of serious malnutrition, measured by a weight/height ratio lower than or equal to 80 percent of WHO's weight/height norm, is much lower, and fewer than one percent of the children suffer from height/weight malnutrition.

Another survey²¹, carried out in February 1974 and covering a total of 832 children attending the malaria prevention centers (centres de nivaquinisation) in four districts of Antananarivo province, revealed that 2.3 percent of the children were suffering from serious malnutrition (weight by age below 60 percent of the norm) and 31.5 percent from moderate malnutrition (weight by age between 60 and 79 percent of the norm). Here again, the number of children suffering from malnutrition rises after one year of age and between two and three years, so that almost half the children are affected by malnutrition. Serious malnutrition appears primarily between the ages of one and two. The prevalence of malnutrition is considerably higher in large families with six or more children, where 35 percent of families suffer from malnutrition, against 27 percent in families with 1-5 children. In addition to family size, birth order is also a factor affecting malnutrition: 36 percent of children of sixth or higher birth order are in poor nutritional condition, against 29 percent of those of first through fifth birth order. Lastly, the survey once more confirmed the existence of a vicious circle: protein-calorie malnutrition, immune deficiency, infectious disease, and aggravation of poor nutritional condition. During the three months preceding the survey, 19 percent of the children in good nutritional condition had experienced fever, against 36 percent of malnourished children; one-third of well-nourished children had suffered from acute respiratory diseases against one-half of the

²¹ Enquête nutritionnelle rapide en milieu rural chez les enfants de moins de six ans dans le Faritany d'Antananarivo, Dr. Randrianarimana, S. Randrianarimanana, and M. Ravelonanosy. Etude épidémiologique de l'allaitement maternel à Madagascar. Projet 62/MADA/WHO: Preliminary Report: Service central du Laboratoire de Nutrition, MOH.

malnourished children, and the incidence of diarrheal diseases was twice as high among malnourished children as among those in good nutritional condition.

In September 1983, a nationwide survey²² was carried out, based on the technique of random cluster sampling. This survey, which covered 1,855 children under two years of age, half in urban and half in rural areas, confirmed the poor nutritional state of Malagasy children: 31 percent of the children surveyed were underweight for their age, below 80 percent of the norm. The as yet preliminary findings of this study give no other information on malnutrition, or at least on serious malnutrition. The survey also revealed that 14.4 percent of the children were of insufficient birth weight (less than 2.5 kg), a figure comparable to that of the report for the first half of 1984 of the Department of Health and Population Statistics, in which 11 percent of newborns have a birth weight of less than 2.5 kg.

The monitoring of 44,818 children between five months and five years attending 59 nutritional recovery centers served by the Catholic Relief Service has revealed that over a six-month period (December 1984-May 1985), 52 percent of children have a weight by age below under 80 percent of the norm and are thus suffering from moderate malnutrition.²³ The percentage of malnourished children falls slightly, to 47 percent, during the harvest period (June 1985). These figures, higher than those of the other surveys, are explained by the fact that many of these children come from families which, being poor and of large size, fall into the high-risk category. The most affected region is Antsirabe, with malnutrition affecting 69 percent of the 900 attending the centers, and the least affected is the province of Toliary, where only 39 percent of the 1,000 children monitored in the centers are malnourished. The low percentage of malnutrition in Toliary province (39% against 52% for all of the provinces) should probably be related to the fact that this region is rich in dairy products—a large quantity of which are locally consumed. Here again, the most affected are in the 1-2 age range, where the percentage of malnourished children reaches 54 percent at harvest time and 60 percent during the period between harvests.

In the Pediatrics Department of Befelatanana General Hospital, approximately six percent of the children hospitalized in 1978 were

²² Study of the epidemiological aspects of breast-feeding in Madagascar. Project 62/MADA/WHO. Preliminary report. Stenciled document, MSP Central Nutrition Laboratory Department.

²³ Food and Nutrition Program. CRS Narrative Report, August 1985.

suffering from protein-calorie malnutrition.²⁴ This percentage rose to 9.5 percent in 1984,²⁵ and, according to the Chief of Pediatrics, practically all children hospitalized at the present time; i.e., in 1985/86, display in addition to the ailment for which they were hospitalized an evident or masked nutritional pathology representing a factor that both aggravates morbidity and promotes mortality.

Another communication from the Chief Physician at Befelatanana Hospital mentions that 15 percent of the children under six have been hospitalized for outright malnutrition.²⁶

A clinical study of 100 non-pregnant and non-lactating women revealed that 27 percent of them were suffering from hypocalcemia (blood calcium lower than 90 mg/liter).²⁷ This calcium deficiency is quite widespread in Madagascar, where spasmophilia is not uncommon.²⁸ Malagasy diet is poor in calcium and does not suffice to meet WHO's recommended minimum requirements of 450 mg of calcium per day. Surveys²⁶ have revealed coverage rates of 208, 230, 241, and 280 mg per day. Several factors may be at the root of this calcium deficiency: the water, which is poor in calcium; a diet rich in phytate and oxalate, a calcium fixative, which hinders its intestinal absorption, and rice, the main dietary staple, which is not only poor in calcium but has an unbalanced phosphorus/calcium ratio that also hinders the intestinal absorption of calcium. In addition to these dietary factors, hormonal factors also play a part (parathyroid deficiency, lack of Vitamin D).

Iron deficiencies, revealed principally by clinical examination of pregnant women, have not yet been quantified. There seems to be no magnesium or Vitamin A deficiency.

²⁴ Rapport d'expertise-conseil en nutrition à Madagascar, by S. Miladi, FAO expert consultant.

²⁵ Personal communication from Dr. Rezanamparany.

²⁶ Personal communication from Dr. Rakotoarimanana.

²⁷ Exploration statistique du métabolisme calcique chez les malgaches, by Ravoninsituou and Coll. Development Research.

²⁸ Personal communication from Dr. Ratsirahonana, Ostie Chief Physician.

5.2 Breast-feeding and dietary habits²⁹

Breast-feeding remains very widespread, both in the urban areas (92.7%) and in the rural areas (98.7%). The average duration of breast-feeding is 16 months, with a significant difference between urban and rural areas. Less than one percent of children are weaned during the first six months; 50 percent are weaned around 14 months; and 4 percent are still at the breast at 24 months. The start of a new pregnancy is by far the principal factor in weaning. The first food supplements are introduced at around 4-5 months. In over 80 percent of cases, these consist of rice prepared in different ways (rice water, soft rice, boiled rice, etc.). During the first year, the consumption of staple foods is adequate to meet the child's energy needs. While protein consumption is relatively low, it is still not negligible, even though all the protein may come from the mother's milk. The fact that nutritional requirements are being met in a relatively satisfactory manner thus explains the relatively low frequency of malnutrition at this age. Between one and two years, breast-feeding diminishes considerably, and if it does continue it represents only a supplementary food source. At the same time, consumption of foods containing protein remains low (once a day at 18 months). Except in the south where it is produced, cow's milk is rare and expensive and very little used; most proteins of animal origin, including eggs and fish, are the subject of dietary taboos (fady), and fruit consumption is insignificant except in the urban areas. This is the point at which malnutrition reaches its maximum intensity.

In conclusion, we may say that the specific, and still fragmentary, studies of the nutritional condition of Malagasy children have revealed the existence of an extremely disturbing situation that demands further study. While the serious malnutrition affecting one percent of children is less widespread than in other sub-Saharan countries (Zimbabwe 9%, Ethiopia 75, Cameroon, Liberia, Lesotho around 3%), moderate malnutrition (weight by age less than 80% of the norm) affects practically one child in three, a level comparable to that of the other countries, and

²⁹ Enquête nutritionnelle rapide en milieu rural chez les enfants de moins de 6 ans dans le Faritany d'Antananarivo, by Dr. Randrianarimana, S. Randrianarimana and M. Ravelonamors. Epidemiological Study of breast-feeding in Madagascar. Project 62/MADA/WHO: Preliminary Report. Central Department Nutrition Laboratory. MSP.

chronic malnutrition is particularly high: 61 percent of children are below normal height, against 30 percent in Zimbabwe, 18 percent in Liberia, 18 percent in Ethiopia, 9 percent in Togo, and 21-24 percent in Lesotho, Sierra Leone and Cameroon.³⁰

³⁰ The comparative data are taken from different sector reports (Health, Population, Nutrition) prepared by the World Bank.

Table 1: MAJOR CAUSES OF MORBIDITY

AFFECTIONS	Number of cases	% Chapitre	% Total
<u>Respiratory Diseases</u>			
Undefined bronchitis	600,490	28.1	9.3
Flu	448,068	21.0	6.9
Simple cold	431,380	20.2	6.7
Bronchitis and acute bronchiolitis	166,936	7.8	2.6
Tonsillitis	147,565	6.9	2.3
Others	342,688	16.0	5.3
Subtotal	<u>2,137,127</u>	<u>100.0</u>	<u>33.2</u>
<u>Infectious and Parasitic Diseases</u>			
Intestinal diseases	624,970	34.3	9.7
Malaria	440,001	24.1	6.8
Helminthiases	240,470	13.2	3.7
Measles	140,653	7.7	2.2
Ascariosis	111,585	6.1	1.7
Venereal diseases	111,329	6.0	1.6
Chickenpox	36,817	2.0	0.6
Whooping cough	27,302	1.5	0.4
Mumps	25,711	1.4	0.3
Bilharziase	12,630	0.7	0.2
Tuberculosis	7,754	0.4	0.1
Leprosy	3,833	0.2	0.06
Others	39,702	2.2	0.6
Subtotal	<u>1,822,757</u>	<u>100.0</u>	<u>28.3</u>
<u>Undefined morbidity</u>	686,115	100.0	10.6
<u>Digestive system diseases</u>	461,142	100.0	7.2
<u>Diseases of nervous system and organs of sens</u>	367,718	100.0	5.7
<u>Skin and sub-cutaneous diseases</u>	233,971	100.0	3.6
<u>Poisonning and traumas</u>	216,713	100.0	3.4
<u>Complicated pregnancy and delivery</u>	169,269	100.0	2.6
<u>Disease of genito-urinary system</u>	87,683	100.0	1.4
<u>Other</u>	258,636	100.0	4.0
TOTAL	6,441,132		100.0

Source: Health Care Service, 1981 Annual Report.

Table 2: TWELVE MAJOR CAUSES OF MORBIDITY

Affections	Number	Percentage
Acute respiratory trachea affection	772,164	12.0
Intestinal disease	624,970	9.7
Undefined bronchitis	600,490	9.3
Digestive system disease	461,142	7.2
Flu	448,068	6.9
Malaria	440,001	6.8
Nervous system/Sens organs disease	367,718	5.7
Helminthiase	240,470	3.7
Skin disease	233,971	3.6
Trauma and poisoning	216,713	3.4
Affection due to pregnancy and delivery	169,269	2.6
Measles	140,653	2.2

Source: Health care service, 1981 annual report.

Note: Apart from non-defined morbidity affections, which with 686,115 cases occupy the second place.

Acute respiratory tach affection include: cold, sinusitis and pharyngitis, tonsillitis, laryngitis and tracheitis, acute superior respiratory trach infection bronchitis and acute bronchiolitis.

Table 3: MAJOR CAUSES OF MORBIDITY BY AGE GROUP

AFFECTIONS	0 - 1	1 - 4	5 +	TOTAL	%
Respiratory system disease	17.2	22.6	60.2	2,137,127	100
Infectious and parasitic disease	19.1	25.8	55.1	1,822,757	100
Undefined morbid syndromes	11.8	18.3	69.9	686,115	100
Digestive system disease	10.6	15.7	73.6	461,142	100[
Nervous system and sense organs	12.7	21.1	66.2	367,718	100
Skin and sub-cutaneous disease	12.2	19.5	68.3	233,971	100
Others	4.1	10.0	85.8	732,302	100
TOTAL	14.7	20.9	64.3	6,441,132	100

Source: Health care service, 1981 annual report.

Table 4: MAJOR CAUSES OF MORBIDITY BY PROVINCE PER 1,000 PEOPLE in 1982

PROVINCE	1982 Population	Respirat. Affection	Infectious and Parasitic Diseases	Undefined Syndromes	Digestive Affection	Disease of Nervous System and Sense Organs
Antananarivo	2,589,436	398	137	35	77	31
Fianarantsoa	2,138,783	74	136	26	19	10
Toamasina	1,415,133	210	302	87	56	46
Mahajanga	981,563	120	184	47	38	39
Toliary	1,241,646	161	237	86	38	44
Antsiranana	713,017	131	261	38	55	56
MADAGASCAR	8,989,578	210	193	50	49	34

Source: Ministry of Public Health. Department of health and medical services. Annual Report, 1982. Population Projection by medical districts (1982-87). Service of demographic and health statistics.

Table 5: MORBIDITY DUE TO DISEASE OF HYDRIC ORIGIN

AFFECTIONS	0 - 1	1 - 4	5 +	TOTAL
Typhoid and paratyphoid fever	167	269	1,752	2,188
Other salmonellose	78	184	2,972	3,234
Shigellose	58	168	589	815
Amoebiasi	178	568	1,864	2,610
Other intestinal protozoa disease	216	212	336	764
Intestinal infection due to other microbacteria	998	2,062	4,433	7,493
Intestinal infection not well defined	177,815	148,141	282,447	608,403
Other gastro-enteritis and colitis non-infectious	15,607	16,781	32,438	64,826
Bilharziöse	577	1,365	10,688	12,630
TOTAL	195,694	169,750	337,519	702,963

Source: Health Care service, 1981 Annual Report.

Table 6: TWELVE MAJOR CAUSES OF MORTALITY

AFFECTIONS	PERCENTAGE
Infectious intestinal diseases	12.2
Undefined bronchitis	7.5
Malaria	5.1
Measles	4.9
Broncho-pneumonia	3.9
Gatro-enteritis and colitis	3.3
Bronchitis and bronchiolitis	3.0
Other respiratory diseases	2.4
Chronic bronchitis	2.3
Senility	1.9
Whooping cough	1.9
Asthma	1.6

Source: Department of Health and Medical Service, 1982 Annual Report.

Table 7: POPULATION DENSITY BY PROVINCE

PROVINCE	POPULATION			Surface Km ²	POPULATION DENSITY		
	1975	1982	1985		1975	1982	1985
Antananarivo	2,166,500	2,589,436	2,828,856	58,283	37.2	44.4	48.5
Fianarantsoa	1,803,893	2,138,783	2,317,306	102,373	17.6	20.9	22.6
Toamasina	1,179,479	1,415,133	1,540,633	71,911	16.4	19.7	21.4
Mahajanga	819,353	981,563	1,063,413	150,023	5.5	6.5	7.1
Toliary	1,032,897	1,241,646	1,338,478	161,405	6.4	7.7	8.3
Antsiranana	598,242	713,017	774,901	43,046	13.9	16.6	18.0
MADAGASCAR	7,600,414	9,079,578	9,863,587	587,041	12.9	15.5	16.8

Source: Population: MSP: Projection de population par circonscription médicale 1982 1987.
Density: MSP: Direction des services sanitaires et médicaux. Rapport annual 1982.

MADAGASCAR

MINISTRY OF HEALTH

ORGANIZATION CHART

Cabinet -- Minister

Secretary General

Legislation Department
International Relations Department
Documentation and Archives Department

Directorate of Public Health and Medical

Medical Care Department
Staff Training Dept.
Communicable Disease Control Department
Health and Population Statistics Department
Frontier Health Control Department

Directorate of Community Health Services

Maternal and Child Health Care Department
Waste Disposal and Sanitary Engineering Dept.
Central Nutrition Laboratory Department
Vaccination and Mobile Teams Department

Directorate of Pharmacies and Laboratories

Procurement and Central Pharmacy Department
Pharmacies Department
Laboratories Department
Traditional Remedies Dpt.

Directorate of Administrative and Financial Affairs

Personnel Department
Financial Department
Logistics Department

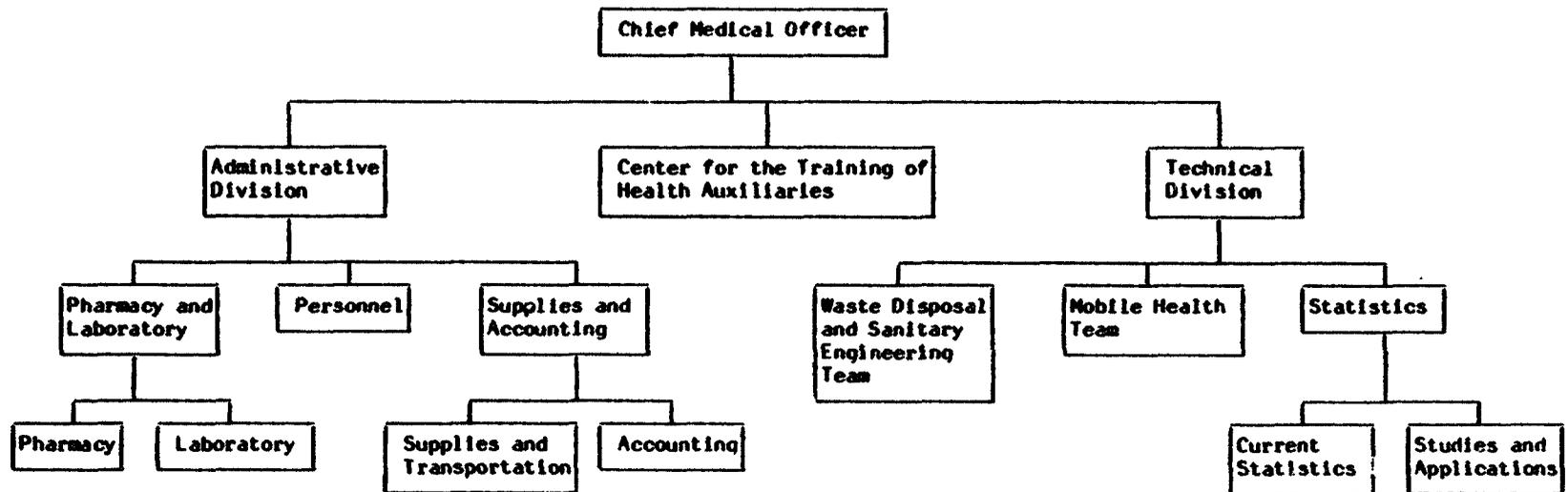
Directorate of Studies, Planning and Programming

Planning and Evaluation Department
Studies and Programming Department
Investment and Maintenance Department

6 Provincial Health Departments
36 Medical Districts

MADAGASCAR

**ORGANIZATION CHART FOR THE OFFICE OF THE CHIEF MEDICAL OFFICER
FOR THE MEDICAL DISTRICT OF WEST INERINA**

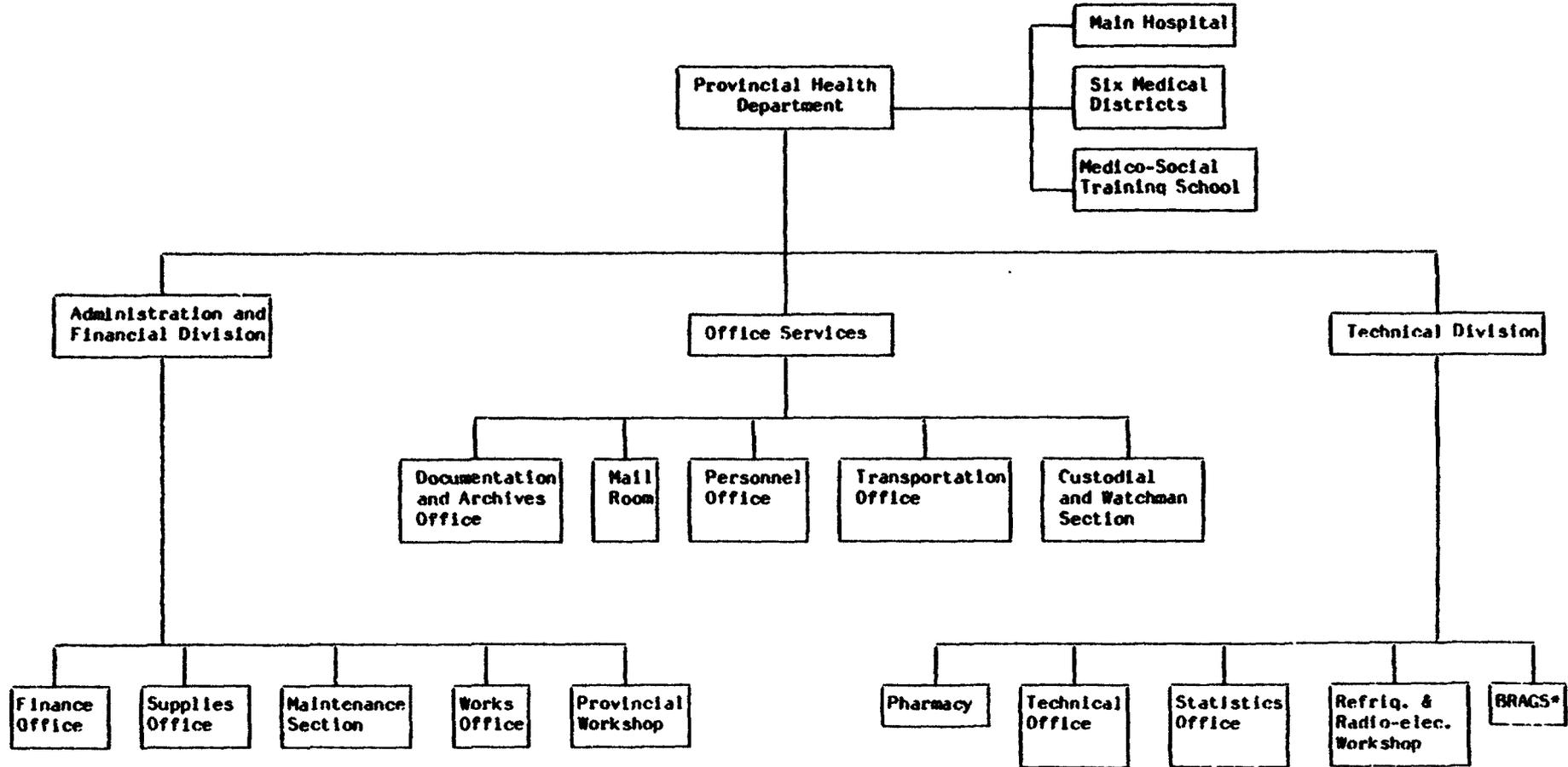


Source: Ministry of Health, Directorate of Studies, Planning and Programming

MADAGASCAR

MINISTRY OF HEALTH

ORGANIZATION OF PROVINCIAL HEALTH DEPARTMENT, FIANARANTSOA

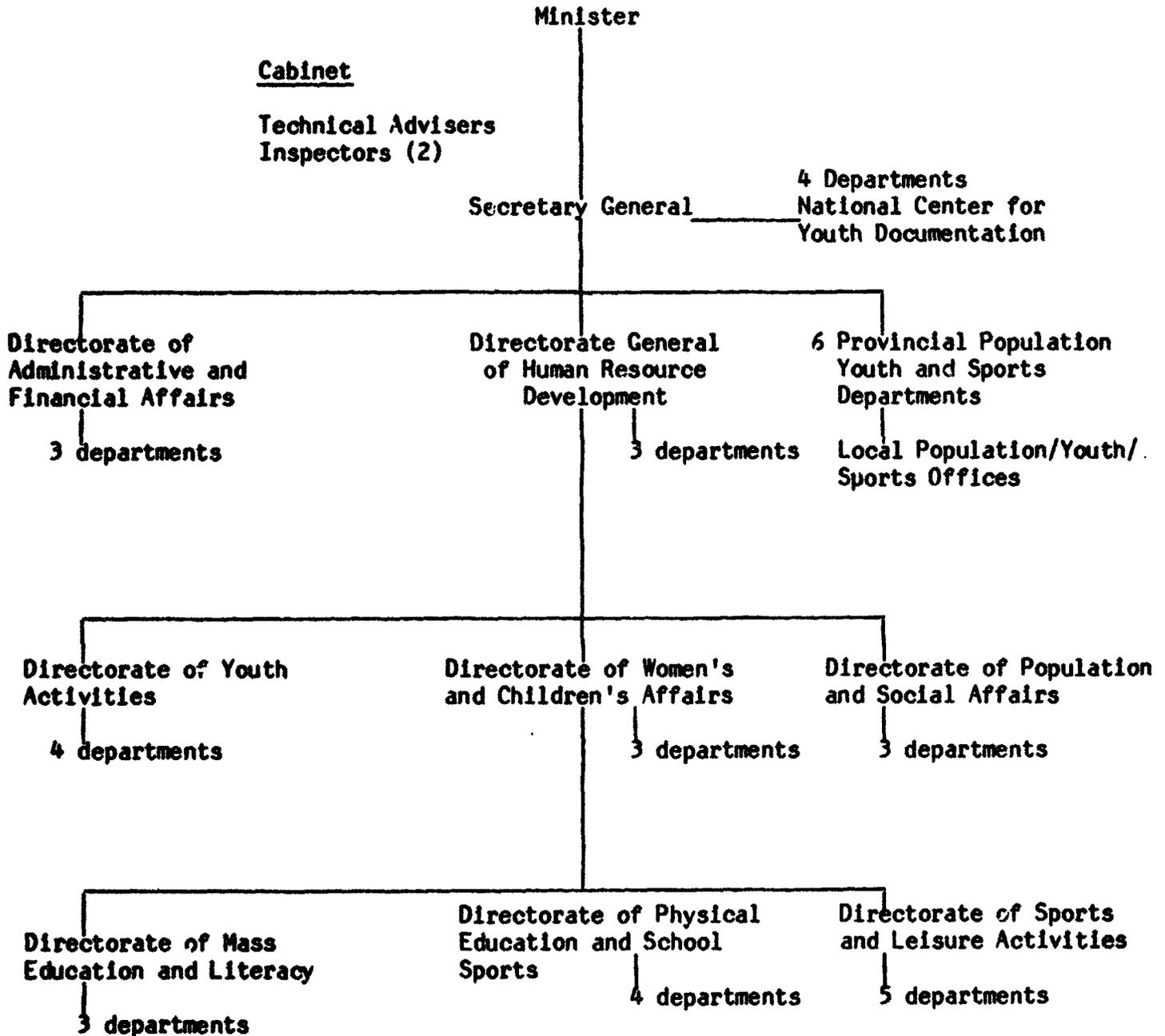


* Regional Office for Waste Disposal and Sanitary Engineering

Source: Ministry of Health, Provincial Health Department, Fianarantsoa.

MADAGASCAR

**ORGANIZATION CHART FOR MINISTRY OF POPULATION,
SOCIAL AFFAIRS, YOUTH AND SPORTS**



Source: Ministry of Population, Social Affairs, Youth and Sports.

Table 1: NUMBER OF PUBLIC HEALTH CENTERS BY PROVINCE AND BY CATEGORY, 1978-85

Provinces	Categories of Health Centers																			
	General Hospital		Provincial Hospital		Medico-Chirurgical Hospital		Secondary Hospital		Medical Center		Health Center		Nurses Aides		Delivery		Care Center		Total	
	78	85	78	85	78	85	78	85	78	85	78	85	78	85	78	85	78	85	79	95
Antananarivo	2	2	-	-	2	2	14	14	23	23	90	94	36	35	9	10	56	107	232	367
Fianarantsoa	-	-	1	1	2	3	13	13	18	19	69	69	13	16	30	38	98	254	244	413
Toamasina	-	-	1	1	2	3	12	12	11	11	76	72	6	11	5	8	95	255	208	373
Mahajanga	-	-	1	1	-	1	8	8	19	20	46	46	27	27	18	19	93	249	212	371
Toliary	-	-	1	1	3	3	6	6	18	18	45	50	26	25	15	17	93	246	207	386
Antsiranana	-	-	1	1	2	2	5	5	8	8	20	9	15	30	9	5	41	112	101	172
Madagascar	2	2	5	5	11	14	58	58	97	99	346	340	123	144	86	97	476	1323	1204	2082

Source: Department of Health and Medical Services, Annual Report, 1978.
World Health Organization Report 31/12/1985.

Table 2: ESTIMATION OF THE POPULATION SERVICED BY PUBLIC AND PRIVATE HEALTH CENTERS, 1985

Provinces	Surface (km ²)	Number of Public/Private Centers	Area by Centers (km ²) ^{1/}	Area ^{2/} by 5km radius	% ^{3/}	Urban Population	Rural ^{4/} Population covered by 5km radius	Total Serviced Population	Total Population	Covered Population (in %)
Antananarivo	58,283	427	135	79	59	908,900	1,236,700	2,145,600	3,005,000	71.4
Fianarantsoa	102,373	444	235	79	34	293,600	722,000	1,015,600	2,417,100	42.0
Toamasina	71,911	437	165	79	48	221,800	654,600	876,400	1,585,500	55.3
Mahajanga	150,023	403	372	79	21	197,400	191,600	389,000	1,109,600	35.1
Toliary	161,405	420	384	79	21	150,400	758,700	909,100	1,382,100	65.8
Antsiranana	43,046	192	224	79	35	211,600	213,600	425,200	821,800	51.7
Madagascar	587,041	2,323	232	79	31	1,983,700	3,777,200	5,760,900	10,321,100	55.9

^{3/} Percent of ^{2/} in relation to ^{1/}.
^{4/} ^{3/} multiplied by rural population.

Source: WHO Report, December 1985.
Health Care Service, Ministry of Public Health.

Table 3: HEALTH COVERAGE INDICATOR BY REGION

Province	Population by					(6) Percentage health centers with 1 aide	(7) Number of consultations/ center/year	(8) Number of consultations/ capita/year
	(1) Hospital Beds	(2) Doctor	(3) Paramedics	(4) Primary Health Care	(5) Total Health Centers			
Antananarivo	487	5,003	1,261	9,212	7,037	43.8	19,276	2.3
Fianarantsoa	502	18,717	2,384	6,411	5,444	57.2	7,314	1.3
Toamasina	575	13,551	1,743	4,582	3,628	58.3	7,790	2.1
Mahajanga	302	10,383	1,380	3,254	2,753	61.8	4,448	1.7
Toliary	506	15,657	1,745	3,861	3,291	63.3	4,966	1.5
Antsiranana	306	10,965	1,143	5,268	4,280	58.3	12,578	3.1
Madagascar	452	9,312	1,562	5,421	4,443	56.9	9,130	2.1

Source: Health Care Service, 1984 annual report.
World Health Organization 1985 report.
Health Care Service, 1982 annual report.

- (1) Private and public health centers, 1981
- (2) Private and public doctors, 1981 (1985: 1 doctor/6,333 people).
- (3) Private and public paramedics, 1981 (1985: 1 paramedical/1,370 people)
- (4) Health Posts, Nurse stations, Birthing clinics, Primary health care centers, 1985
- (5) All public (1985) and private (1982) centers
- (6) Percentage of Primary health care centers in relation to total public and private health centers, 1985
- (7) and (8) Private and public sector in 1981 except for FIANARANTSOA: public sector only.

Table 4: CHANGE IN NUMBER OF PERSONNEL, MINISTRY OF HEALTH

Categories	1975	1985	Increase in %
Doctor	543	1,218	224
Oral Surgeon	11	31	281
Dentist	21	45	214
SUBTOTAL	575	1,294	
Pharmacist	20	31	155
Midwife	867	1,644	190
Nurse	2,148	3,325	158
Health aide	-	1,387	-
Other paramedical personnel	203	476	234
Various techni.	44	57	129
SUBTOTAL	3,282	6,920	
TOTAL	3,857	8,214	213

Source: Ministry of Health findings, 1975-85.
Department of Study/Planification.
Ministry of Public Health.

Table 5: VACCINATION COVERAGE BY PROVINCE AND DISTRICT, 1984

Province/District	Population 0 - 1	Vaccination Coverage Rate		
		BCG	DPT 3 inj.	Polio 3 doses
<u>ANTANANARIVO</u>				
Imerina East	34,750	34.8	27.5	21.8
Imerina West	24,456	41.3	22.2	18.9
Itasy	11,485	10.4	11.6	6.4
Ambatolampy	14,963	39.7	17.6	14.3
Antsirabe	19,145	50.2	27.4	5.7
Total Province	<u>104,799</u>	<u>37.2</u>	<u>23.1</u>	<u>15.4</u>
<u>FIANARANTSOA</u>				
Fianarantsoa	24,814	29.3	40.8	17.5
Ambositra	14,823	26.7	20.5	22.9
Mananjary	17,263	10.7	6.8	3.2
Farafaangana	8,915	0.4	8.0	6.6
Manakara	9,512	16.9	18.7	16.1
Vangaindrano	6,894	10.2	9.2	8.0
Total Province	<u>82,221</u>	<u>18.8</u>	<u>21.2</u>	<u>13.3</u>
<u>TOAMASINA</u>				
Tamatave	12,607	10.8	13.1	8.5
Vatomandry	10,938	12.6	12.3	11.8
Ambatondrazaka	8,786	17.2	8.7	13.0
Moramanga	5,618	17.9	17.2	15.8
Fenerive East	4,483	11.9	8.7	5.9
Marqantsetra	3,976	21.5	4.4	3.7
Sainte Marie	411	41.6	42.8	12.9
Total Province	<u>53,819</u>	<u>14.6</u>	<u>12.2</u>	<u>9.7</u>
<u>MAHAJANCA</u>				
Mahajanga	8,619	21.1	11.3	2.4
Maevatanana	6,385	14.8	6.2	7.0
Analalava	6,023	22.8	18.4	17.9
Mandritsara	6,733	11.2	5.6	3.5
Port Berge	4,131	23.1	6.7	1.2
Maintirano	4,290	13.0	3.3	2.8
Total Province	<u>36,181</u>	<u>17.7</u>	<u>9.1</u>	<u>5.9</u>

.../...

(Table 5 continued)

ANNEX IV
Page 5 of 6 pages

Province/District	Population 0 - 1	Vaccination Coverage Rate		
		BCG	DPT 3 inj.	Polio 3 doses
<u>TOLIARY</u>				
Toliary	8,950	84.0	41.2	33.5
Betioky	7,262	67.9	28.6	7.1
Murumbe	2,223	82.7	27.1	15.8
Morondava	7,139	24.7	11.5	7.8
Miandrivazo	1,725	57.0	23.3	20.5
Tolagnaro	8,049	46.6	22.0	12.1
Ambovombe-Androy	5,458	25.3	10.8	5.6
Betroka	5,263	19.0	7.3	4.6
Total Province	<u>46,069</u>	<u>50.3</u>	<u>22.4</u>	<u>14.0</u>
<u>ANTSIRANANA</u>				
Antsiranana	7,050	7.8	8.2	5.1
Ambanja	3,993	52.2	37.6	21.5
Antalaha	16,249	10.0	12.4	9.2
Total Province	<u>27,292</u>	<u>15.6</u>	<u>15.0</u>	<u>10.0</u>
TOTAL MADAGASCAR	350,381	27.4	18.8	12.5

Source: Community Health Department. Service of vaccinations and mobile teams, Annual Report 1984.

Population projection by medical districts, 1982-87. Service for Health and Demographic Statistics.

Table 6: CHANGE IN THE VACCINATION COVERAGE RATE

	1982	1983	1984
<u>0 - 1 year old⁽¹⁾</u>			
BCG	21.9	31.4	27.4
DPT 3 inj.	15.1	23.5	18.8
Polio 3 doses	7.9	10.7	12.5
<u>1 year and older⁽²⁾</u>			
BCG	49.0	49.4	43.6
DPT 3 inj.	26.3	43.2	35.4
Polio 3 doses	16.6	23.4	20.8

Source: Direction de la Sant communautaire--Service des vaccinations et des quipes mobiles--Rapport annual 1984.

Projection de population par circonscription m dicale
1982-1987--Service des statistiques sanitaires et d moographiques.

(1) 0 - 1 years old: Target population: total population 0-1 years of age.

One year old and older: Target population: BCG: 1/5 of the population between 2 and 15 years old.

BCG/DPT/Polio: 80 percent of the population 1-2 years old.

MADAGASCAR
PROJECTED MEDICAL DOCTOR NEEDS AND SUPPLY 1986-1995

	Projected Requirements				Projected Supply				
	New Posts		Attrition ^{2/} (3)	Total Requirements (1)+(2)+(3) (4)	Assumption No. 1: Maintain Current Level of Internal Efficiency ^{1/}		Assumption No. 2: 5% Cumulative Annual Increase In Internal Efficiency ^{1/}		
	Public Sector (1)	Private Sector (2)			Net Output ^{3/} (5)	Surplus (Deficit) (5)-(4) (6)	Cumulative Surplus (7)	Net Output ^{3/} (8)	Cumulative Surplus (9)
Existing Backlog	0						90		
1986	66 ^{4/}	5	6	77	200	123	213	200	
1987	10	5	6	21	363	342	555	363	
1988	10	5	6	21	210	189	744	221	
1989	10	5	7	22	276	254	998	319	
1990	10	5	7	22	369	347	1345	435	
1991	10	5	8	23	365	342	1687	454	
1992	10	5	8	23	292	269	1956	386	
1993	10	5	9	24	280	256	2212	392	
1994	10	5	10	25	205	180	2392	309	
1995	10	5	12	27	235	208	2600	371	
TOTAL FOR 10 YEARS	156	50	79	285	2885		2600	3450	3165

^{1/} Refers to internal efficiency of medical education. Assumption No. 2 applies beginning in 1987.

^{2/} Public Sector only. Assumes average attrition initially of 0.5% p.a., increasing to 0.9% p.a. by the end of the period.

^{3/} Net output equals total graduates of previous year (e.g., June 1985 graduates fill 1986 requirements) minus 50 who depart for studies abroad and do not return.

^{4/} Actual budget posts authorized.

Source: World Bank projections.

MADAGASCAR

PROJECTED DENTIST NEEDS AND SUPPLY 1986-1995

	<u>Projected Requirements (New and Attrition)</u>	<u>Training Output^{1/}</u>	<u>Surplus (Deficit)</u>	<u>Cumulative Surplus</u>
Existing Backlog				0
1986	8 ^{2/}	42	34 ^{2/}	34
1987	9	78	69	103
1988	9	108	99	202
1989	9	72	63	265
1990	9	36	27	292
1991	10	18	8	300
1992	10	18	8	308
1993	10	18 ^{3/}	8	316
1994	10	18	8	324
1995	10	18	8	332
TOTAL FOR 10 YEARS	94	426		332

^{1/} Graduates from previous year (e.g., July 1986 graduates fill 1987 manpower requirements), estimated to be 60% of intake six years earlier.

^{2/} Actual recruitment and residual surplus reported by Personnel Service, Ministry of Health.

^{3/} All graduates through 1993 are already in the system.

Source: World Bank projections.

MADAGASCAR

PROJECTED PARAMEDICAL PERSONNEL NEEDS AND SUPPLY 1986-1995 1/

	<u>New Posts</u> (1)	<u>Attrition 2/</u> (2)	<u>Total Needs</u> <u>(1) + (2)</u> (3)	<u>Training</u> <u>Output</u> (4)	<u>Surplus</u> <u>(Deficit)</u> <u>(4) - (3)</u> (5)	<u>Cumulative</u> <u>Surplus</u> (6)
Existing Backlog						0
1986	20 3/	25	45	245	200	200
1987	30	25	55	245	190	390
1988	30	25	55	245	190	580
1989	30	30	60	245	185	765
1990	30	30	60	245	185	950
1991	30	30	60	245	185	1135
1992	30	35	60	245	180	1315
1993	30	35	60	245	180	1495
1994	30	35	60	245	180	1675
1995	30	40	70	245	175	1850
TOTAL FOR 10 YEARS	290	310	600	2450		1850

1/ Requirements and supply are for the public sector only and refer to personnel graduating from paramedical training schools; requirements for health aids are not included.

2/ Assuming average annual attrition initially of 0.5%, rising to 0.7% by the end of the period.

3/ Actual budget posts authorized.

Source: World Bank projections.

MADAGASCAR

FACULTY OF MEDICINE: PROJECTED ENROLLMENTS AND OUTPUT 1985/86 - 1994/95

	<u>1985/86</u>	<u>86/87</u>	<u>87/88</u>	<u>88/89</u>	<u>89/90</u>	<u>90/91</u>	<u>91/92</u>	<u>92/93</u>	<u>93/94</u>	<u>94/95</u>
Pre-Med Year	950	950	450	0	100	0	100	0	100	0
1	1429	1053	785	325	197	150	0	90	0	90
2	987	666	603	571	360	320	165	0	81	0
3	847	760	576	544	459	347	310	170	30	73
4	404	521	493	389	354	295	322	280	150	30
5	311	393	505	500	412	397	308	343	270	150
6	413	258	326	419	415	342	330	255	285	240
TOTAL ENROLLMENTS	5341	4601	3738	2748	2297	1851	1535	1138	916	583
GRADUATES	413	258	326	419	415	342	330	255	285	240

Notes: Projections of student flows for students already in the system are based on estimated efficiency rates. These are raised in later years to reflect efficiency gains resulting from smaller total enrollments. Intake projections for 1987/88 onward illustrate the flows which would result from reducing intake to levels necessary to meet requirements for medical doctors. Total enrollments would otherwise stabilize at about 4,000.

Source: World Bank projections.

**Table 5: INTERNAL EFFICIENCY OF MEDICAL EDUCATION:
COHORT OF 1000 STUDENTS**

Year	Pre-Med	Year of Study					Intern Year	Graduates
		1	2	3	4	5		
1	1000							
2	800	150						
3		487	38					
4		282	135	19				
5		150	146	74	10			
6			119	112	42	8		
7				90	79	36	7	7
8				20	80	72	30	30
9					23	79	60	60
10					4	32	66	66
11						9	27	27
12							9	9
Total students-year per class	1800	1069	438	315	238	236	199	
Total dropouts per class	450	217	99	35	0	0		

Summary

Total cohort 1000
of which: graduates 199
dropouts 801

Total student-years (excluding intern year)^{1/} 4096
student-years per graduate (4096:199) 20.6

Estimated cost per student-year FMG 556,550

Cost per graduate (FMG 556,500 x 20.6) FMG 11,464,000
US\$17,600

Cost per X 330 graduates graduate not otherwise FMG 181.5 million
FMG 11 employed million
million = (US\$280,000)

20 graduates recruited by MOH^{2/}

Assumed Efficiency Rates (%)^{1/}

Years of Study	Pass ^{2/}	Repeat	Dropout
Pre-Med Year			
1st Attempt	15	80	5
2nd Attempt	50	not allowed	50
1	25	58	17
2	50	35	15
3	54	32	14
4	84	16	0
5	83	17	.0
Intern Year	100		

^{1/} Intern year is excluded since the student is effectively working as a doctor and making a contribution to the provision of health services.

^{2/} See Annex V, Table 1.

^{1/} Based on rates observed in 1982/83 and 1984/85.

^{2/} Pass rate for first-year students. Repeaters are assumed to have slightly higher pass rates.

Source: University of Madagascar, Faculty of Medicine and World Bank estimates.

**Table 1: TRENDS IN MINISTRY OF HEALTH EXPENDITURES
(FMG billion)**

Year	Recurrent	Capital ^{1/}	Total
1977	8.2	0.7	8.9
1978	9.0	0.6	9.6
1979	9.5	0.9	10.4
1980	11.2	0.4	11.6
1981	9.4	0.3	9.7
1982	9.2	0.7	9.9
1983	11.7	1.3	13.0
1984	12.2	2.2	14.4
1985	13.7	1.8	15.5

^{1/} Capital includes local and only 1984 foreign funded projects of 870 MM

Source: Ministry of Finance.

**Table 2: TRENDS IN REAL MINISTRY OF HEALTH EXPENDITURES
(FMG billion)**

Year	Recurrent	Capital	Total
1977	18.2	2.3	20.5
1978	19.1	1.8	20.9
1979	17.7	2.4	20.1
1980	21.5	1.0	22.5
1981	14.8	0.6	15.4
1982	12.9	1.1	14.0
1983	14.6	1.6	16.2
1984	13.8	2.4	16.2
1985	13.7	1.8	15.5 (Base Year)

Source: Calculated from Ministry of Finance data using GNP deflator (see Annex VI, Table 1).

Table 3: PUBLIC INVESTMENT PROGRAM, 1986-1990
(FMG in millions)

	1986	1987	1988	1989	1990
HC Central Level	2,370	2,205	2,725	2,725	2,195
HC Intermediary Level	2,700	1,755	1,755	1,755	1,755
PHC Program	270	270	270	270	270
Logistics and maintenance	350	620	520	520	380
CNDS	170				
TOTAL	5,860	4,850	5,270	5,270	4,600

HC: Health Center.

CNDS: Centre national de Developpement sanitaire (National Center for Health Development).

PHC: Primary Health Care.

Source: Ministry of Health, project files.

**Table 4: EXTERNAL BILATERAL AND MULTILATERAL
HEALTH AIDE FROM 1981 TO 1984**

	<u>Technical Assistance</u> (FMG in millions)			
	1981	1982	1983	1984
UNDP	60	28	46	92
UNICEF	99	162	227	173
WHO	81	53	111	148
UNFPA	0	1	9	5
FRANCE*	1306	1466	1600	1756
SWITZERLAND	10	69	139	62
FEDERAL REPUBLIC OF GERMANY	0	0	0	186
ITALY	0	0	0	135
USA	0	0	0	3
EUROPEAN DEVELOPMENT FUND	33	27	0	0
CATHWELL	5	0	0	0
TOTAL HEALTH	1594	1806	2132	2560
TOTAL EXTERNAL AIDE	14433	15830	20848	19937
% HEALTH AIDE	11.0	11.4	10.2	12.8

* French aid, which represents 69 to 82 percent of the total health aid, is composed of approximately 70 doctors or higher level staff working in hospitals (half in public hospitals and the remaining half in the Military Hospital) and of 8 experts working for the Pasteur Institute.

Table 5: CAPITAL ASSISTANCE
(FMG in millions)

	1981	1982	1983	1984
AID/IBRD	0	0	0	1,231*
WHO	104	248	85	393
FRANCE	24	111	38	229
CANADA	10	0	0	0
SWITZERLAND	0	8	0	0
USA	0	0	7	0
INDE	0	5	0	0
CODEL USA	14	0	0	0
CATHWELL	0	389	0	0
EUROPEAN DEVELOPMENT FUND	77	257	717	70
OTHERS	6	0	0	0
TOTAL HEALTH	235	1,018	847	1,923
TOTAL EXTERNAL AIDE	30,221	76,026	133,214	56,622
% HEALTH AIDE	0.8	1.3	0.6	3.4

* Health allocation includes a loan for water conveyance works done by JIRAMA.

Source: UNDP reports.

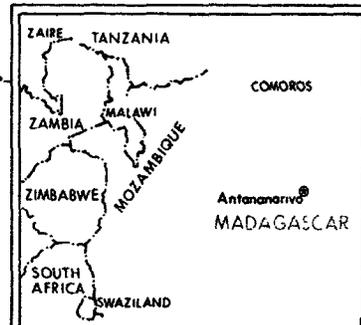
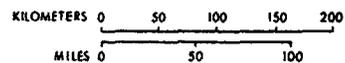
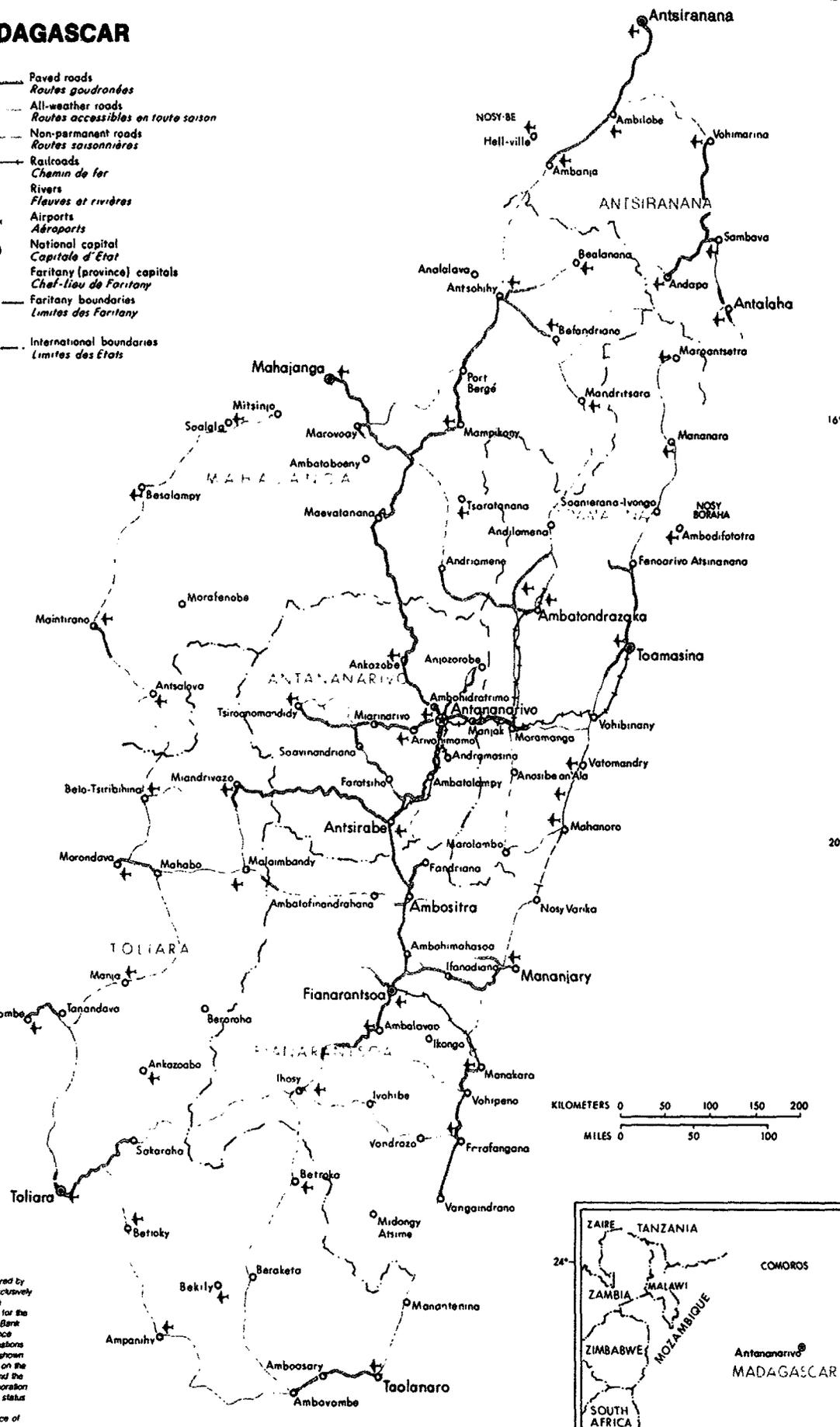
NOTES

NOTES

MAP SECTION

MADAGASCAR

-  Paved roads
Routes goudronnées
-  All-weather roads
Routes accessibles en toute saison
-  Non-permanent roads
Routes saisonnières
-  Railroads
Chemin de fer
-  Rivers
Fluvis et rivières
-  Airports
Aéroparts
-  National capital
Capitale d'Etat
-  Province capitals
Chef-lieu de Faritany
-  Province boundaries
Limites des Faritany
-  International boundaries
Limites des Etats



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