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This document provides countries in the Sahel region of Africa with a proposal that outlines a strategy to improve the health status of the population within the context of a general development framework. Special emphasis is placed on the health of mothers and children and of members of the labor force. Four major themes are presented: the importance of coordinating health services with other development activities; the importance of access to world-wide health services; the limits of current and future resources; and the great need for health services to peripheral villages. The current situation in the Sahel with regard to demography, disease, and of health infrastructure pattern is presented. Five health strategy premises discussed are: resource allocation, village based health systems, demographic and health planning, components of an integrated village-based system, and health implications of planning in other sectors. The study explores various aspects of investment in health as a factor in socioeconomic development. These are: migration and resettlement projects, investments, health and the role of women, and the value of health. It presents organizational illustrations of health services at the village level, focusing on selection of candidates, training and employment, and support. The study recommends that the Sahelian states adopt a coordinated health strategy in the region. The design and implementation of national and regional health projects will put this strategy into practice.

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A STRATEGY FOR HEALTH AS A COMPONENT
OF THE SAHEL DEVELOPMENT PROGRAM

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FOREWORD

The purpose of this document is to provide individual countries in the Sahelian region, the international group of countries considering regional development (CILSS: Comité Permanent Inter-Etats de Lutte Contre la Sécheresse dan le Sahel), and the coordinated donor agencies (Club des Amis du Sahel) with a background proposal outlining a strategy for improving the health status of the population within the context of the more general development framework.

In a meeting of the Human Resources Group of CILSS/ Club in Ouagadougou in December, 1976 (at which one of the authors--Dr. Scheyer--was present), a work plan was adopted which called for the development of a strategy paper in the health sector.

Following this meeting, Dr. Stephen Joseph was asked by The Club to participate with Dr. Scheyer in the development of a background document. The authors met with representatives of The Club in Paris in mid-February, 1977, and also with individuals from the WHO (Geneva), the World Bank, OECD, FAC, IDRC, and USAID.

It was agreed that the development of the paper should also include the technical participation of individuals from CILSS, WHO, and FAC. In early March 1977,

the authors spent a week in Ouagadougou working with Mr. Ali Cissé, Secretary-General of CILSS, and Dr. F. Martin-Samos, WHO Country Representative in Upper Volta and Chairman of the Health Sub-Committee of the CILSS Human Resources Group.

A draft paper was developed by the authors and then used as a basis of discussion at the technical meeting of the Human Resources Group of CILSS in Dakar in late March 1977. During the month of April, a task force of the Health, Water and Nutrition Commission of the Human Resources Group, under the supervision of Dr. El Hadj Rasmané Sawadogo of the Ministry of Health of Upper Volta, reviewed the text and synthesized it with another document which was prepared by a team headed by Dr. Martin-Samos. On April 26, the synthesized document emanating from the Dakar draft and the Martin-Samos team report was incorporated into a technical briefing paper by CILSS/Club for the Ministerial-level meeting scheduled to commence on May 25, 1977 in Ottawa.

The development of the health strategy comes at a point in time when the CILSS and The Club are analyzing concrete prospects for development initiatives across a wide variety of working groups (human resources, ecology,

transport and infrastructure, adaptation of technology, marketing).

In preparing this paper, the authors have benefited from reference materials and documentation provided by various Sahelian governments and international agencies; much of this material is cited in the bibliographic section of the paper. Particularly useful have been the current and detailed country health profiles prepared by Dr. Martin-Samos and his staff, and by the WHO representatives who collected data from official Sahelian sources in each of the countries, as well as various USAID program documents and studies. In addition, the water resources analysis, prepared by Mr. David Henry of IDRC, has been incorporated into this paper.

In addition to the assistance provided by many individuals and agencies to the development of this paper, the authors would especially like to thank Mr. Roy Stacy of The Club Secretariat, Ms. Anne Tinker of AID/Washington's Special Development Program for the Sahel, Mr. Ali Cissé of CILSS, Mr. Paul Lawton of WHO, Mr. George Klein of the USAID Mission in Geneva, Dr. Helies of FAC, and Dr. Fournier, a consultant with the OECD, Paris.

The collaboration of Dr. Martin-Samos and his staff in Ouagadougou has been invaluable, both in making available

to us the country-specific material contained in the Profiles which have been developed, and in their thoughtful and valuable comments on our ideas and proposals.

The authors are indebted to the staff of Family Health Care, especially Ms. Julia Terry, Ms. Carol Carp, and Mr. Alan Fairbank for their assistance in the preparation of this paper.

I. INTRODUCTION

I. INTRODUCTION

GOAL OF A HEALTH STRATEGY IN THE SAHEL

The Sahel health strategy outlined in this document is being presented as a conceptual framework rather than as a detailed planning document. Obviously, the latter involves a higher level of specificity, while the former is meant to generate and initiate broad guidance toward a general course of action. The overall goal of the strategy defined herein is to improve the health status of the population in the countries of the Sahelian region, with initial special emphasis upon the health of:

1. Mothers and children (the population groups most vulnerable to excessive morbidity and premature mortality); and
2. Members of the productive labor force* (thus providing a direct stimulus to the broader agricultural and industrial development of the region and its countries).

This goal is related to both a short-term and long-term time perspective, and takes realistic account of limited resources for health and development activities that are, or can become, available from the Sahelian

* For purposes of this paper, "productive labor force" should be considered to include all workers in both the traditional and modern sectors of the economy. It is recognized that the effects on employment of improving the health of the "productive labor force" can be significant; these are discussed in Section IV.

countries' own individual and collective resources, and from assistance by international agencies.

Though certain groups within the population (mothers, children, labor force) have been chosen for initial and priority emphasis, many of the health options recommended in this paper will have direct, as well as spill-over, effects upon the health status of the entire population (examples: nutritional improvements, improved quantity and quality of local water supplies, control or amelioration of major endemic diseases).

As the refinement of health strategy and program planning proceeds, there will be an important need for setting specific targets and objectives, so that program options and their possible health benefits can be weighed against program costs. This process will be hampered by the lack of reliable health and demographic data available within the region, and the wide range of health indices of differing localities. For example, the infant mortality rate (deaths before one year of age per 1,000 live births) over much of the Sahel can be estimated at 180, though this may vary by 50 or more in either direction depending upon specific location, "dry" or good year, etc. A set of health interventions such as those recommended in this paper, delivered through

a village-based* infrastructure, could reduce this "average" infant mortality of 180 to the range of 100-130, even in the absence of other social and economic changes. However, to measure the actual effectiveness of these health interventions, and to compare them with their direct and indirect costs, one needs to know the time- and area-specific rates with greater accuracy. In addition, more accurate information on patterns of cause- and age-specific disease and death rates is important for effective and efficient program planning. Further, basic and applied research concerning identification of disease patterns, new measures to prevent and/or treat disease, and delivery systems to apply this new knowledge, can and will profoundly alter both the costs and benefits of any given health sector strategy. The degree to which scarce resources should be invested in the short run in research and information systems is a difficult but important question.

* The authors have chosen to use the term "village-based" health system in place of the less-specific "community-based" in order to emphasize the importance of the dispersed rural villages in the Sahel, where most of the population resides, and where fewest of the health and other social services reach. However, the reader should be aware that the concepts of "locally-" or "community-based" services are equally applicable to urban sub-units as to rural villages; the health strategy outlined in this paper is relevant to a national, and not solely rural, scope.

Clearly, some significant research investment is required, both for enhancing the future effectiveness of health sector activities, and for monitoring the effects which health programs and other facets of socioeconomic development will have upon the health of the population.

STRATEGIC THEMES

Four major themes underlie the health strategy proposed in this paper. These themes must constantly be kept in mind in the design and implementation of maximally effective and efficient health services in the Sahel. They are:

1. The importance of linking health interventions with development activities in other sectors;
2. The importance of promoting health, preventing disease, and treating illness through the wide distribution of basic services accessible to the mass of the population;
3. The constraints of limited resources--fiscal, manpower, facilities, and logistics--available at present and in the foreseeable future; and
4. The priority need for a health services' infrastructure, emphasizing the peripheral village focus of services, through which categorical health programs can be implemented.

These four themes are, obviously, all closely interwoven, and are briefly outlined below.

1. Linking Health Activities With Other Development Efforts

This perspective is important for three reasons. First, there are potential positive and negative effects of all other

development activities upon the health of the population. An example of a positive effect is the improvement in population nutritional status secondary to the increased foodgrain production stimulated by an agricultural development project. Where resettlement of previously scattered populations is part of an agricultural development program, the improved accessibility of services to the population provides a significant opportunity for complementing the nutritional benefits with basic health services. The classical example of adverse effects upon health of inadequately-planned development projects is the explosive increase in incidence of diseases (e.g., schistosomiasis, malaria) associated with water-impoundment or irrigation schemes.

Secondly, improving the health of a population engaged in development activities may serve as a stimulus to more rapid development by improving the nutrition and health status (e.g., by controlling malaria and other endemic diseases) of workers engaged in agricultural or industrial development projects. The economic arguments for investment in health within the development context are outlined in a subsequent section of this paper.

Thirdly, there are severe limits to the amount of resources (money, manpower, facilities) available for

providing health services in countries such as those of the Sahel. It is important, therefore, to optimize the use of available resources by seeking ways in which health and other development investments can interact in a synergistic manner. Some examples of this approach are: the use of multipurpose agricultural extension workers for village health education and disease-preventive actions; the inclusion of health education as a component of the primary school curriculum; and the "double-use" of distribution and logistic channels in other sectors for similar purposes regarding drugs and other health-related equipment and supplies.

2. A "Distributive" Philosophy of Health Services

In order to achieve the greatest improvement of the health of Sahelian populations, 80 percent of which currently have little or no effective contact with government health systems, the current pattern of concentrated, high-cost, often over-specialized health services reaching only a minority of the population must be altered. This argument underlies our proposals for the development of village-based health systems (with the maximum possible integration of traditional health practitioners and methods with "modern" health services).

3. Resource Constraints

The reality of these constraints will be familiar to readers of this paper. Of particular importance is attention to the implications for excessive recurrent costs of inappropriate capital investments in the health sector. For example, annual recurrent costs of operating hospitals in West Africa are as high as one-third the original capital costs and, in many cases, are far beyond the range of the available government budget. Such expenditures further serve to drain ever greater proportions of scarce resources toward provision of comprehensive health services benefitting few at the expense of broad distribution of basic health services to the rural majority. In contrast, a wide range of health promotive, disease preventive, and basic curative services can be more equitably distributed to rural populations by systems such as those proposed in this paper. The initial investment for this extension of services to an estimated 80 percent of rural populations not now covered by the public health system will be considerable, i.e., training, logistic support services, management information services, communications, and the development of a managerial and administrative structure at both central and decentralized levels, etc. Moreover, the investment strategy must be planned at a rate commensurate with the capacity of each individual country to absorb donor funds effectively into their existing health

structures and consistent with their capacity to develop internal resources (a trainable and available labor pool) to implement the proposed system. For instance, some countries may elect initially to target the proposed system into highly specific and limited disease preventive areas while logistics, training, and management systems are being set in place and demand patterns among the 80 percent of the population without services are being determined. Other countries with higher absorptive capacity may decide to initiate the proposed system in a broad, comprehensive manner as soon as possible. Therefore, specific projects supporting this health strategy are best devised as part of national health policy development initiatives in each of the Sahelian countries. The aim of these initiatives is to provide equity in the distribution of services within a range of expenditures consistent with the internal capacity to manage and absorb external resources.

4. Priority Need for a Health Services Infrastructure

Development of a permanent and self-sustaining infrastructure, emphasizing the importance of the dispersed rural village majority, is the key to the implementation and maintenance not only of local basic health services, but also of regional and national categorical disease control programs. The means towards the development of such an infrastructure is the major issue addressed in this paper.

A final note regarding the strategic themes: health services, particularly when based at the local level, can serve as a powerful catalyst for community development and self-reliance, and for the mobilization of the population for their own development.

II. THE CURRENT SITUATION IN THE SAHEL:
DEMOGRAPHIC/DISEASE AND HEALTH
INFRASTRUCTURE PATTERNS

II. THE CURRENT SITUATION IN THE SAHEL: DEMOGRAPHIC/DISEASE AND HEALTH INFRASTRUCTURE PATTERNS

Extensive information concerning the health and disease patterns of the Sahelian countries has been prepared by WHO representatives and Ministries of Health in the respective countries and collected by Dr. Martin-Samos of WHO and CILSS for presentation in individual country profiles. These should be consulted by readers of this paper who wish a detailed analysis. The country profiles and this paper are available for the Ottawa CILSS/Club meeting along with the health strategy synthesis prepared by the Health, Water and Nutrition Commission.

As an overview of the current patterns, this section of the paper presents highlighted data drawn from the country profiles and other sources.

HEALTH STATUS

The health status of the people of the Sahel is among the poorest of any population group in the world:

1. Infant mortality rates are known to be among the highest in the world, ranging from 160 to 200 per 1,000 live births (European rates are in the 9-20 range). Life expectancy at birth varies from 34-41 years for the region (compared to 68-78 years in Europe and North America).

2. Death rates annually are about 25 per 1,000 persons (for Europe and North America the rate is in the 7-10 range).
3. Birth rates for the region annually average close to 47 per 1,000 women, among the highest in the world. (European and North American rates are in the 10-20 range.)
4. Although incidence and prevalence of the major diseases are not known with any accuracy, in the aggregate, the majority of morbidity and mortality can be attributed to bacterial and viral infections (particularly diarrhea pneumonia) of early childhood in combination with undernutrition.
5. The disease pattern which contributes to these statistics includes a high prevalence of malaria, measles, meningitis, tuberculosis, leprosy, onchocerciasis, trypanosomiasis, and schistosomiasis.
6. High fertility rates and the resulting population growth have led to large proportions of dependent children in the population, placing an increasing burden on the region's already inadequate food-producing capacity and social support services.
7. Mothers and children are the most vulnerable group. Thirty to fifty percent of all children born alive in the Sahelian drought region die before they reach the age of five years. Women in the Sahel spend their reproductive years in a continuous cycle of conceiving, bearing, and caring for children, in addition to performing hard physical labor.
 - a. Women have little or no access to family planning information and service, and only a few practice conscious control of fertility using modern methods of contraception.
 - b. Babies are often born prematurely or have low birth weight due to the combined

effects of poor maternal nutrition and health, too closely spaced pregnancies, and heavy physical labor.

- c. Babies are then exposed to adverse environmental conditions and a wide variety of bacterial and viral infections.
- d. Mothers are often ignorant of the necessity for supplementary weaning foods and they are often unaware of how to use indigenous foods for such purposes.
- e. Young children pass through a period of serious under-nourishment until they adjust to adult foods.

The determinants of the poor health of the Sahelian populations are a complex of sociocultural and economic factors, each of which has an impact which is virtually impossible to isolate from the others. Although research has shown that there is some positive and direct relationship between health and socioeconomic development (each reinforcing the advance of the other), the pattern of interactions among the variables is not well understood (see Section IV for more discussion). There are few reliable guides for projecting the health status outcomes of specific levels of national investments in health. This problem can be graphically illustrated in the charts at the end of this section, which provide a cross-country comparison of relationships between the principal health status indicators and various economic variables. The reader should recognize that the quality and accuracy of

the data vary substantially from country to country, and cause-and-effect cannot be deduced from the apparent associations. With these caveats, however, the charts illustrate the associations of health/economic variables in the Sahelian countries compared to those in other developing countries.

In Chart Number One, infant mortality is shown to have a generally inverse relation to per capita GNP. Countries with the lowest per capita GNP, including all the Sahel countries, are clustered in the upper left of the graph, with infant mortality rates in the range of 150 to 200. There is a clear relationship between higher levels of per capita GNP and lower levels of infant mortality.

Among developing countries with low per capita GNPs, Sri Lanka (whose GNP is quite similar to the average for the Sahelian countries) presents an unusually low infant mortality rate of 49--less than one-third that of the Sahelian region. The conditions in this island nation are quite different than those likely to exist in the Sahel in the near future. For instance, Sri Lanka has a high literacy rate (now nearly 90 percent; an effective system of land reform; and a very productive and fertile agricultural land mass. Still, it may be instructive to consider three other factors that have contributed in major ways to lowering infant and general mortality in Sri Lanka:

1. a national program of combatting malnutrition by assuring an adequate supply of daily intake of rice to all the population;
2. investment in a widely-distributed basic health services network with an emphasis on immunization and preventive services for mothers and children; and
3. a highly successful campaign to control the major endemic disease of malaria (once thought to be eradicated but now resurgent on the island).

Sri Lanka demonstrates that it is possible to effect major health improvements within the constraints of limited economic resources.

Chart Number Two shows the relationship of the crude birth rate to per capita GNP. Again the Sahel countries are clustered in the upper left area of the graph with crude birth rates in the range of 45 to 55.

Chart Number Three shows the relationship of crude death rate to per capita GNP and, here too, the Sahel countries are among the least-favored in the world, with reported death rates ranging from 22 to 28.

Chart Number Four shows the relationship of population growth to per capita GNP. The population growth rates of the Sahel countries range from 1.3 to 2.7. No clear relationship to per capita GNP is apparent. Countries with high sustained birth rates along with high death rates can have relatively slow population growth, as illustrated by Mauritania.

Chart Number Five shows the direct association of life expectancy at birth to per capita GNP. In this case, all the Sahel countries are clustered in the lower left area of the graph with life expectancy between 35 and 40 years. Among other developing countries, Sri Lanka is shown to have a life expectancy greater than Iran, a country with nearly ten times the per capita GNP, but where the distribution of health and other social services is not nearly as equitable as it is in Sri Lanka. In Chart Number Six, we examine the relationship between per capita health expenditures and infant mortality. Although data on per capita health expenditures for some of the Sahel countries was not available to the authors, the chart demonstrates no clear association between per capita expenditures on health and infant mortality.

Chart Number Seven shows infant mortality in relation to percent of government expenditures spent on health. Mali, for example, with roughly the same per capita GNP as Niger, spends over twice as much on health. These countries show no significant difference in infant mortality.

These charts illustrate that the health status of a population, by and large, is more closely associated with the overall economic status of the population, often expressed as per capita GNP, than it is to actual per capita expenditures or the percent of government expenditures on

health. However, as important as (or perhaps more important than) national measures of economic wealth, are the patterns of distribution of income and the distribution of social services within a society.

The country of Sri Lanka, with roughly the same per capita GNP as the Sahelian countries' average, and with an average government health expenditure of roughly \$4.00/person per year, has made dramatic improvements in the health status of its population. This may be a unique phenomenon; however, Sri Lanka has invested its available health resources differently than most developing countries. The kinds of investments Sri Lanka has made, we believe, are consistent with the long-range strategy outlined in this paper for the Sahel.

Individual summary profiles for each of the Sahelian countries are presented at the end of this section. As mentioned above, the data were obtained from a variety of sources and verified with the more extensive profiles compiled by WHO representatives in each of the Sahelian countries. These profiles are now available through CILSS.

The health sectors of the Sahelian countries can be descriptively summarized as follows:

1. Available government resources applied toward health services have, over the past ten years, shown definite trends toward:

- An increasing proportion of health expenditures going for personnel--estimated at 50 to 85 percent.
- Expansion in training of highly skilled technical personnel--MDs, nurses, etc.--through expansion of medical education, nursing schools, and an increased number of foreign scholarships.
- Expansion of facilities--hospital beds, medical and nursing schools, etc.
- A decreasing proportion of the resources allocated for drugs, supplies, equipment, maintenance, logistical support, diagnostic labs, etc.
- Constant per capita expenditures on health. Whereas government budgets have increased, relatively small proportions of expenditures have been spent on health. Most recent data indicate that aggregated health expenditures by Sahelian governments are at a level of \$2.15 per capita; individual governments' expenditures per capita range from a low of \$0.84 to a high of \$4.13.
- Concentration of government health expenditures in urban areas. Since those who reside in rural areas (over 80 percent of total population) have little or no access to government health services, government health expenditures per capita of population actually served are much higher than the per capita figures above. Applying Sahelian country estimates of urban population, which when aggregated come to just over 13 percent of the region's total, Sahelian governments spend annually on health an average of \$16.22 per urban person; this figure for individual countries ranges from about \$10 to more than \$50 per urban person. (These figures are only very rough approximations of cost per person reached since some rural people get services and some urban people do not.)
- Continuous fiscal support being provided through direct subsidies from external donors.

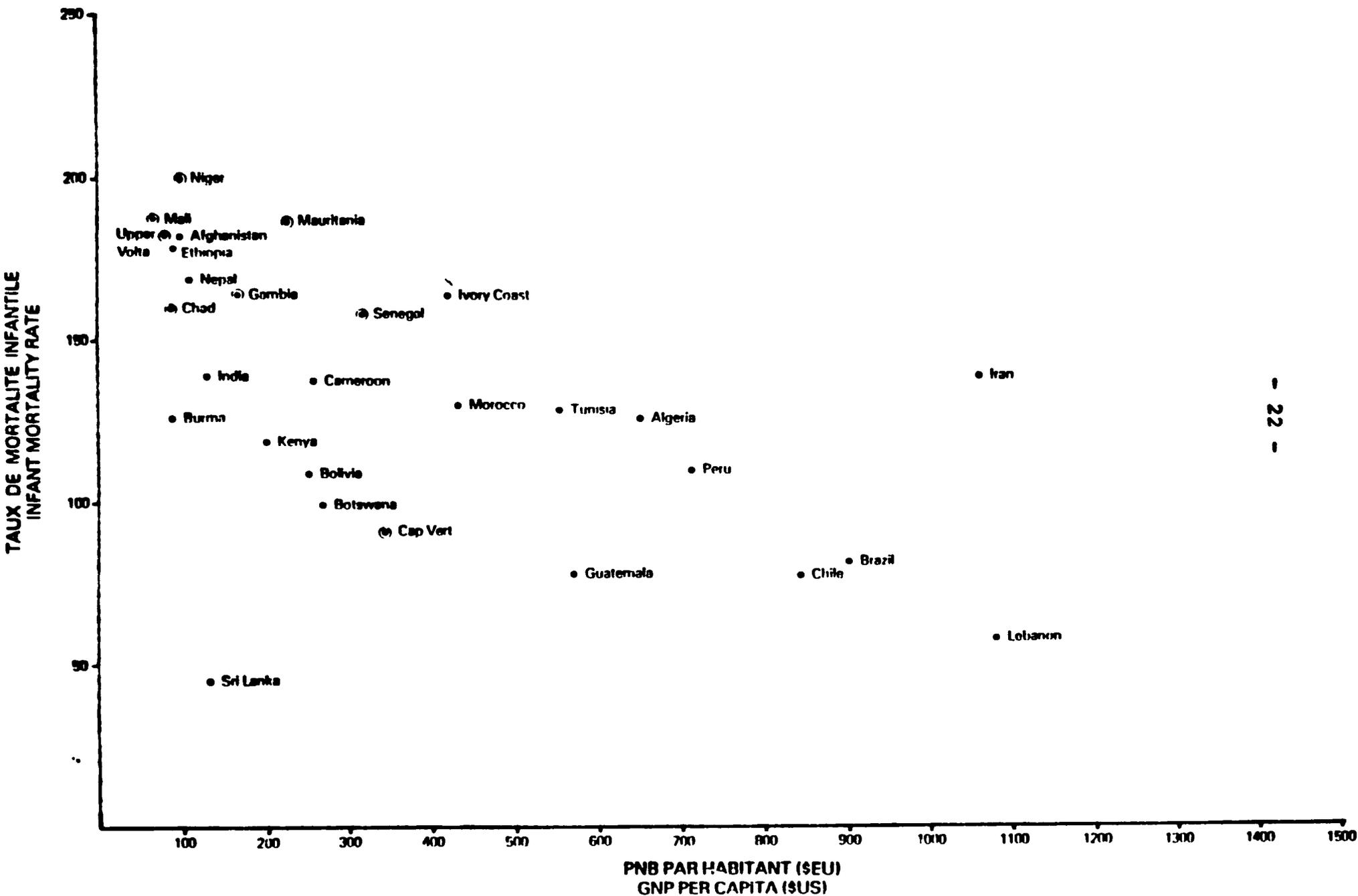
2. Donor resources have, for the most part, supported the trends outlined above.
 - Capital support for facility construction-- hospitals, medical and nursing education.
 - The provision of expatriate manpower to staff the facilities has become increasingly specialized.
 - Direct subsidies for medical education in donor countries or African institutions.
3. In the past ten years, significant donor support for regional or area-specific disease control measures has occurred. For example:
 - Smallpox is now eradicated in the Sahel.
 - Attempts to control onchocerciasis in the Volta River Basin are being undertaken.
 - Trypanosomiasis control activities are being undertaken in the Bobo-Dioulasso area.
4. The organization of the health infrastructure in the six former French colonies of the eight Sahelian countries remain, in most instances, highly centralized.
5. Until recently, relatively few resources have been made available to support village-based health infrastructure. In the past two to three years, however, a number of the Sahelian countries have shifted their policies toward an emphasis on the villages.
 - The development of village-based health workers' projects.
 - Village water and sanitation projects.
 - Nutrition enhancement for mothers and infants.

6. Although considerable effort has gone into training Sahelians, most of the countries are still highly dependent on expatriate physicians to staff hospitals and other facilities.
7. The health infrastructure in the Sahelian countries remains highly dependent on external donor assistance.

In summary, the health status of the Sahelian population is extremely poor. Little significant improvement has taken place over the past 20 years: infant mortality and crude death and birth rates have remained at extremely high levels; life expectancy is still very low; the limited resources available to the Sahelian countries to spend on health have increasingly gone to support personnel, leaving little for drugs, diagnostic measures, equipment, supplies, maintenance, and preventive measures.

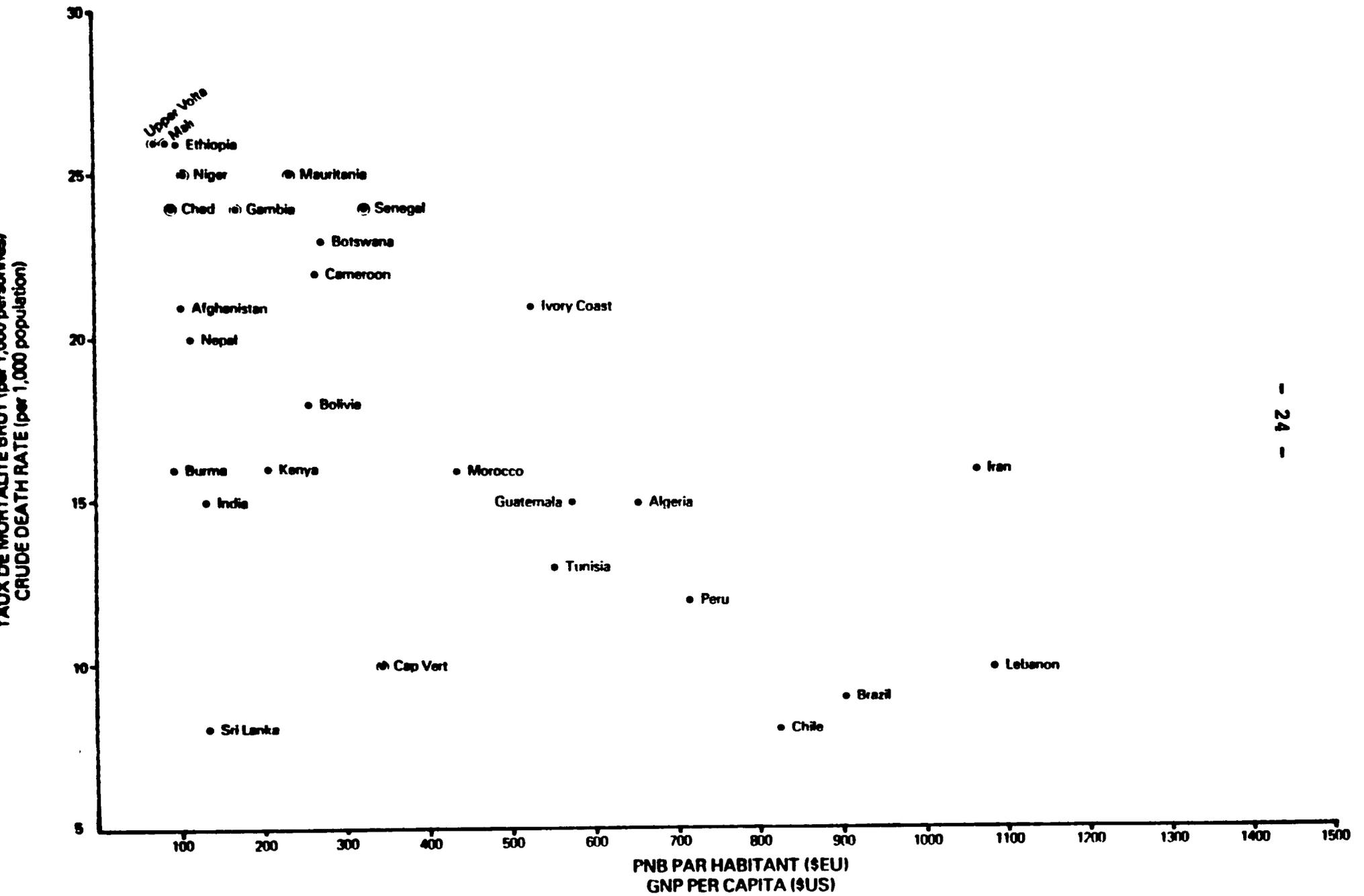
The past tendency of governments to concentrate on the development of urban, hospital-based, and personal curative health services has led to a neglect of preventive public health measures and to a lack of basic health services to the 80 to 90 percent of the populations living in rural areas.

CHART NUMBER ONE



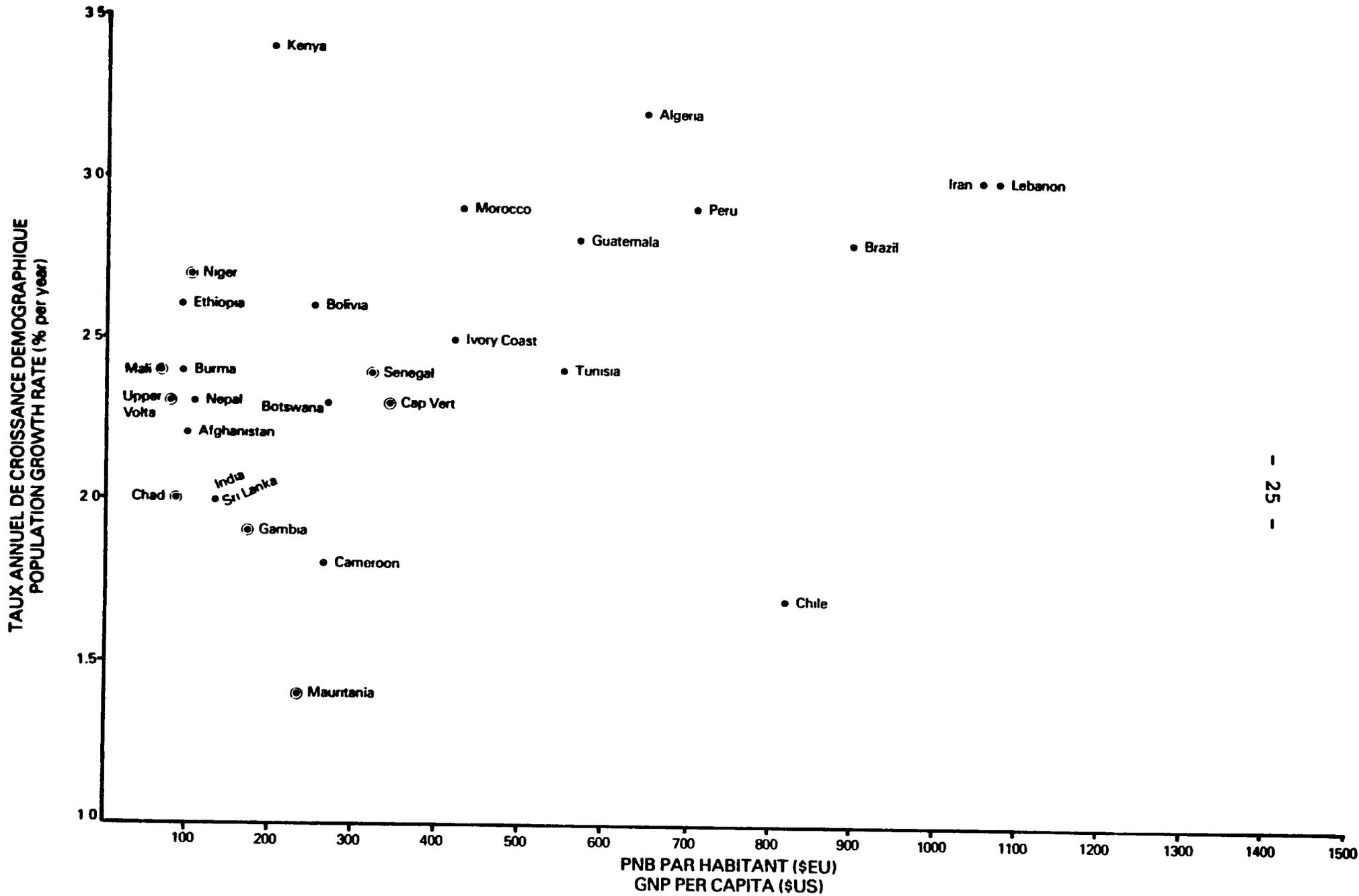
Source: 1976 World Population Data Sheet, Population Reference Bureau, Inc., Washington, D.C.

CHART NUMBER THREE



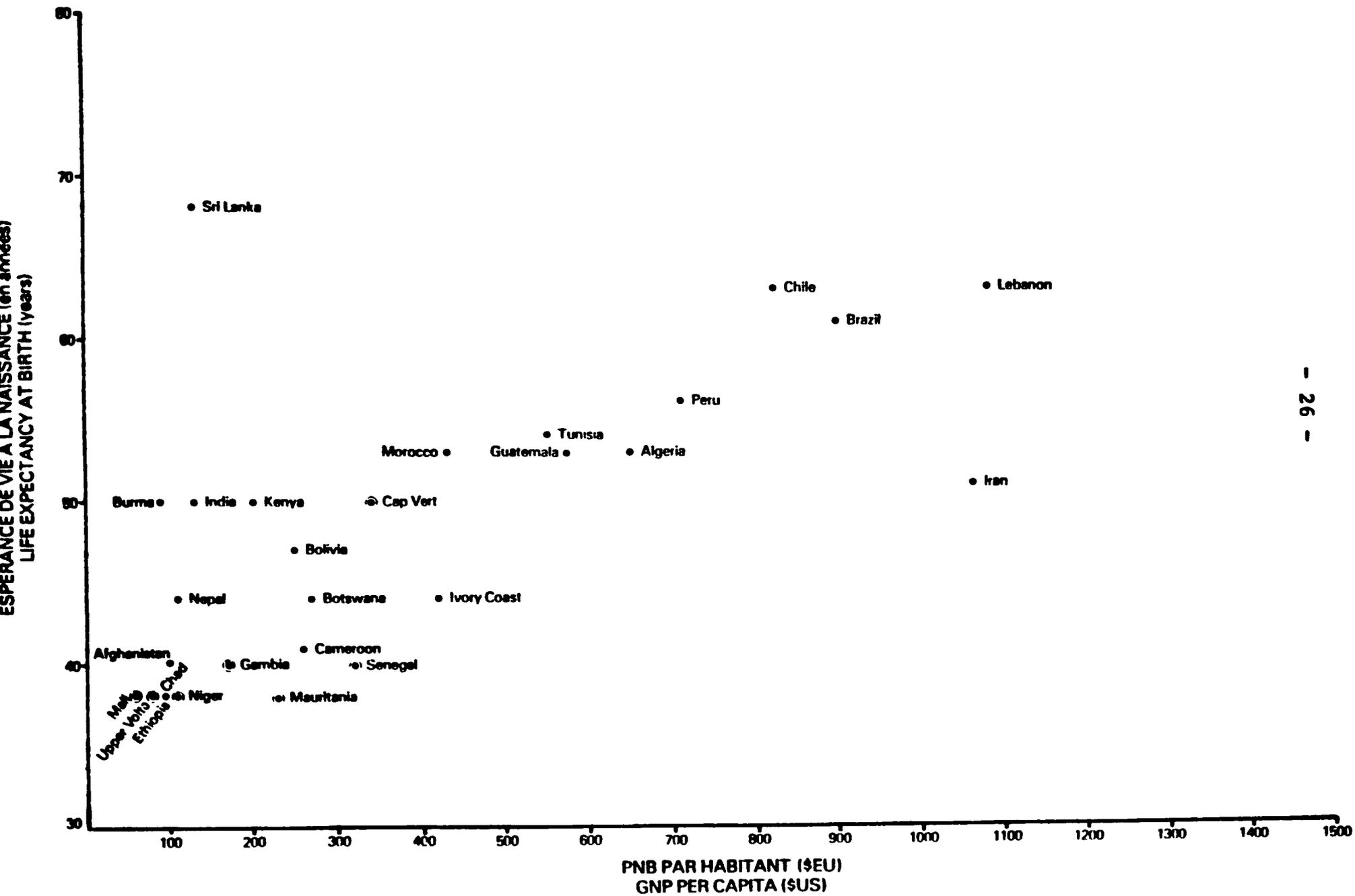
Source: 1976 World Population Data Sheet,
Population Reference Bureau, Inc., Washington, D.C.

CHART NUMBER FOUR



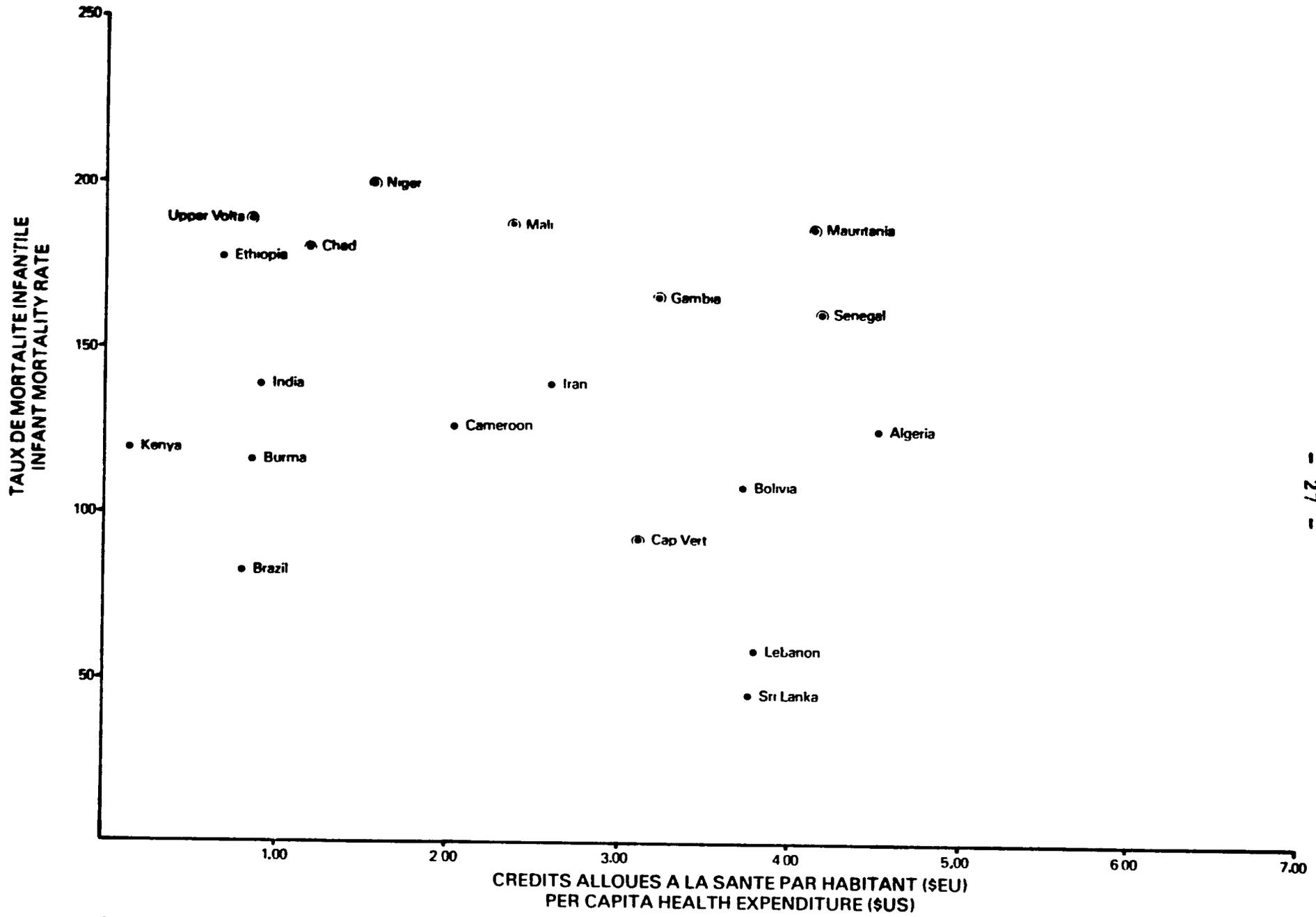
Source: 1976 World Population Data Sheet,
Population Reference Bureau, Inc., Washington, D.C.

CHART NUMBER FIVE



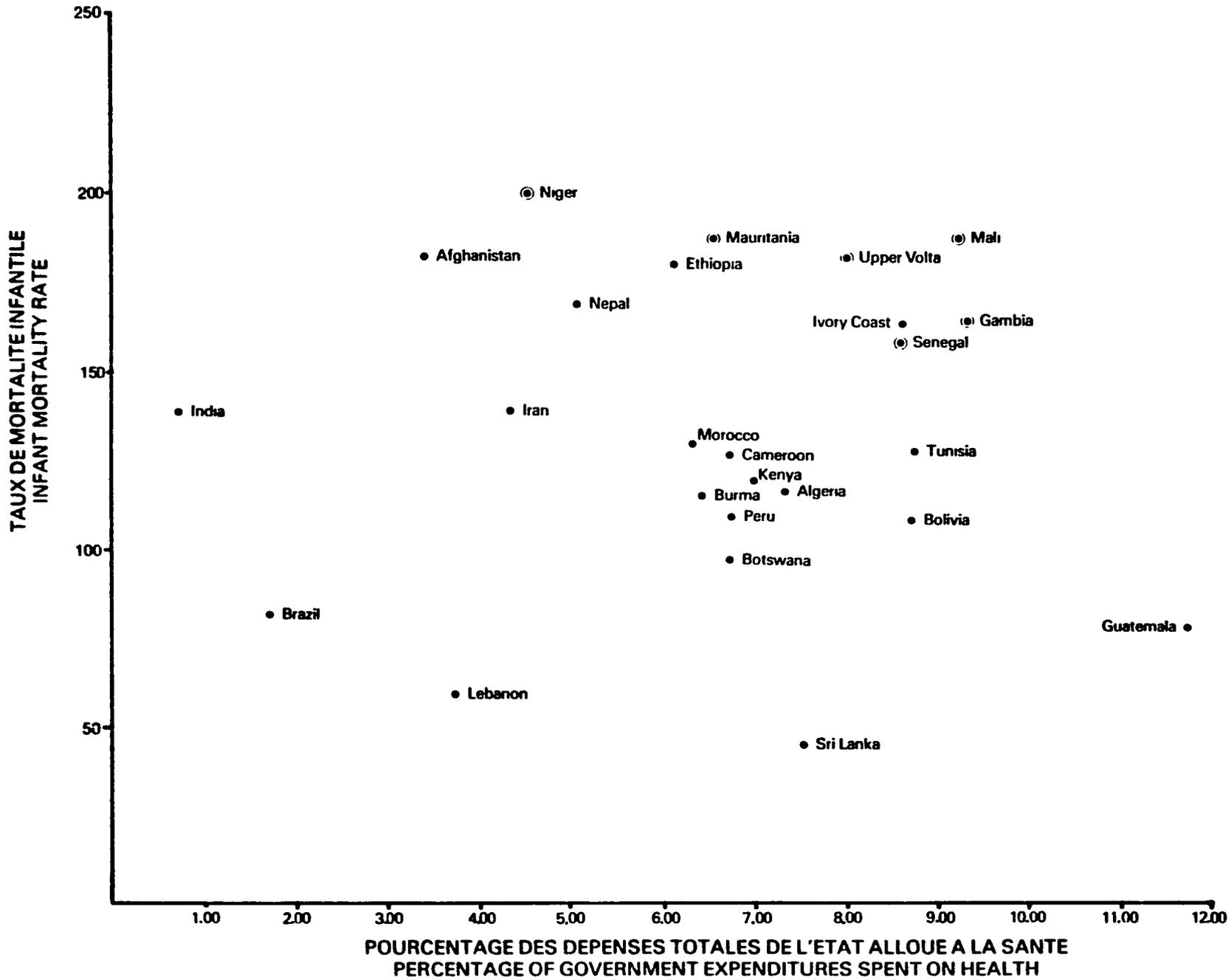
Source: 1976 World Population Data Sheet,
Population Reference Bureau, Inc., Washington, D.C.

CHART NUMBER SIX



Sources: 1976 World Population Data Sheet,
and World Bank Data

CHART NUMBER SEVEN



Sources: 1976 World Population Data Sheet,
and World Bank Data

SUMMARY PROFILE

General

Population	5 772 712 ⁽¹⁾
Total land area	274 122 km ² (1)
Population density (pop./km ²)	21 ⁽¹⁾
Km. paved roads	500 ⁽¹²⁾
Urban population	6.8% ⁽¹⁾
Nomadic population	
Population under 5 years	17.3% ⁽¹⁾
Population under 15 years	42.2% ⁽¹⁾
Per capita GNP	\$80 ⁽¹⁰⁾ \$90 ⁽¹¹⁾ \$70 ⁽¹³⁾
Per capita energy consumption (kg. coal equivalent)	13 ⁽¹³⁾
Literacy rate	5-10% ⁽¹¹⁾

Health Status

Life expectancy at birth	38 ⁽¹⁰⁾
Crude birth rate (per 1,000 pop./year)	50 ⁽¹⁾
Crude death rate (per 1,000 pop./year)	32 ⁽¹⁾
Population growth rate (per year)	2.3% ⁽¹⁰⁾
Number of years for population to double	30 ⁽¹⁰⁾
Infant mortality rate (per 1,000 live births)	189.7 ⁽¹⁾
Under 5 years mortality rate	36% ⁽¹⁾
Maternal mortality rate	
Nutrition: ave. calories/day	2 200 ⁽¹⁾
ave. grams protein/day	45-60 ⁽¹⁾

Health Resources

Government health expenditures	\$4 847 718 ⁽¹⁾
Percent of total government expenditures	8% ⁽¹⁾
Per capita health expenditures	\$.84 (209 FCFA)
Physicians (population/physician)	53 951 ⁽¹⁾
Nurses (population/nurse)	4 444 ⁽¹⁾
Non-physician primary health worker (pop. lation/worker)	3 095 ⁽¹⁾
Hospitals (pop./bed)	3 002 ⁽¹⁾
Community water supply (% pop. served)	25 ⁽¹⁴⁾

PROFIL SOMMAIRE

Général

Population	
Superficie totale du pays	
Densité démographique (nombre d'hab. par km ²)	
Km de routes goudronnées	
Population urbaine	
Population nomade	
Population de moins de 5 ans	
Population de moins de 15 ans	
PNB par habitant	
Consommation d'énergie par habitant (kg d'équivalent charbon)	
Taux d'alphabétisation	

Santé

Espérance de vie à la naissance	
Taux brut de natalité (pour 1.000 hab. par an)	
Taux brut de mortalité (pour 1.000 hab. par an)	
Taux annuel de croissance démographique	
Nombre d'années pour que la population double	
Taux de mortalité infantile (par 1.000 naissances vivantes)	
Taux de mortalité en dessous de 5 ans	
Taux de mortalité maternelle	
Nutrition: moy. calories par jour moy. gr protéine par jour	

Ressources sanitaires

Dépenses publiques allouées à la santé	
Pourcentage du budget total de l'Etat	
Crédits alloués à la santé par habitant	
Médecins (nombre d'hab. par médecin)	
Infirmiers (nombre d'hab. par infirmier)	
Auxiliaires paramédicaux (nombre d'hab. par auxiliaire)	
Lits d'hôpitaux (nombre d'hab. par lit)	
Approvisionnement public en eau (% de la population desservie)	

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SUMMARY PROFILE

SENEGAL

PROFIL SOMMAIRE

General

Population	5 085 000 ⁽²⁾
Total land area	197 722 km ²⁽²⁾
Population density (pop./km ²)	26 ⁽²⁾
Km. paved roads	2 200 ⁽¹²⁾
Urban population	30% ⁽¹⁰⁾
Nomadic population	
Population under 5 years	178.6% ⁽²⁾
Population under 15 years	43% ⁽¹⁰⁾
Per capita GNP	\$320 ⁽¹⁰⁾ \$330 ⁽¹¹⁾
Per capita energy consumption (kg. coal equivalent)	158 ⁽¹³⁾
Literacy rate	5-10% ⁽¹¹⁾

Health Status

Life expectancy at birth	40 ⁽¹⁰⁾ 44 ⁽¹¹⁾
Crude birth rate (per 1,000 pop./year)	47 ⁽²⁾
Crude death rate (per 1,000 pop./year)	25 ⁽²⁾
Population growth rate (per year)	2.2% ⁽²⁾
Number of years for population to double	29 ⁽¹⁰⁾
Infant mortality rate (per 1,000 live births)	159 ⁽¹⁰⁾ 170 ⁽¹²⁾
Under 5 years mortality rate	
Maternal mortality rate	
Nutrition: ave. calories/day	2 299 ⁽¹⁵⁾
ave. grams protein/day	64 ⁽¹⁵⁾

Health Resources

Government health expenditures	\$20 988 000 ⁽²⁾
Percent of total government expenditures	6.64% ⁽²⁾
Per capita health expenditures	\$4.13 ⁽²⁾
Physicians (population/physician)	14 044 ⁽²⁾
Nurses (population/nurse)	1 686 ⁽²⁾
Non-physician primary health worker (population/worker)	12 990 ⁽¹²⁾
Hospitals (pop./bed)	767 ⁽²⁾
Community water supply (% pop. served)	

Général

Population	
Superficie totale du pays	
Densité démographique (nombre d'hab. par km ²)	
Km de routes goudronnées	
Population urbaine	
Population nomade	
Population de moins de 5 ans	
Population de moins de 15 ans	
PNB par habitant	
Consommation d'énergie par habitant (kg d'équivalent charbon)	
Taux d'alphabétisation	

Santé

Espérance de vie à la naissance	
Taux brut de natalité (pour 1.000 hab. par an)	
Taux brut de mortalité (pour 1.000 hab. par an)	
Taux annuel de croissance démographique	
Nombre d'années pour que la population double	
Taux de mortalité infantile (par 1.000 naissances vivantes)	
Taux de mortalité en dessous de 5 ans	
Taux de mortalité maternelle	
Nutrition: moy. calories par jour	
moy. gr protéine par jour	

Ressources sanitaires

Dépenses publiques allouées à la santé	
Pourcentage du budget total de l'Etat	
Crédits alloués à la santé par habitant	
Médecins (nombre d'hab. par médecin)	
Infirmiers (nombre d'hab. par infirmier)	
Auxiliaires paramédicaux (nombre d'hab. par auxiliaire)	
Lits d'hôpitaux (nombre d'hab. par lit)	
Approvisionnement public en eau (% de la population desservie)	

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SUMMARY PROFILE	NIGER	PROFIL SOMMAIRE
<u>General</u>		<u>Général</u>
Population	4 500 000 ⁽³⁾	Population
Total land area	1 267 000 km ² (3)	Superficie totale du pays
Population density (pop./km ²)	3.7	Densité démographique (nombre d'hab. par km ²)
Km. paved roads	1 000 ⁽¹²⁾	Km de routes goudronnées
Urban population	6.6% ⁽³⁾	Population urbaine
Nomadic population	11% ⁽³⁾	Population nomade
Population under 5 years	16.8% ⁽¹⁶⁾	Population de moins de 5 ans
Population under 15 years	46% ⁽¹⁰⁾	Population de moins de 15 ans
Per capita GNP	\$100 ⁽¹⁰⁾	PNB par habitant
Per capita energy consumption (kg. coal equivalent)	30 ⁽¹³⁾	Consommation d'énergie par habitant (kg d'équivalent charbon)
Literacy rate	13% ⁽³⁾	Taux d'alphabétisation
<u>Health Status</u>		<u>Santé</u>
Life expectancy at birth	38 ⁽¹⁰⁾	Espérance de vie à la naissance
Crude birth rate (per 1,000 pop./year)	50-55 ⁽³⁾	Taux brut de natalité (pour 1.000 hab. par an)
Crude death rate (per 1,000 pop./year)	25-30 ⁽³⁾	Taux brut de mortalité (pour 1.000 hab. par an)
Population growth rate (per year)	2.7% ⁽¹⁰⁾	Taux annuel de croissance démographique
Number of years for population to double	26 ⁽¹⁰⁾	Nombre d'années pour que la population double
Infant mortality rate (per 1,000 live births)	200 ⁽³⁾	Taux de mortalité infantile (par 1.000 naissances vivantes)
Under 5 years mortality rate	118/1 000 ⁽¹²⁾	Taux de mortalité en dessous de 5 ans
Maternal mortality rate		Taux de mortalité maternelle
Nutrition: ave. calories/day ave. grams protein/day	2 175 ⁽¹⁵⁾ 72 ⁽¹⁵⁾	Nutrition: moy. calories par jour moy. gr protéine par jour
<u>Health Resources</u>		<u>Ressources sanitaires</u>
Government health expenditures	\$6 800 000 ⁽³⁾	Dépenses publiques allouées à la santé
Percent of total government expenditures	7 ⁽³⁾	Pourcentage du budget total de l'Etat
Per capita health expenditures	\$1.51 ⁽³⁾	Crédits alloués à la santé par habitant
Physicians (population/physician)	41 284 ⁽³⁾	Médecins (nombre d'hab. par médecin)
Nurses (population/nurse)	6 024 ⁽³⁾	Infirmiers (nombre d'hab. par infirmier)
Non-physician primary health worker (population/worker)	5 090 ⁽³⁾	Auxiliaires paramédicaux (nombre d'hab. par auxiliaire)
Hospitals (pop./bed)	1 091 ⁽³⁾	Lits d'hôpitaux (nombre d'hab. par lit)
Community water supply (% pop. served)	27 ⁽¹⁴⁾	Approvisionnement public en eau (% de la population desservie)

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SUMMARY PROFILE	MAURITANIA MAURITANIE	PROFIL SOMMAIRE
<u>General</u>		<u>Général</u>
Population	1 300 000 ⁽⁴⁾	Population
Total land area	1 088 000 km ² (4)	Superficie totale du pays
Population density (pop./km ²)	1.3	Densité démographique (nombre d'hab. par km ²)
Km. paved roads		Km de routes goudronnées
Urban population	10% ⁽¹⁰⁾	Population urbaine
Nomadic population	70-75% ⁽⁵⁾ 68% ⁽⁴⁾	Population nomade
Population under 5 years	16.9% ⁽¹⁶⁾	Population de moins de 5 ans
Population under 15 years	42.6% ⁽⁴⁾	Population de moins de 15 ans
Per capita GNP	\$230 ⁽¹⁰⁾ \$290 ⁽¹¹⁾	PNB par habitant
Per capita energy consumption (kg. coal equivalent)	115 ⁽¹³⁾	Consommation d'énergie par habitant (kg d'équivalent charbon)
Literacy rate	1-5% ⁽¹¹⁾	Taux d'alphabétisation
<u>Health Status</u>		<u>Santé</u>
Life expectancy at birth	38 ⁽¹⁰⁾	Espérance de vie à la naissance
Crude birth rate (per 1,000 pop./year)	39 ⁽¹⁰⁾ 45 ⁽⁴⁾	Taux brut de natalité (pour 1.000 hab. par an)
Crude death rate (per 1,000 pop./year)	29 ⁽⁴⁾	Taux brut de mortalité (pour 1.000 hab. par an)
Population growth rate (per year)	2.0% ⁽⁵⁾ 1.8% ⁽¹¹⁾	Taux annuel de croissance démographique
Number of years for population to double	50 ⁽¹⁰⁾	Nombre d'années pour que la population double
Infant mortality rate (per 1,000 live births)	187 ⁽¹⁰⁾	Taux de mortalité infantile (par 1.000 naissances vivantes)
Under 5 years mortality rate		Taux de mortalité en dessous de 5 ans
Maternal mortality rate		Taux de mortalité maternelle
Nutrition: ave. calories/day	1 993 ⁽¹⁵⁾	Nutrition: moy. calories par jour
ave. grams protein/day	75 ⁽¹⁵⁾	moy. gr protéine par jour
<u>Health Resources</u>		<u>Ressources sanitaires</u>
Government health expenditures	\$5 321 662 ⁽⁴⁾	Dépenses publiques allouées à la santé
Percent of total government expenditures	3.9% ⁽⁴⁾	Pourcentage du budget total de l'Etat
Per capita health expenditures	\$4.09 ⁽⁴⁾	Crédits alloués à la santé par habitant
Physicians (population/physician)	18 310 ⁽⁴⁾	Médecins (nombre d'hab. par médecin)
Nurses (population/nurse)	3 641 ⁽⁴⁾	Infirmiers (nombre d'hab. par infirmier)
Non-physician primary health worker (population/worker)	2 281 ⁽⁴⁾	Auxiliaires paramédicaux (nombre d'hab. par auxiliaire)
Hospitals (pop./bed)	2 778 ⁽¹²⁾	Lits d'hôpitaux (nombre d'hab. par lit)
Community water supply (% pop. served)	17 ⁽¹⁴⁾	Approvisionnement public en eau (% de la population desservie)

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SUMMARY PROFILE	MALI	PROFIL SOMMAIRE
<u>General</u>		<u>Général</u>
Population	5 800 000 ⁽¹⁰⁾	Population
Total land area	1 240 150 km ² (6)	Superficie totale du pays
Population density (pop./km ²)	4.5 ⁽⁶⁾	Densité démographique (nombre d'hab. par km ²)
Km. paved roads	1 650 ⁽¹²⁾	Km de routes goudronnées
Urban population	12% ⁽¹⁰⁾	Population urbaine
Nomadic population	12% ⁽⁶⁾	Population nomade
Population under 5 years	19.4% ⁽¹⁶⁾	Population de moins de 5 ans
Population under 15 years	48% ⁽⁶⁾	Population de moins de 15 ans
Per capita GNP	\$70 ⁽¹⁰⁾ \$98 ⁽⁶⁾	PNB par habitant
Per capita energy consumption (kg. coal equivalent)	25 ⁽¹³⁾	Consommation d'énergie par habitant (kg d'équivalent charbon)
Literacy rate	5% ⁽¹¹⁾	Taux d'alphabétisation
<u>Health Status</u>		<u>Santé</u>
Life expectancy at birth	37.2 ⁽⁶⁾	Espérance de vie à la naissance
Crude birth rate (per 1,000 pop./year)	55 ⁽⁶⁾	Taux brut de natalité (pour 1.000 hab. par an)
Crude death rate (per 1,000 pop./year)	30 ⁽⁶⁾	Taux brut de mortalité (pour 1.000 hab. par an)
Population growth rate (per year)	2.5% ⁽⁶⁾	Taux annuel de croissance démographique
Number of years for population to double	29 ⁽¹⁰⁾	Nombre d'années pour que la population double
Infant mortality rate (per 1,000 live births)	188 ⁽⁶⁾	Taux de mortalité infantile (par 1.000 naissances vivantes)
Under 5 years mortality rate	21/1 000 ⁽⁶⁾ 5.1% ⁽⁶⁾	Taux de mortalité en dessous de 5 ans
Maternal mortality rate (of all adult deaths)	69 ⁽¹⁵⁾	Taux de mortalité maternelle
Nutrition: ave. calories/day ave. grams protein/day	2 131 ⁽¹⁵⁾ 69 ⁽¹⁵⁾	Nutrition: moy. calories par jour moy. gr protéine par jour
<u>Health Resources</u>		<u>Ressources sanitaires</u>
Government health expenditures	\$13 657 740 ⁽⁶⁾	Dépenses publiques allouées à la santé
Percent of total government expenditures	8.7% ⁽⁶⁾	Pourcentage du budget total de l'Etat
Per capita health expenditures	\$2.35 ⁽⁶⁾	Crédits alloués à la santé par habitant
Physicians (population/physician)	32 584 ⁽⁶⁾	Médecins (nombre d'hab. par médecin)
Nurses (population/nurse)	3 229 ⁽⁶⁾	Infirmiers (nombre d'hab. par infirmier)
Non-physician primary health worker (population/worker)	1 932 ⁽⁶⁾	Auxiliaires paramédicaux (nombre d'hab. par auxiliaire)
Hospitals (pop./bed)	1 525 ⁽⁶⁾	Lits d'hôpitaux (nombre d'hab. par lit)
Community water supply (% pop. served)		Approvisionnement public en eau (% de la population desservie)

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SUMMARY PROFILE	<u>GAMBIA</u>	PROFIL SOMMAIRE
<u>General</u>		<u>Général</u>
Population	500 000 ⁽¹⁰⁾	Population
Total land area	11 295 km ² ⁽¹²⁾	Superficie totale du pays
Population density (pop./km ²)	44	Densité démographique (nombre d'hab.par km ²)
Km. paved roads	9.3 ⁽⁷⁾	Km de routes goudronnées
Urban population	14% ⁽¹⁰⁾	Population urbaine
Nomadic population	_____	Population nomade
Population under 5 years	_____	Population de moins de 5 ans
Population under 15 years	41% ⁽¹⁰⁾	Population de moins de 15 ans
Per capita GNP	\$170 ⁽¹⁰⁾	PNB par habitant
Per capita energy consumption (kg. coal equivalent)	87 ⁽¹³⁾	Consommation d'énergie par habitant (kg d'équivalent charbon)
Literacy rate	10% ⁽¹¹⁾	Taux d'alphabétisation
<u>Health Status</u>		<u>Santé</u>
Life expectancy at birth	40 ⁽¹⁰⁾	Espérance de vie à la naissance
Crude birth rate (per 1,000 pop./year)	43 ⁽¹⁰⁾	Taux brut de natalité (pour 1.000 hab. par an)
Crude death rate (per 1,000 pop./year)	24 ⁽¹⁰⁾	Taux brut de mortalité (pour 1.000 hab. par an)
Population growth rate (per year)	1.9% ⁽¹⁰⁾ 2.8% ⁽⁷⁾	Taux annuel de croissance démographique
Number of years for population to double	36 ⁽¹⁰⁾	Nombre d'années pour que la population double
Infant mortality rate (per 1,000 live births)	165 ⁽¹⁰⁾	Taux de mortalité infantile (par 1.000 naissances vivantes)
Under 5 years mortality rate	45% ⁽⁷⁾	Taux de mortalité en dessous de 5 ans
Maternal mortality rate	_____	Taux de mortalité maternelle
Nutrition: ave. calories/day	2 370 ⁽¹²⁾	Nutrition: moy. calories par jour
ave. grams protein/day	63 ⁽¹²⁾	moy. gr protéine par jour
<u>Health Resources</u>		<u>Ressources sanitaires</u>
Government health expenditures	D 2 698 000 ⁽⁷⁾ \$1 587 059	Dépenses publiques allouées à la santé
Percent of total government expenditures	9.3 ⁽⁷⁾	Pourcentage du budget total de l'Etat
Per capita health expenditures	\$3 17	Crédits alloués à la santé par habitant
Physicians (population/physician)	26 316 ⁽⁷⁾	Médecins (nombre d'hab. par médecin)
Nurses (population/nurse)	5 556 ⁽⁷⁾	Infirmiers (nombre d'hab. par infirmier)
Non-physician primary health worker (population/worker)	_____	Auxiliaires paramédicaux (nombre d'hab. par auxiliaire)
Hospitals (pop./bed)	800 ⁽⁷⁾	Lits d'hôpitaux (nombre d'hab. par lit)
Community water supply (% pop. served)	12 ⁽¹⁴⁾	Approvisionnement public en eau (% de la population desservie)

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<u>SUMMARY PROFILE</u>	<u>CHAD</u> <u>TCHAD</u>	<u>PROFIL SOMMAIRE</u>
<u>General</u>		<u>Général</u>
Population	4 100 000 ⁽⁸⁾	Population
Total land area	1 284 000 km ² (12)	Superficie totale du pays
Population density (pop./km ²)	3.2	Densité démographique (nombre d'hab. par km ²)
Km. paved roads	230 ⁽¹²⁾	Km de routes goudronnées
Urban population	12% ⁽¹⁰⁾	Population urbaine
Nomadic population		Population nomade
Population under 5 years	15% ⁽¹⁶⁾	Population de moins de 5 ans
Population under 15 years	41% ⁽⁸⁾	Population de moins de 15 ans
Per capita GNP	\$90 ⁽¹⁰⁾ \$100 ⁽¹¹⁾	PNB par habitant
Per capita energy consumption (kg. coal equivalent)	21 ⁽¹³⁾	Consommation d'énergie par habitant (kg d'équivalent charbon)
Literacy rate	5-10% ⁽¹¹⁾	Taux d'alphabétisation
<u>Health Status</u>		<u>Santé</u>
Life expectancy at birth	M = 36 F = 41 ⁽⁸⁾	Espérance de vie à la naissance
Crude birth rate (per 1,000 pop./year)	43 ⁽⁸⁾	Taux brut de natalité (pour 1.000 hab. par an)
Crude death rate (per 1,000 pop /year)	23 ⁽⁸⁾	Taux brut de mortalité (pour 1.000 hab. par an)
Population growth rate (per year)	2.0% ⁽¹⁰⁾	Taux annual de croissance démographique
Number of years for population to double	35 ⁽¹⁰⁾	Nombre d'années pour que la population double
Infant mortality rate (per 1,000 live births)	180 ⁽⁸⁾	Taux de mortalité infantile (par 1.000 naissances vivantes)
Under 5 years mortality rate		Taux de mortalité en dessous de 5 ans
Maternal mortality rate		Taux de mortalité maternelle
Nutrition: ave. calories/day	2 064 ⁽¹²⁾	Nutrition: moy. calories par jour moy. gr protéine par jour
ave. grams protein/day	73 ⁽¹²⁾	
<u>Health Resources</u>		<u>Ressources sanitaires</u>
Government health expenditures	\$4 620 000 ⁽⁸⁾	Dépenses publiques allouées à la santé
Percent of total government expenditures	7.7 ⁽⁸⁾	Pourcentage du budget total de l'Etat
Per capita health expenditures	\$1 13 (281 FCFA)	Crédits alloués à la santé par habitant
Physicians (population/physician)	48 810 ⁽⁸⁾	Médecins (nombre d'hab. par médecin)
Nurses (population/nurse)	7 454 ⁽⁸⁾	Infirmiers (nombre d'hab. par infirmier)
Non-physician primary health worker (population/worker)	4 790 ⁽⁸⁾	Auxiliaires paramédicaux (nombre d'hab. par auxiliaire)
Hospitals (pop./bed)	1 350 ⁽⁸⁾	Lits d'hôpitaux (nombre d'hab. par lit)
Community water supply (% pop. served)	26 ⁽¹⁴⁾	Approvisionnement public en eau (% de la population desservie)

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<u>SUMMARY PROFILE</u>	<u>CAPE VERDE ISLANDS</u> <u>ILES DU CAP VERT</u>	<u>PROFIL SOMMAIRE</u>
<u>General</u>		<u>Général</u>
Population	300 000 ⁽¹⁰⁾	Population
Total land area	4 033 km ² (9)	Superficie totale du pays
Population density (pop./km ²)	74	Densité démographique (nombre d'hab. par km ²)
Km. paved roads	6% ⁽¹⁰⁾	Km de routes goudronnées
Urban population	6% ⁽¹⁰⁾	Population urbaine
Nomadic population	_____	Population nomade
Population under 5 years	_____	Population de moins de 5 ans
Population under 15 years	44% ⁽¹⁰⁾	Population de moins de 15 ans
Per capita GNP	\$340 ⁽¹⁰⁾ \$470 ⁽¹¹⁾	PNB par habitant
Per capita energy consumption (kg. coal equivalent)	118 ⁽¹³⁾	Consommation d'énergie par habitant (kg d'équivalent charbon)
Literacy rate	34% ⁽¹¹⁾	Taux d'alphabétisation
<u>Health Status</u>		<u>Santé</u>
Life expectancy at birth	50 ⁽¹⁰⁾	Espérance de vie à la naissance
Crude birth rate (per 1,000 pop./year)	33 ⁽¹⁰⁾	Taux brut de natalité (pour 1.000 hab. par an)
Crude death rate (per 1,000 pop./year)	10 ⁽¹⁰⁾	Taux brut de mortalité (pour 1.000 hab. par an)
Population growth rate (per year)	2.3% ⁽¹⁰⁾	Taux annuel de croissance démographique
Number of years for population to double	30 ⁽¹⁰⁾	Nombre d'années pour que la population double
Infant mortality rate (per 1,000 live births)	91 ⁽¹⁰⁾	Taux de mortalité infantile (par 1.000 naissances vivantes)
Under 5 years mortality rate	_____	Taux de mortalité en dessous de 5 ans
Maternal mortality rate	_____	Taux de mortalité maternelle
Nutrition: ave. calories/day ave. grams protein/day	_____	Nutrition: moy. calories par jour moy. gr protéine par jour
<u>Health Resources</u>		<u>Ressources sanitaires</u>
Government health expenditures	\$925 000 ⁽⁹⁾	Dépenses publiques allouées à la santé
Percent of total government expenditures	4	Pourcentage du budget total de l'Etat
Per capita health expenditures	\$3.08 (767 CFAF)	Crédits alloués à la santé par habitant
Physicians (population/physician)	20 200 ⁽¹¹⁾	Médecins (nombre d'hab. par médecin)
Nurses (population/nurse)	_____	Infirmiers (nombre d'hab. par infirmier)
Non-physician primary health worker (population/worker)	_____	Auxiliaires paramédicaux (nombre d'hab. par auxiliaire)
Hospitals (pop./bed)	_____	Lits d'hôpitaux (nombre d'hab. par lit)
Community water supply (% pop. served)	_____	Approvisionnement public en eau (% de la population desservie)

N.B. Most of the figures quoted above must be taken as approximations, as wide variations exist within countries between urban and rural areas, between age groups, and from season to season.

La plupart des chiffres cités sont approximatifs puisque d'un pays à l'autre il existe de grandes variations entre les régions urbaines et rurales, entre les différents groupes d'âges et de saison à saison.

FOOTNOTES (SOURCES):

1. OMS (WHO), Profil de la République de Haute-Volta, September, 1976.
2. OMS (WHO), Profil du Sénégal, Dakar, September, 1976.
3. OMS (WHO), Profil de la République du Niger, November, 1976.
4. OMS (WHO), Profil de la République de Mauritanie, 1976.
5. République Islamique de Mauritanie, Deuxième plan de développement économique et social, 1970-1973.
6. OMS (WHO), Profil de la République du Mali, 1976.
7. Republic of the Gambia, Five Year Plan for Economic and Social Development, 1975/76 - 1979/80, July, 1975.
8. OMS (WHO), Profil de la République du Tchad, 1976.
9. République du Cap Vert, Direction Nationale de la Coopération, "Aperçu sur la situation aux Iles du Cap Vert découlant de la poursuite de la sécheresse," Praia, 13 septembre, 1976.
10. 1976 World Population Data Sheet, Population Reference Bureau, Inc., Washington, D.C.
11. AID, FY 1978 Submission to the Congress, February, 1977.
12. World Bank data, 1973-1975.
13. Overseas Development Council, Agenda for Action 1976.
14. WHO, World Health Statistics Report, Vol. 29, No. 10, 1976.
15. J. B. Stanbury and J. A. Childs, "Health, Nutrition and Population Sectors--Report of the M.I.T. Sahel-Sudan Project," Washington, D.C., AID, 1975.
16. AID data, 1969-72.

III. HEALTH STRATEGY PREMISES

III. HEALTH STRATEGY PREMISES

Given this picture of the health sector as it now exists in the Sahelian countries, what can realistically be done over the next 30 years to improve the status of the Sahel population?

This strategy paper is intended as a transition phase between conceptual policy/planning alternatives in the health sector and more concrete program initiatives that Sahelian countries and international donor agencies can implement on a regional and national basis. In such a transition document, it is difficult to set specific targets for health improvements that might be achieved. However, as a reasonable approximation of achievable targets, the authors suggest that the CILSS/Club and the individual countries concerned adopt the targets that an international group of development experts (the so-called Tinbergen Group) proposed in their report to The Club of Rome, "Reshaping the International Order." These targets, considered achievable in all the world's nations by the end of the twentieth century, include:

- a. life expectancy at birth, 65 years or more;
- b. literacy, 75 percent or more;
- c. infant mortality, 50 or less;
- d. birth rate, 25 or less.

The section which follows attempts to outline a set of health strategy premises which the authors feel could provide the policy guidelines for future health initiatives in the Sahel aimed at moving towards the above targets. The recommendations we make in the final section of the paper represent an incremental strategy, priority-focused, derived from the premises listed below. These program premises should be examined carefully by the CILSS, the individual Sahel countries, and The Club as to their validity. Assuming a consensus can be reached, they provide the basis for specific project identification and financing.

A. Resource Allocation

1. The additional allocation of available resources to health by the Sahelian countries over the next ten years most likely will not, and in all probability cannot, realize per capita health expenditures beyond two to three dollars per year (expressed in terms of constant 1977 dollars). The ability to increase health expenditures will depend upon increased per capita economic growth, and the resource constraints previously discussed in Section I.
2. The long-term operating costs of proposed health sector capital investments made by either the Sahelian countries or by external donors cannot exceed the recurrent-cost budgetary capabilities of the Sahelian nations.

In the short-term, in all probability, the external donors* will have to both capitalize as well as

* Information concerning current external donor support to the health sector in Sahelian countries, including in some instances direct budgetary support, is presented in Appendix A.

- subsidize to some extent the recurrent expenditures of the minimum program initiatives essential to improve the health status of the peoples of the Sahelian countries.
3. External donors, in all probability, will not assume on a long-term basis the responsibility for recurrent deficits.
 4. A modest increase, on the order of magnitude of 30 percent, over the next five years in government per capita health expenditures will have a major effect on improving the health of the Sahelian population if:
 - a. The available resources are distributed over the entire population, particularly the rural population which makes up 80-90 percent or more of the Sahel.
 - b. The resources are targeted to those population segments in which investments can yield the greatest return in terms of improved health status (mothers and young children).
 - c. Health problems posing the greatest risk are given highest priority.
 - d. Health services are developed on a "self-help" basis and are organized at the village level.
 5. Capital investments over the next five years in hospital beds or in high-cost technologies and/or facilities will deny the cost-efficient extension of health services to the village or rural population, 80-90 percent of whom currently either receive some health services from traditional practitioners or none at all.
 - a. The additional recurrent operating costs to sustain these high level technologies would use up most available resources. In all probability, fewer resources would reach the rural populations.
 - b. Current health expenditures in several of the Sahelian countries already amount to 8-10 percent of all government expenditures.

- c. Public and private sector capability to support the costs of employment of highly-trained health professionals, especially physicians, will not expand significantly over the next 5-10 years.

This should not be interpreted to mean that existing health services (hospitals, PMIs, dispensaries, etc.) should be curtailed. At best, they are now inadequate, even for the 10 to 20 percent of the population that have access to them. In fact, some additional investments will be necessary to facilitate more effective operation of existing health structures. The support of a minimal level of relatively expensive service is justified because of the need to utilize the current infrastructure in the development and support of the village-based strategy outlined below and to create an appropriate referral structure.

B. Village-Based Health Systems*

1. Village health systems, organized by and for local residents, and supported by the professional health infrastructure, offer the most effective and efficient way to promote and protect community health for the

* The thrust of this paper concerns the development of rural health services in the Sahel, which are the most underserved (in comparison with the urban Sahelian setting) and where 80-90 percent of the population resides. It should be pointed out, however, that the village-based system described in this paper has potential for a direct analogy with the provision of expanded and more effective community health services for urban populations as well. A system of urban "block" workers, analogous to village health workers, can be developed; neighborhood or district ("quartier") health posts can fulfill functions similar to those proposed for rural arrondissement and cercle levels. The adaptation of these rural health concepts to urban settings can take much pressure off overloaded urban hospitals, avoid inefficient use of costly hospital resources, and be much more effective in health promotion and disease prevention than the current system of urban hospital emphasis.

majority of the population which is dispersed in rural areas.

- a. Indigenous systems of health care exist in almost every Sahelian community; these systems could well be integrated into low-cost technologies and simple primary care methods.
- b. Local healers and practitioners, including traditional midwives, are effective to the extent they are because these local providers enjoy the confidence of the community.
- c. It is possible to train village practitioners and selected village residents to enhance their skills in prevention and to provide simple diagnoses and treatment of common health problems and, thus, to facilitate their effective intervention in the health status of the community. At the local level, the common disease patterns of infants and young children--respiratory infections, diarrhea, malaria, and malnutrition--are the major killers and can be effectively managed at the village level, along with a wide variety of prevalent infectious and parasitic diseases.
- d. Village health workers (VHW), as they continue to serve their communities, can expand the scope of their knowledge and problem-solving skills.
- e. The implementation of the village-based system can take place in a phased incremental way allowing resources to be allocated as they become available.
- f. The closeness of such a community health system to local residents creates an incentive and an opportunity for the citizens to mobilize local resources and to contribute to the successful development of the system.
- g. The use of village health workers in the development and collection of health and vital statistics offers an effective mechanism by which to develop a health information system.

- h. Birth spacing services are most appropriate when provided within the context of maternal and child health services that effectively reach the village level, and where the community itself has made an informed choice regarding these services.
 - i. The estimated 80-90 percent of the population that do not have access to the existing health systems in the Sahel countries can be reached.
 - j. The expected operating expense of this system is justified on the basis of the benefits anticipated from the equitable distribution of resources for basic health services to rural populations.
 - k. The capital investment outlay is minimal relative to existing expenditure patterns.
2. The existing health infrastructure in the Sahelian countries can provide the basis of technical and logistical support for a village-based strategy. Successful pilot efforts have already been undertaken.
- a. The Maradi ten-year village-based regional experience in Niger has strongly influenced a fundamental health service reform in Niger-- currently reflected in the current three-year plan.
 - b. Village-based projects, using existing health infrastructures, are being implemented in Mali and Senegal and perhaps in other Sahelian countries.
 - c. The successful experience of other countries which have undertaken health service reforms with scarce resources strongly favor this approach (China, Tanzania, Sri Lanka, the Kerala State of India).
 - d. The health services technologies appropriate and applicable to any particular Sahel village would require

country- and possibly area-specific definitions and adaptations to fit localized customs, patterns, and resources.

C. Demographic and Health Planning

1. Planning of health and social services, as well as other sectoral planning, requires reliable data concerning population growth and distribution combined with an accurate assessment of health and disease patterns. Unless national censuses, surveys, and epidemiologic studies in the Sahel take special account of the following three factors, considerable uncertainty will remain concerning purported future demographic patterns.
 - a. Migration: nomadism, rural settlement, and also rural-to-urban population shifts.
 - b. Isolated rural populations.
 - c. Changing fertility and age-specific mortality rates.

Further, an understanding of small-area variations in local demographic and disease patterns is essential to the planning, implementation, and evaluation of health and other projects.

2. It is important that these data be used in all development programs. This can only be done by enhancing the understanding of relationships between population and Sahelian development objectives and by expanding the capability of planning institutions to incorporate these population dimensions into their development programs.
3. The health risks to Sahelian mothers and children can be significantly reduced by the spacing of births. This has long been recognized in the Sahel and accomplished by traditional methods of abstinence, contraception, and prolonged breast-feeding. There is evidence that urbanization and other modernizing forces are eroding these traditions.

The lengthening of birth intervals by modern child spacing measures (combined with improved child and

maternal nutrition) markedly increases the survival chances of infants and young children, and also improves maternal health.

D. Components of an Integrated Village-Based System

To make most effective use of a village-based organizational structure for improving health, the preventive/community health orientation of services delivered should include components focusing on nutrition, clean water, environmental sanitation, and communicable disease control.

In general, the successful implementation of such components within the delivery mechanism of a village-based system depends on the effectiveness of a health education effort emphasizing the importance of each of the above components. Unless villagers are convinced of the importance of the component programs, successful implementation will be most difficult.

For each particular component, the strategy postulates a number of program premises, which are outlined below: (Of course, these components are in addition to, and complementary of, other primary health care activities.)

1. NUTRITION

- a. Improvement in the nutritional status of the Sahelian population, particularly mothers and infants, is dependent upon:
 - "Self-sufficiency" in a nutritional sense, i.e., having available adequate supplies of a nutritionally sound diet, preferably produced locally.
 - Future planning and implementation of nutritional self-sufficiency through new crops, livestock, or other foods being derived from the definition of specific localized (village or regional) nutritional requirements.
 - Ultimate achievement of a constant local availability of a nutritionally sound diet.
- b. Significant improvement in the nutritional status of the Sahel population can be effected by a well-developed village-based health structure.

- Changes in feeding practices of infants and children can substantially contribute to nutritional improvement and can most effectively be accomplished within a village-based system.
 - In addition to nutritional emphasis on infants and young children, emphasis must be placed on the nutritional needs of pregnant women and lactating mothers.
- c. After initial training and deployment of village health personnel, continuing education/skill upgrading workshops should be provided periodically at the intermediate level (i.e., at peripheral health centers and dispensaries serving in support of village health workers), and should include nutrition training. Also, at the intermediate level of the health infrastructure, resources for the nutritional rehabilitation of severely malnourished children needs to be available. Stress should be placed on the health and nutrition education of the mothers of these children and the use of locally available weaning and supplementary foods.

2. VILLAGE WATER

- a. The consistent availability of safe potable water in the villages will significantly reduce the environmental health risk to the population. The first priority concerning water supply in the Sahel is to make available an adequate quantity of water for village personal consumption needs. Following achievement of adequate supply, village populations must be educated regarding the importance of, and techniques for, making water supplies safe.
- The minimum system should prevent gross surface contamination.
 - Simple low-maintenance pumps are now available and could be widely applied. Small-scale industrial development for manufacture of this equipment is feasible in the Sahelian region.

- The continued maintenance of a safe village water supply, which is in large part dependent on active community participation in implementation, can best be achieved within the structure of a village-based health system. Training, logistical, and technical support for environmental health activities in the villages should be built into "arrondissement"-level support systems.
- b. A crucial prerequisite to the implementation of all these measures is adaptive field research at the country level so that applied water technology will be suitable to determined needs and resources.

3. ENVIRONMENTAL SANITATION

- a. The chances for successful implementation and proper use of village sanitation systems are increased by the extent to which there is village participation in the planning, installation, and maintenance of the systems.
 - Attempts to implement or to expand the various conventional sanitation systems have frequently failed because of high construction costs, poor adaptation to community customs, and subsequent non-use.
 - Inappropriate use and inadequate maintenance can lead to increased risk of disease transmission.
- b. Simple technologies exist which can improve the level of sanitation at the village level, e.g, low-cost household filtration systems can be made of local materials (earthen jars, charcoal, sand) for the treatment of water drawn from communal wells.
- c. Rapid urban growth, such as prevails in the cities of the Sahel, produce the particular hazards of inadequate and unsafe water supplies and sewage systems.

- d. The planning of systems for the urban Sahel can now benefit from the analyses of existing systems which are being questioned because of their total environment impact. This planning should carefully select techniques which prevent or eliminate the negative impact of these methodologies.
- e. There is the need for applied research relevant to village sanitation practises.
 - To what extent are current practices effective and safe for dispersed population groups?
 - To what extent can current practices where populations congregate in rural areas be made safe through pit latrines?
 - At what cost can health education on sanitary practices be extended to the population?

4. COMMUNICABLE DISEASE CONTROL

- a. In the Sahel certain endemic communicable diseases-- onchocerciasis, trypanosomiasis, treponematoses-- are amenable to control. Other infectious diseases can be significantly reduced. Health risks to the population can be significantly controlled by regional or area-specific attacks on these diseases. (The experts seem to be divided on the technical feasibility at the moment of including schistosomiasis.) Further, technically, malaria can be curtailed; however, there appears to be strong evidence that the long-term maintenance of a malaria control program is dependent upon having in place a village-based health structure. Disease control efforts, in general, are enhanced by having in place a village-based health structure (see "Recommendations" section).
- b. Regional or area projects to control major endemic diseases provide an opportunity for external donors to invest in efforts which can significantly improve the health status of the population. In the immediate future the implementation of disease control efforts should be directly linked to, and be financed by, specific economic development projects.

The implementation should preferably be undertaken through an international organization. In the long-run, large-scale or total population application will be more efficiently effected through the village-based health structure.

- c. The World Health Organization (WHO) and other technical experts in the communicable disease control field question both the advisability of and the prospects for long-term maintenance of campaigns to control the major transmissible diseases without having in place a reliable and accountable village-based health system that provides a permanent infrastructure for basic health services and categorical programs.

E. Health Implications of Planning in Other Sectors

1. Reducing the health risk in many areas of the Sahel will be a requirement prior to:
 - a. Resettlement of population along rivers (Onchocerciasis and malaria)
 - b. Expansion of irrigation projects (Schistosomiasis and malaria)
 - c. Improvement in animal husbandry
2. Inappropriate planning and implementation of development projects outside the health sector, particularly in agriculture and housing, can have a negative impact on the health of the population.
 - a. The resettlement of new populations into areas or villages previously free or less affected by a given disease can increase incidence of diseases such as malaria, schistosomiasis, etc.
 - b. The establishment of irrigation canals, man-made lakes, etc., create the natural habitat for the vectors of major transmissible diseases--thus increasing the risk to the population and jeopardizing the economic benefits of the development program.

- c. The inappropriate use of "ortho-phosphate" insecticides and pesticides can result in severe risks to the agricultural population.
- d. Emphasis on production of "cash crops" may hinder nutritional improvements among agricultural populations, particularly among mothers and infants, unless national agricultural policies and regional food distribution systems can ensure adequate nutrition; local agricultural production must fulfill local quantitative and qualitative nutritional needs.
- e. The use of available labor for cash crop production may result in neglect of the household gardening which is necessary for providing basic food requirements.

In summary, improving health services and the health status of the Sahelian countries must take place inter-dependently with improvement of the quality of life in general and with overall socioeconomic growth. The extension of basic health services to a rural population requires the identification of appropriate administrative and managerial support structures which are institutionally indigenous to the local area.

1. To facilitate effective functioning, decisions concerning the operation of health services must be vested in the community or as close to it as possible--culturally and geographically.
2. The most successful implementation of any technological and programmatic approach to health services delivery at the village level requires the effective involvement and functioning of a locally-based administrative/management structure. Moreover, an even higher probability of success is likely when

the local structure works in cooperation with a hierarchy sensitive to the basic principles of local administration. Specific health tasks will be carried out when they are defined, prioritized, and delegated by regional or national administrators to local governing bodies. For example, the more successful carrying out of the following tasks is facilitated by, and may be dependent upon, the availability of a village-based health structure:

- Immunization of children
- Safe village water
- Solid waste disposal
- Management of infant diarrhea and pneumonia
- Malaria (maintenance phase)
- Improved nutrition for mothers, infants, and children
- Birth spacing and family planning where desired.

IV. INVESTMENT IN HEALTH AS A FACTOR
IN SOCIOECONOMIC DEVELOPMENT

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Within the general development program of the countries of CILSS, and also of the assistance program of The Club, the funding of health programs is usually considered as social investment without obvious benefits for economic growth. Because the beneficial effects of health improvement on overall development are mostly indirect and long-term in nature, and are difficult to differentiate from other factors; the justifications for including health interventions as integral parts of a development effort have yet to be convincingly supported by empirical evidence. But a strong argument can be made, if somewhat theoretical, where health interventions are planned and designed to achieve specific appropriate objectives within the overall development effort, they can support and reinforce other social and economic investments and can lead to substantial benefits for national modernization programs. This section of the paper briefly describes some of the major arguments for the direct and indirect economic benefits to be gained by investments in the health sector, and also suggests a means by which competing options within the health sector can be rank-ordered by priority.

IMPROVED HEALTH AS A STIMULUS TO LABOR PRODUCTIVITY

The increased productivity of a healthier and better-nourished labor force has already been mentioned under the earlier discussion of "Strategic Themes" (see Introduction). Studies of increased agricultural and industrial productivity of workers following control and treatment of malaria have demonstrated both increased per capita output and a reduction in necessary labor force to achieve a given output. Attempts to demonstrate increased productivity related to diminished prevalence of schistosomiasis have yielded less clear results. Though the available data are not conclusive, it seems reasonable to argue that increased labor productivity results from improved health. The impact relative to cost is particularly high where the costs of health investments can be kept small and where the adult prevalence of incapacitating diseases (such as malaria, tuberculosis, loss of vision due to onchocerciasis and trachoma, etc.) are very high, as they are in the countries of the Sahel.

While labor surplus and high rates of under- and unemployment may mitigate the productivity benefits to be gained by improving the health of the labor force, these benefits are in turn increased in importance in situations in which an expanded labor force is required for new agricultural development; some economists argue

that the limiting factor in increasing agricultural production in the Sahel and elsewhere in West Africa is the availability of labor. Also, insofar as a limited manpower pool of skilled, trained workers constrains agricultural and industrial development in the Sahel, the safeguarding and improvement of the health of these workers is important in economic terms.

"NEW LANDS" DEVELOPMENT AND HEALTH CONSTRAINTS

An argument closely related to the one above concerns the importance of assuring the health of populations resettled in areas for agricultural development, or of controlling or eliminating health hazards that have previously made these areas unsuitable for habitation or intensive agriculture. A prime example of this argument may be found within the Sahel itself in the current project to control onchocerciasis in the Volta Basin. This multilateral effort has been undertaken by the countries concerned, with the help of a consortium of foreign donors and directed by the WHO. The project's investment in health (and in a range of community development measures) has the aim of opening up some of the most fertile land in West Africa for intensive agricultural production.

MIGRATION AND RESETTLEMENT PROJECTS

Many of the development proposals being considered for the Sahel involve the migration and/or resettlement of populations. There are numerous examples from the developing world where inattention to the health hazards posed by the regrouping and/or concentration of previously dispersed populations has seriously compromised or destroyed the economic benefits potential in the development scheme. For example, a large-scale resettlement program in East Asia experienced a mortality among new migrants as high as 30 percent in its early years; explosive outbreaks of malaria in East and West African resettlement projects seriously compromised the effectiveness of the projects. Protection and promotion of the health of resettlement populations is especially important where the migrating populations already have high rates of disease and where there are major health hazards in the new environments; both of these conditions exist throughout the Sahel.

IMPROVED HEALTH AS AN ASSET TO OTHER SOCIAL SECTOR INVESTMENTS

Health investments can maximize the returns on investment in other social sectors. For example, it has been shown that malnourished and anemic children are inefficient in learning at school. Thus, the considerable investment of Sahelian governments in primary education,

in effect its capital investment in human resources, would be directly benefited to the extent that the school age population would be healthier and better-nourished from infancy onwards. Similar arguments can be made regarding social sector investments for the entire population.

HEALTH AND THE ROLE OF WOMEN

The women of the Sahel constitute an enormous productive factor, albeit often outside the formal economic sector. They provide major contributions in agriculture and family-maintenance functions and, to a limited but increasing extent, in local and national commerce and trade as well as government and civil service. Yet, the female population, especially in the child-bearing age range, is, along with their infants and young children, especially vulnerable to and affected by frequent pregnancy and by high rates of disease and premature death. Improvements in the health of the female population would increase their productivity and expand their role in national development towards its full potential.

HEALTH AND IMPROVED "NUTRITIONAL EFFICIENCY"

A problem of first-line importance in the Sahel, as in most of the developing world, is the vicious cycle of malnutrition and infectious/parasitic disease, especially

as it affects infants and young children. This association is the primary cause of severe morbidity and mortality in the childhood population. Investments in health can directly enhance the benefits of investments in agriculture and food production and distribution in two ways: (1) improved nutrition increases labor productivity which may maximize the outputs of agricultural and other sector investments; and (2) by improving the "efficiency" of available nutritional intake. Infectious diseases, especially diarrhea, and diseases accompanied by fever, produce a "wastage" of ingested nutrients that has been estimated to be as high as 20 percent. Better health conditions can produce economic benefits by the more efficient biological utilization of foods that have been produced, distributed, and ingested.

INCREASED SURVIVAL, POPULATION GROWTH AND DEVELOPMENT

There is considerable argument among demographers and population planners as to whether the Sahel faces significant pressures of over-population in the short-term future. At issue is the question of how many people the Sahel can support, at what levels of well-being. The recent drought highlighted the fragile nature of the Sahelian ecology, and its susceptibility to sudden climatic reverses. There are at present situations reflecting population pressures

on scarce resources in the Sahel. Among these are: rapidly expanding urban settings, over-grazed and deforested pastoral areas, and the extension of dryland agriculture vulnerable to drought.

Accelerated population growth is likely in the Sahel, given very high birth rates and the decline in death rates, particularly among children, that will result from more effective investments in health. The childhood proportion of the population will rise, creating an increase in the dependency ratio (the proportion of economically inactive members of a population who must be supported by the productive proportion).

Comprehensive research is needed to examine the level of population growth which is congruent with the development goals of increasing human productivity and improving the living standards of the Sahelian populations. Planning options should consider linkages between health needs, demographic issues, and general development goals. Options which ought to be considered, among others, are rural employment generation to decrease out-migration and improved health for greater worker productivity and reduced infant mortality. The benefits to the health of mothers and children of birth spacing and fertility limitation are described elsewhere in this paper; the benefits to economic development of some slowing of population growth seem no

less arguable. However, it is clear that the Sahelian countries themselves are convinced that significant declines in fertility rates are only likely to be achieved after a reduction in childhood death rates.

THE "VALUE" OF HEALTH

Despite numerous attempts, economists have not been able to place a quantifiable value upon health and its improvement. Governments, in general, invest in the health sector as a means toward improving the "quality of life" of their populations. This benefit, though impossible to fully quantify in economic terms, is perhaps the major justification for investments in the health sector. Conversely, it is clear that general improvements in economic and social well-being, generated by investments and social change in other sectors, have as much or more to do with improvement in the health status of the population as does direct investment in health services, particularly where economic and social improvements are widely and equitably distributed among the population.

The concluding portion of this section describes a method by which options for investment in the categorical disease components of the health sector can be compared for priority ranking. The scheme presented in Table 1 is a modification of one originally proposed by Dr. John

Table 1: A SCHEMA FOR SETTING HEALTH PRIORITIES*

	1.** Prevalence	2. Impact on Morbidity, Mortality	3. Technical Feasibility of Control	4. Technical Feasibility of Program Maintenance	5. Probability of Long-term Success	6. Cost of Control and Maintenance	7. Economic Development Benefits	8. Community Awareness and Acceptance
Disease (or Health Activity)								
<p>**Code: 1. Prevalence = Rate of disease per thousand population (or size of population benefitted by health activity). 2. Impact on Morbidity, Mortality = Amount of illness and death caused by disease (or probable reduction in same by health activity). 3. Technical Feasibility of Control = Efficacy of available technology to control disease (or feasibility of mounting health activity) (A modifier can be added to reflect probability of future advances in the technology). 4. Technical Feasibility of Program Maintenance = Reliable, predictable methods exist to maintain the disease once it 's controlled (or to maintain a given health program). 5. Probability of Long-Term Success = The probability that the maintenance aspect of the program will occur. 6. Cost of Control and Maintenance = Actual cost of carrying out the control (or other) program/Cost of maintenance. 7. Economic Development Benefits = The relationship of the specific disease control (or other) program to the overall economic development of the area covered. 8. Community Awareness and Acceptance = Expressed desire of the population for control of the disease (or availability of the health activity).</p>								

*Modified from J. Bryant

Bryant. In this method, a health activity (which can be a disease problem to be attacked, a program to be mounted, or a proposal for infrastructure or manpower development) is rated according to a number of criteria which fall into categories of the importance of the problem, the cost, and the feasibility of dealing with the problem. (Each criterion is assigned a weight, decided upon by those responsible for choosing among alternative activities.) The cumulative weights of the various activities are then compared against each other and the activities are assigned priorities, either singly or as combinations, in order to allow for the most effective and efficient use of scarce health resources.

This method is obviously not rigorously quantitative, but it does permit some objective weighing of options and, at the least, forces program planners and decision-makers to be explicit in determining objectives and potential outcomes. Tables 2 and 3 repeat the schema presenting several examples of disease problems, compared here in a descriptive rather than a semiquantitative fashion.

Table 2: EXAMPLES OF CATEGORICAL DISEASE PRIORITIES IN THE SAHEL*

	1. Prevalence	2. Impact on Morbidity, Mortality	3. Technical Feasibility of Control	4. Technical Feasibility of Program Maintenance	5. Probability of Long-term Success	6. Cost of Control and Maintenance	7. Economic Development Benefits	8. Community Awareness and Acceptance
MALARIA	very high	very high	high (ref. pro- phylaxis & treatment)	high	high	moderately low	high	very high
SCHISTOSOMIASIS	very high	high?	very low	low	low	high	high	moderate
ONCHOCERCIASIS	high, but localized	moderately high	probably high	high	moderate	high	high	very high
IMMUNIZABLE CHILDHOOD DISEASES	very high	very high	very high	very high	very high	low	moderate	high
TREPONEMATOSES	high, but localized	moderate to low?	very high	very high	very high	very low	moderate	low
TRYPANOSOMIASIS	high (epidemic potential)	high	high	high	moderate	moderate	high	moderately low
LEPROSY	moderate	very high	moderately high	high	high	moderate to low	low	high

*Assuming the availability of access to health services via a village-based system.

Table 3: EXAMPLES OF PRIORITY RANKING OF CONTROLLABLE DISEASES IN THE SAHEL*

	1. Prevalence	2. Impact on Morbidity, Mortality	3. Technical Feasibility of Control	4. Technical Feasibility of Program Maintenance	5. Probability of Long-term Success	6. Cost of Control and Maintenance	7. Economic Development Benefits	8. Community Awareness and Acceptance
MALARIA	very high	very high	moderately high high	high low	high low	moderately low high	high	very high very high
SCHISTOSOMIASIS	very high	high?	very low low	low low	low low	high higher	high	moderate low
ONCHOCERCIASIS	high, but localized	moderately high	probably high high	higher high	moderate moderate	high high	high	very high high
IMMUNIZABLE CHILDHOOD DISEASES	very high	very high	very high low	very high low	very high moderate	low low	moderate	high moderate
TREPONEMATOSES	high, but localized	moderate to low?	very high high	very high low	very high high	very low low	moderate	low low
TRYPANOSOMIASIS	high (epidemic potential)	high	high moderate	high moderate	moderate moderate	moderate low	high	moderately low low
LEPROSY**	moderate	very high	moderately high mod. low	high low	high moderate	moderate - low moderate	low	high high

*The upper left section of the cell represents a ranking assuming the existence of the proposed village-based health system (See Table 2); the bottom right section of the cell represents a ranking based on the current health infrastructure.

**Treatment, not control program.

V. TOWARDS A VILLAGE-BASED HEALTH SYSTEM:
ORGANIZATIONAL ILLUSTRATIONS

V. TOWARDS A VILLAGE-BASED HEALTH SYSTEM: ORGANIZATIONAL ILLUSTRATIONS

In this section of the paper a proposal for the organization of the health services system in the Sahel is outlined in illustrative fashion: the functional objectives for health workers at various levels which could be set, how training and continuing education/skill upgrading could most effectively function, what the organizational and administrative relationships between the various levels from the village to a national Ministry of Health could be, and what resources would be necessary for the development and operation of the system. The proposed type of health services system could serve as the keystone for the overall health strategy.

It should be emphasized that the description that follows is in preliminary form to serve as a basis for discussion by the CILSS/Club. If basic agreement on the proposal is reached, the illustrations can be further refined by Sahelian health representatives for the Ottawa meeting in May 1977. Additional detailed planning and analysis, necessary to develop and implement similar systems in the countries of the Sahel, could then be undertaken by the health planning units of the respective ministries

of the countries concerned, assisted by the proposed health planning unit within CILSS (see Specific Action Recommendation #1, Section VI).

The system described below is outlined for five levels of organization (village; "intermediate" or arrondissement; "secondary" or cercle; "tertiary" or regional; and "central" or national) as they might be found in one of the larger Sahelian countries. This proposed system can be suitably modified to fit any of the countries concerned with, of course, recognition given to the wide divergence which will be found among the countries--for instance, decentralized versus centralized governmental structures. It is strongly recommended that such a system be considered for implementation on a national, or at least large-area sub-national scale; the principles on which the village-based system rests have already been demonstrated on the small-area "pilot" level, both in the Sahel and elsewhere in the developing world. Table 4 provides a functional outline of the health activities to be performed at the various levels of the system; these activities and their organization are more fully described in the text of this section.

The elements of the system described below flow directly from the strategic themes and program premises presented

earlier in this paper; together they form the background for the recommendations presented in Section VI of this document.

HEALTH SERVICES AT THE VILLAGE LEVEL

The village described in this illustrative example is representative of many villages in the Sahelian countries. It has a population of 500, has no government school or health post, and is one of 25-40 similar villages in its arrondissement. Although there is no motorable road, there is a track passable by four-wheel drive vehicles or motor-bikes and linked to the administrative center ("chef-lieu") of the arrondissement, 20 (or perhaps even 40) kilometers away. Here there is a small health post currently staffed by one auxiliary nurse. The people of the village are millet-farmers, living in extended families and practicing traditional subsistence agriculture; traditional forms of village organization and authority remain dominant. Health care in the village has always been provided by several indigenous healers ("guerrisseurs") and traditional midwives. The disease patterns in the village are those described in the country profiles, with high rates of illness and death, especially among mothers and children, primarily based on infectious and parasitic diseases (diarrhea, pneumonia, measles and other childhood

communicable diseases, malaria, etc.), in association with malnutrition in early childhood. Probable health indices, if they were to be measured, would include: crude death rate, 35/1,000 population per year; infant mortality rate, 190 per 1,000 live births; under-five mortality rate, 300 per 1,000; maternal mortality rate, 90 per 10,000 live births; and birth rate, 45 per 1,000 population per year. The life-setting of the people of this village is roughly typical of almost 80 percent of the population of the Sahelian countries.

Health services in the village, under the proposed village-based national system of health care, would be provided by two village health workers (VHWs) who are residents of the village, selected by a village council (or other traditional authority structure) in cooperation with health officials, trained in the village setting [partly in their own village and partly at the arrondissement center ("chef-lieu") health post], and who are able to provide a wide range of health promotive functions (examples: nutrition education, simple hygiene, simple environmental improvements in cooperation with the village council), disease preventive functions (examples: organizing the village children for visits by mobile immunization teams, health education), and simple curative

functions (examples: early treatment of diarrhea by oral rehydration, treatment of respiratory and skin infections, treatment of malaria, first aid of simple injuries). They refer more complicated disease problems to the next appropriate treatment levels. Normal deliveries take place in the village: one of the VHWs is a traditional midwife who has received training from the cercle-level government midwife. The duties of the VHW are performed in accordance with standard practices worked out on a national basis; a basic formulary of five or six necessary drugs and dosages is available at the village level. In addition, the VHW is responsible for the collection of basic demographic and disease data in the village, transmitted to the arrondissement or cercle level. The VHW may be illiterate or functionally illiterate; he/she can nevertheless be trained to carry out the above activities competently and efficiently.

Key issues in the development and support of the village health worker include the following:

1. Selection: Selection is a collaborative process between the village council (or other traditional local authority) and representatives of the Ministry of Health. Literacy is an asset, but not a requirement. Wherever possible, traditional

healers and midwives are to be considered as candidates.

2. Training: Initial training, probably of as short as two months duration, is carried out at the arrondissement level and in the village itself by arrondissement, cercle, and, in some cases, regional personnel. (It must be emphasized that the preparation of nursing and other personnel, which is carried out at the arrondissement and cercle levels for their new roles as trainers, supervisors, and consultants for VHWs, will involve major changes in their own training needs and subsequent functions). As previously noted, training is extremely pragmatic and task/problem-oriented, based on standard protocols developed by a careful assessment of those major village-level health needs which can be effectively dealt with by the VHWs. Training in the standard use of a basic formulary of a very few drugs is provided; maximal utilization of locally-available traditional remedies, tested by the National Institute of Traditional Medicine, is encouraged.

Initial training of the VHW is only the first step in a continuing process of supervision,

consultation, and ongoing and periodic further education carried out by arrondissement, cercle, and mobile regional personnel. This continuation of contact and training is indispensable if the system is to work effectively, and if the VHWS are to remain motivated to maintain and upgrade their skills and effectiveness.

3. Employment and Support: The VHW, though closely linked to the government health system and its personnel, is not part of the government civil service. He/she remains a resident of his/her village, essentially responsible to the village elders or village health council. The VHW is not government-salaried, but receives either cash or in-kind reimbursement for services from the villagers. The government provides drugs and basic equipment, and may decide to allow the VHW to retain a portion of the income derived from the sale of some medicines to the villagers. Ideally, the village health council would assume responsibility for the financial management of the village-based system; the council would be accountable to MOH authorities from whom it would receive resupplies. The VHWS work with and

through the health council to stimulate environmental and nutritional health improvements that can be carried out using locally-available resources.

The village health council, which takes operational responsibility and accountability for village health activities, is developed within the traditional authority structure of the village. It may include members of the council of elders, other important residents of the village, as well as political party or other government representatives residing in the village.

The health council will be represented on the village development committee to ensure that health issues are given adequate consideration within the context of village development, and to help coordinate activities with the other sectors. Therefore, in addition to its directly health-related activities, the village health council can serve as an important link between health efforts within the village and activities in agricultural and other rural development sectors.

ARRONDISSEMENT ("INTERMEDIATE") LEVEL HEALTH ACTIVITIES

In most of the Sahel today, the arrondissement level represents the most peripheral focus of government health

services. As outlined in the previous discussion, this level will play a critical role in extending health services out to peripheral village communities. At present, at the arrondissement center ("chef-lieu"), there may be found a small dispensary or health post which is usually staffed by a single nursing auxiliary. Due to the multiple duties of this position and the shortage of transportation and other resources, it is unusual for this worker, at present, to leave the post for service in dispersed villages. The new role envisaged by the proposed village-based health system for the arrondissement workers requires that a major proportion of their time is to be spent in liaison with the village health workers, visiting them in their villages, providing administrative and logistic support, supervision, consultation, and continuing education. Therefore, it will be necessary to increase the number of nursing auxiliaries and nurses available at the arrondissement level in order to provide, in general, at least two health workers based at this level. This will allow continuation of the fixed activities in the arrondissement-level facility, as well as the critically important function of support for the dispersed village health workers. As is true at all levels of the system--village, arrondissement, cercle, regional, and national--the new roles proposed for health workers require

a major reorientation of their training and motivation at each level. In particular, the ability of arrondissement (as well as cercle) health workers to function as teachers and supervisors involves a series of skills that is not at present well developed in the nursing and other health training schools in the Sahelian countries.

In addition to the activities carried out by arrondissement-level workers as described above, there will be a need for frequent and periodic visits to this level by health personnel from the next more central level, i.e., the cercle, and also periodic visits by mobile personnel from the regional level. Some of these visits will be in conjunction with vaccinations and categorical disease campaigns, but there will also be a need for regional and cercle-level personnel to visit the arrondissement, and in some cases the villages, in order to perform a kind of training and consultation function which is similar to that which the arrondissement-level worker is providing to the village health workers. As was suggested earlier in the paper, most, if not all, of the training of the village health workers should take place at either arrondissement or village levels. The arrondissement facility, therefore, needs to become both a site where training and recycling of arrondissement and village-level personnel can take place, and a field site for the training of other health

workers (including physicians) who will be trained to function at more central levels.

In general, the arrondissement health facility should carry out ambulatory treatment and preventive health measures in addition to its support of village activities described above, and should not provide a site of inpatient or hospital activities. Patients that need to be referred for hospitalization should generally go from the village or the arrondissement to the cercle or regional level. If possible, however, one of the health workers at the arrondissement should have a more extensive capacity in obstetrics to enable him/her to handle some of the problems of delivery referred by the village health worker and also so as to continually improve the midwifery skills in the village.

The arrondissement facility also serves as a coordinating point for demographic and disease data collected in the villages, for scheduling of visits by mobile vaccination and categorical disease teams coming out from a more central level, and, in general, for assisting the village health councils and the village health workers with the development and implementation of their programs of health services.

CERCLE ("SECONDARY") LEVEL HEALTH ACTIVITIES

The cercle level is, fairly typically throughout the Sahel, a more major site of administration and communications activities for the government. The cercle is usually linked back to the regional level by motorable roads, and includes an infrastructure for health, education, and administration. There is most often a larger dispensary or health center, usually with 10 to 30 beds, for complicated deliveries and hospitalization. Nursing auxiliaries, nurses, midwives, and often a physician are based at this level. Therefore, building upon this existing infrastructure in much of the Sahel, the cercle or secondary level becomes a major point of reference, support, and more advanced training and recycling for health workers from the arrondissements and, thus, the activities which they in turn supervise and support in the villages. In the proposed village-based health system, most patients referred for hospitalization from village and arrondissement can be accommodated here, including those with complicated problems of delivery. Some of these patients will, of course, need to be referred to the regional level for hospitalization, but the reality constraints will generally limit such referrals.

Similar to the argument presented for arrondissement-level services, at the cercle level too, a major re-orientation of personnel and resources is necessary so that

they can be used in a support capacity (administrative, training, and consultation) for workers functioning in outlying areas. However, only a minority of the training of more peripheral workers carried out by cercle personnel should be done at this level; most of this activity should be carried out by cercle personnel traveling to the arrondissement and the villages.

The cercle level within the health system, in coordination with the regional level, should also be responsible for the logistics and operation of mobile health activities. Finally, the cercle also serves as the collection point for the transmittal of demographic and disease data to the national level, as received from the arrondissement.

REGIONAL ("TERTIARY") LEVEL HEALTH ACTIVITIES

The regional level in most Sahelian situations represents the most effective central functioning point for the administration and delivery of health services. In most instances, a hospital with physicians and nurses, and the capacity to carry out a wide range of medical and surgical activities, is now based at the regional level; it also serves as the headquarters for endemic disease activities. This arrangement would prevail under the proposed village-based health system, but again, as has been described for more peripheral

levels, the additional function emphasizing support and supervision of more peripheral health services needs to be strengthened or, in some cases, added. The regional level also serves as the coordination center for planning and implementation of health care delivery, from the village up to the regional level. It is here also that the health information system for the region is based, and from which specific training and functional protocols for health workers using the standard formulary are developed and evaluated.

In general, very little training of health workers from the periphery should be done at the regional level. Instead, personnel from the region should go out to the cercle, arrondissement, and villages to conduct training in the setting in which those personnel will function. It should be emphasized that in most Sahelian situations the functional liaison for health care between the region and the national level has a restricted capacity. Therefore, with the exception of very occasional referrals for hospitalization, the most central responsibility for the delivery of health services and, most importantly, for the support of village-based health services, must rest at the regional level. Here too, the various government organizations concerned with other development sectors are headquartered. The regional health director and his

staff can operate at this level to develop and ensure the implementation of the coordination of rural health services with agricultural extension, basic education, and other rural development and mobilization measures. To achieve such coordination, the health system must have an efficient administrative and logistics support network. As the most central effective level of the delivery of health services, the region is obviously also where overall coordination of the development, implementation, and evaluation of more peripheral health programs take place, and where the budgetary allocations received from the central government are distributed to more peripheral levels. To the greatest extent possible, there should be budgetary flexibility granted to the regions so that the actual utilization of budget at village, arrondissement, and cercle levels is as relevant as possible to the specific local setting.

NATIONAL ("CENTRAL") LEVEL HEALTH ACTIVITIES

The national or central level, where the Ministry of Health is located in the capital city, is the locus at which basic health policy and planning, and national management and administration of the health care systems should take place. This level, except of course for the health services facilities serving the capital itself, should not be involved in direct implementation of health

services which are executed from the regions out through more peripheral levels. However, the basic policy and planning reforms, which must be conceived and implemented if a village-based health strategy is to take place in a country of the Sahel, are the concern of the national Ministry at the central level. Similarly, a re-orientation of national health manpower policy, curriculum development for health training institutions, and overall supervision and evaluation of the regional programs should take place at this central level. Responsibility for the regional distribution of overall budgetary allocations, as well as a central control and accounting function, are also found here. Similar to the inter-sectoral development planning efforts that take place at the region, it is at the central level that inter-ministerial policy and planning for integrated rural development is based.

Although, at present, many of the health training schools are located in the capital city in Sahelian countries, it is important to emphasize that a more effective educational orientation in a village-based health system must involve the development of field training sites at peripheral community levels where a considerable portion of training and education (even of senior administrators and physicians) should take place.

In other sections of this report we have stressed the importance of the development of traditional medicine as an asset to the wider accessibility and greater effectiveness of a rural health care system. An institute of traditional medicine, based in the national capital, should perform the functions of evaluating various treatment modalities, conducting research into active pharmacological principles of traditional remedies, and also developing effective ways to involve traditional health practitioners in the government health system.

TABLE 4

FUNCTIONAL OUTLINE OF VILLAGE-BASED HEALTH SYSTEM: RESPONSIBILITIES APPROPRIATE TO VARIOUS LEVELS

RESPONSIBILITY	VILLAGE-LEVEL	ARRONDISSEMENT LEVEL "INTERMEDIATE"	CERCLE LEVEL "SECONDARY"	REGIONAL LEVEL "TERTIARY"	NATIONAL LEVEL "CENTRAL"
BASIC HEALTH SERVICES	Basic Promotive, Preventive, and Simple Curative Activities by VHWs. Examples: nutrition education, village sanitation, treatment of diarrhea, malaria, skin infections, normal delivery.	Nurse or auxiliary visits villages in support of VHW activities. Some referral of treatment problems.	Nurses, midwives, and M.D. visit ARR's and villages for consultation and continuing education. Some referrals of treatment problems.	Coordination of supervision at more peripheral levels. Referral for hospitalization when possible.	No direct involvement in providing basic health services. Develops national treatment guide and formulary. Research regarding traditional medicine.
CATEGORICAL DISEASE CONTROL AND MASS IMMUNIZATION CAMPAIGNS	Organizes population for visits by immunization and disease control teams. Collects data within village.	Collates data. Plans mobile campaign schedule within arrondissement.	Responsible for immunization and categorical disease control on cercle <u>or</u> regional basis. Collates data for transmittal to national level. Mobile teams based at cercle <u>or</u> regional levels.		Policy and planning only, plus procurement and logistic support to regions and cercles.
TRAINING AND MANPOWER DEVELOPMENT	Training and recycling of VHWs and auxiliaries take place at village and arrondissement levels. Selection of VHWs by village councils.		Recycling of auxiliaries, nurses, and midwives. Cercle-level personnel responsible for carrying out training at village and arrondissement levels.	Occasional recycling of senior cercle-level personnel. Regional health officials responsible for overall training plans and programs within the region.	National manpower policy and planning. Training of administrators, M.D.s, senior nurses and midwives, <u>BUT</u> a significant part of training to take place at <u>field</u> levels.
HEALTH POLICY AND PLANNING	Local program activities guided by village council.	Support and supervision of village programs.	Support and supervision of arrondissement programs.	Regional health plan development, implementation, and evaluation. Supervision of cercle programs. Administrative support and logistics, etc.	National health policy and planning. Supervision and evaluation of regional programs. Inter-sectoral as well as health sector policy and planning.
FINANCING AND BUDGETING	In-kind and cash reimbursement for VHW services; village health council takes operational responsibility and accountability for village health activities.	Budget preparation, review, and general monitoring.	Budget review and fiscal accountability.	Allocation of health budget to cercle, arrondissement, and village levels.	National budgeting and procurement. Allocation to regional levels.

VI. RECOMMENDATIONS

VI. RECOMMENDATIONS

The following recommendations represent the authors' view of concrete steps that can be taken to enable the Sahelian states, the CILSS, and The Club to move from the adoption of a coordinated health strategy in the region to the design and implementation of specific national and regional health projects which will put this strategy into practice. The views expressed here benefited greatly from a number of discussions with technicians from WHO, FAC, CRDI, CILSS, USAID, the World Bank, and others. In addition, numerous documents outlined in the bibliography were reviewed in the preparation of this paper. Of extreme value was the work done on the country profiles by Dr. Martin-Samos and the WHO representatives in each of the Sahelian countries. Mr. Ali Cissé's perspective and review during our March 7-15 visit to Ouagadougou were of great value. The recommendations flow directly from the Strategic Themes (see Introduction) and the Premises outlined in previous sections of this paper; modification of the premises by the CILSS group in the March meeting in Dakar has led to a corresponding modification by the Sahelian health representatives of the action recommendations.

The authors believe that the recommendations presented here reflect effective means by which to improve the health status of the population of the Sahel, given the realities and, especially, current and future resource constraints. We wish to emphasize, however, that our recommendations are presented not as prescriptions, but as a point of departure (hopefully persuasive) for discussion and decision by the responsible officials of the Sahel countries and the CILSS.

Adoption of a health strategy, modified by debate and consensus, can provide the countries of the Sahel and the coordinated donor group with a framework for defining and prioritizing investments in the health sector, both on a national and regional basis.

We believe that the final definition and evolution of a specific strategy must be carried out by the CILSS countries themselves. This paper can and should serve only as the point of departure from which this process can go forward. The recommendations that follow are directed toward steps which we see as instrumental in institutionalizing a capacity within CILSS not only to develop a strategy, but to carry it out.

The balance of this section contains the recommendations which the authors feel CILSS and the individual countries should consider.

POLICY AND PROGRAM RECOMMENDATIONS

A. Resource Allocation

1. Both The Club and the CILSS should adopt a policy of limiting future capital investments in the health sector to programs or projects in which the operating costs can ultimately be absorbed by the individual countries themselves.

2. A balance must be achieved between current and future investments in the health sector. It is our judgment that the contemporary trends in the Sahel countries--an increasing proportion of the available health resources reaching a decreasing proportion of the population--must be reversed. New investments by both the CILSS countries and the donors, in our judgment, should support:

- a. the development of village-based health services delivery infrastructure in each country (see Section V on Organizational Illustrations);
- b. investments within the context of the village-based health systems, in particular emphasizing:
 - water supply
 - nutrition
 - environmental sanitation;
- c. the policy, planning, management, and training initiatives essential to create village-based systems;
- d. the specific disease control measures outlined on pages 89-92 in this section of the paper;

- e. the institutionalization of a demographic information and research capability within the CILSS and the individual countries.

3. It should be understood that such a policy would, in all probability, curtail for the short-term future a major expansion of high-cost, high-technology dependent, and such highly specialized resources as:

- medical schools
- urban and rural hospitals
- expansion of training and employment of highly trained medical specialists.

In addition, it would mean limiting the dependency of the Sahel countries on external commodities (drugs, supplies, and equipment) to the essential items needed to confront priority problems.

Assuming basic policy agreement on the program premises and recommendations outlined herein, we would recommend:

B. Village-Based Health Systems

(For further detail, see Section V on Organizational Illustrations.)

1. These systems should be incrementally developed, utilizing from the outset traditional village healers whenever and wherever possible:

- a. the traditional midwife
- b. the guerrisseur and other traditional practitioners of medicine.

2. The role of the village-based health worker must be specifically defined. The tasks to be performed must relate directly to priority health problems facing the villages.

3. Protocols for incrementally expanding the skills of the village worker over time, as related to priority village problems and needs, must be developed.

4. The logistical, training and technical support requirements for the village-based worker must be defined and implemented.

5. The adoption of a village-based health strategy would require major alterations in, and reform of, the existing health infrastructures in the Sahelian countries. The village-based systems should gradually replace the hospital and dispensary as the prime providers of basic health services. The role of the more central levels must progressively shift from that of provider of services to that of technical support (consultation, training, supervision) to the village-based worker. Resources would be allocated accordingly.

6. Support to the village-based health infrastructure should not necessarily be limited to the existing health (Ministry) personnel.

- a. Veterinary auxiliaries in a number of Sahel countries already have an established support

role in the village. An expanded role, focusing on human health problems, should be considered.

- b. "Animation rural" workers exist in a number of Sahel countries, and could assume an extended health support function.
- c. Similar supporting health roles can be performed by primary school teachers.

Existing logistical support systems within the Ministries responsible for agricultural and rural development, as well as for health, could be appropriately utilized to support village health workers.

7. Responsibility for the performance of health tasks, especially those related to environmental improvements, should be vested in the village to the fullest extent possible. It is our conviction that if tasks specifically related to the reduction of environmental risk can be defined within the village context, and if the responsibility for their implementation is vested with the village governance, there is a higher probability that they will be performed. This assumes that the more technical aspects of Ministry of Health categorical disease activities continue to be carried out.

C. Demographic and Health Planning

We recommend that a permanent research and planning group should be established within the CILSS Research Institute which focuses on the broad range of demographic

questions as these relate to health and population policy, as well as to non-health sector development projects. This group would not only be responsible for the gathering and appropriate distribution of relevant data, but also for its interpretation and specific application to an overall health strategy.

D. Components of an Integrated Village-Based System

1. Nutrition

Our recommendations on nutrition flow directly from the premises outlined earlier. Specifically, we recommend that a nutrition component be incorporated into the village-based infrastructure as proposed above.

This component would be included in:

- a. Training of village-based health workers;
- b. Educational materials available in the village;
- c. Primary school curriculum;
- d. Determination of optimal local crop (foodgrain) production patterns within each village;
- e. Distribution (in appropriate circumstances) of essential, but locally unavailable, food supplements, particularly those needed by children and mothers;
- f. Food preparation and food storage methods;

- g. Treatment of early malnutrition cases in the village; and
- h. Referral protocols for malnutrition cases to intermediate levels for nutritional rehabilitation of the more severely afflicted.

2. Village Water

We strongly recommend that external donors place a high priority on assisting the individual Sahel countries to establish village water supplies. Our recommendations follow the premises outlined previously. In summary:

- a. Make sufficient water available in every village;
- b. Expand direct donor support to more villages than are covered in water supply programs currently being carried out in most Sahelian countries;
- c. Require community involvement in the design and implementation of these programs.

3. Environmental Sanitation

(We recommend that activities in this area be carried out within the context of the village-based health structure. See Premises and Section V on Organizational Illustrations.)

4. Communicable Disease Control

A CILSS plan for the regional and national control of the major communicable diseases should be developed in

cooperation with WHO. These diseases should be ranked in order of priority. Tables 1, 2, and 3 presented earlier in Section IV on "Investment in Health as a Factor in Socioeconomic Development" provide a framework for the development of a strategy with respect to the control of communicable diseases. On the basis of this we recommend the following:

- a. A plan should be developed by CILSS in conjunction with WHO for current action regarding:
 - (1) Control of treponematoses. The WHO Africa Regional Office has already worked out a plan.
 - (2) Expanded programs of immunization of children against:
 - Diphtheria
 - Pertussis
 - Tetanus
 - Polio
 - Measles
 - Tuberculosis
 - (Meningococcus vaccine could be added; however, because of the current high cost of the vaccine, we recommend that decision on its inclusion in mass immunization programs in the Sahel await further technical improvements and reduced vaccine costs.)
 - (3) The cost and feasibility of expanding the interregional project for trypanosomiasis control, now based in Bobo-Dioulasso, should be determined. Specifications for action should be drawn up by CILSS in conjunction with WHO.
- b. Schistosomiasis: The methods now being researched in Northern Ghana and other areas should be examined carefully by the Sahelian countries

before large-scale applications are undertaken. Definitive results of these research projects are not yet available. For the present, control efforts should include:

- (1) Direct linkage to specific economic development projects, such as expanded irrigation schemes; and
 - (2) Additional research efforts in schistosomiasis control methods; a research plan should be developed by CILSS in conjunction with WHO.
- c. Malaria: Wide-scale malaria control measures in the Sahel should await the establishment of village-based health infrastructures. There exist today sufficient worldwide evidence of extremely expensive control failures, directly related to the absence of local surveillance and maintenance, to argue against major national or regional campaigns at this time. More localized control measures, directly related to the feasibility of specific economic development projects, may be warranted; this should be examined on a project by project basis.
- d. Onchocerciasis: The results of the existing onchocerciasis program, directly related to the economic development of the Volta River Basin, should be examined closely by the Sahel countries before wide-scale applications throughout the Sahel are undertaken. For the present, expansion beyond the present areas should be determined on the basis of direct relationship to economic development. (See attached recommendations provided by WHO Regional Office for Africa).

Once the plans for communicable disease control are developed, including definition of costs and benefits from each activity, negotiations between CILSS and The Club (and other donors) can proceed, taking account of:

1. Additional required research in regard to technical feasibility;

2. The time frame necessary for each phase of the control program(s);
3. The resource requirements for each phase;
4. The estimated cost-differential, if several diseases are to be attacked at the same time as opposed to a one-by-one approach.

Once these steps are taken, CILSS should act as the coordinating mechanism through which donor participation in the plans can be defined and agreed upon.

E. Health Implications of Planning in Other Sectors

We recommend that the CILSS and The Club, in conjunction with WHO Technical Support, organize as part of the CILSS Research Institute a permanent group responsible for the review of all non-health sector development program proposals.

The group would be charged with the responsibility for:

1. Determining the possible negative impact of a project on the health of the specific population involved.
2. Defining the specific steps that could be taken to minimize or eliminate the potential risk.
3. Determining how the project could be complemented with other activities in order to improve the health of the population involved in the project.

Ideally, this group would provide technical assistance during the early planning of non-health sector projects; this would allow them to make positive inputs into the projects, rather than to react negatively to something that has already been implemented.

SPECIFIC ACTION RECOMMENDATIONS

1. We recommend that within the CILSS Research Institute a permanent health group should be organized to investigate and disseminate to the member countries information on all aspects of planning, organizing, and implementing village-based systems within the Sahel context, as well as to attend to other important issues such as health status and traditional medicine. This group would examine the experience of other countries which have adopted a policy emphasizing health systems that reach the rural population (such as China, Sri Lanka, Tanzania, and the State of Kerala in India). In addition, this group would examine the successes and failures of pilot projects in existence in the Sahel and would also be available to serve as a technical resource to the individual countries that have chosen to implement the reforms outlined in these recommendations.

2. We recommend that CILSS sponsor a Ministry-level conference, comprised of representatives of health as well as economic and rural development ministries, to implement health strategy recommendations arising from the May 1977 Ottawa Conference. This next conference could be held in the Sahel in October-November 1977, and include on its agenda detailed steps to be taken to implement national and regional health strategies.

3. We recommend that the health policy, planning, and resource allocation capabilities be enhanced in each of the Sahelian countries. Donor organizations should support the development of both the policy and planning infrastructures, as well as the training of the essential manpower to staff them. These infrastructures should have the capacity to examine the most optimal courses that the individual countries could take in the development of their national health strategies. Annual investments in the development of the health infrastructure can then be made within the context of an incremental long-term development policy. In this context, one immediate concern the Institute should address is the design and implementation of research efforts which incorporate a methodology to yield: a definitive understanding of health status among the population; the demand and utilization patterns and their determinants for service delivery to rural areas; and pragmatic estimates of the absorptive capacity within and among the Sahelian countries for health resource allocations.

4. We recommend that each Sahel country incorporate in its next three- or five-year plan a basic reform or shift in this direction. Village-based health systems should be incorporated into overall plans for integrated rural development.

FIGURE 1

PROJECTS FOR THE SAHEL COUNTRIES
(suggested by WHO Regional Office for Africa)

Eradication of Endemic Syphilis in the five countries

The project which was proposed to UNDP for budgetary provision in its Regional programme did not attract required support. However, we consider this a top priority for the Region. We have noted that it is listed under auxiliary considerations in the report by Mr. Lawton on the meeting of Human Resources group in the Sahel. We accord priority to this because substantial preliminary work has been undertaken in most of the countries and they also attach priority to this problem.

Control of Schistosomiasis in the Region would be a noble and rewarding project in terms of lowering morbidity among susceptibles. It is agreed that for such a project to have any impact, it is has to be on the scale of the current Oncho-control programme in the Volta River basin, and perhaps include other countries bordering on the Sahel.

A Trypanosomiasis Control Project for the Sahel region could collaborate with the inter-regional project now based in Bobo-Dioulasso to apply modern vector control measures in the countries. At the same time, the project drawing from experience acquired in the field of tropical therapeutic research could apply modern treatment of known cases on a sub-regional basis.

Expanded Immunization Programme

Most of the countries are interested in this programme, and would welcome substantial support for their ongoing vaccination campaigns to develop them step-by-step into a comprehensive programme to attain a continuous coverage of 80% of children 0-3 years.

Control of Cerebro-Spinal Meningitis

The Sahel is encircled by the meningitis belt. All countries of the sub-region have epidemics of CSM in three-year cycles. One of the countries has had experience with polysaccharide A vaccine, and some have expressed a desire to use the vaccine in control measures.

Sporadic isolations of aero-type C meningococci (Nigeria, Cameroon) indicate that type C-vaccine could be also needed.

APPENDIX A

CURRENT DONOR HEALTH INVESTMENT

IN THE SAHEL

Sources: WHO Country Profiles, 1976.
AID FY 1978 Submission to the Congress, February,
1977.
Stanbury & Childs, "Health, Nutrition and Population
Sectors--Report of the MIT Sahel-Sudan Project,"
1975.

NOTE: Some projects which were cited in the above sources,
but which did not provide enough information to
indicate their current status, were not included on
this list.

CURRENT DONOR INVESTMENTS IN HEALTH IN THE SAHEL

COUNTRY OR PROGRAM: REGIONAL

Project/Activity	Donor Agency or Country	Total Amount (\$US)	Other Information
Schistosomiasis control	WHO and other donor agencies & countries	120,000,000 (41,000,000)	20-year program (first 6 years)
MVS: health research program	USAID		proposed for 1978 on
MVS: water data collection program	USAID		
Sahel water data network/management	USAID		proposed for 1978 on
Demographic data collection/analysis	USAID		proposed for 1978

CURRENT DONOR INVESTMENTS IN HEALTH IN THE SAHEL

COUNTRY OR PROGRAM: UPPER VOLTA

Project/Activity	Donor Agency or Country	Total Amount (\$US)	Other Information
Basic health services development	WHO		1968 - present: Continuing assistance in various aspects of health services development
Equipment, supplies, vehicles, medications	France	455,000	ongoing assistance (annual)
<u>URBAN HEALTH SERVICES/HOSPITAL SERVICES</u>			
Management of Gaoua hospital	R.F.A.	550,000	ongoing assistance
Town water supply	Germany	10,480,000	long-term loan
<u>RURAL HEALTH SERVICES</u>			
Sahel project - equipment, vehicles, medications, vaccines	UNICEF		mainly well construction
Emergency water project	UNDP	12,000	
Road development and well drilling	Norway	370,000	
Onchocerciasis area village development	USAID	518,000	
Savannah water resources	USAID	365,000	
<u>MANPOWER</u>			
Fellowships	WHO, FED, FAC UNICEF, RFA, URSS, CEE, AUA, Canada, Roumania, Hungary, Bulgaria, Yugoslavia		annual, permanent 1968 - present
Physicians, social workers	France		
Nursing education	WHO		
5 External volunteer programs	various		
<u>DISEASE CONTROL</u>			
Onchocerciasis (Upper Volta portion)	FED	746,988	annual, permanent program
Leprosy campaign	Follereau	220,000	
Smallpox vaccine	USAID		
Measles vaccine	USAID, China		
Equipment, medications: BCG, tuberculosis	UNICEF		
Smallpox eradication	WHO		
Tuberculosis	WHO		

CURRENT DONOR INVESTMENTS IN HEALTH IN THE SAHEL

COUNTRY OR PROGRAM: UPPER VOLTA, continued

Project/Activity	Total Amount (\$US)	Other Information
The WHO Profile of Upper Volta provides the following ranking of external donor investments for all sectors in 1975:		
Agriculture	(25%) 27,252,000	{Capital assistance: 71%
Transport & Communications	(21%) 23,163,000	{Technical assist.: 29%
Industry	(14%) 15,549,000	{Capital assistance: 87%
Food	(14%) 14,846,000	{Technical assist.: 13%
Education	(11%) 11,815,000	{Capital assistance: 96%
Health	(8%) 8,245,500	{Technical assist.: 4%
Natural Resources	(5%) 5,206,000	Capital assistance: 100%
Economic & Social Policy	(2%) 2,377,000	{Capital assistance: 82%
	(100%) 108,453,500	{Technical assist.: 18%
<u>"Miscellaneous":</u>		
French budgetary aid to gov't RFA equipment, loans to several sectors	2,500,000	{Capital assistance: 62%
RFA water project - Koudougou	2,600,000	{Technical assist.: 38%
other multi-sector donations	10,300,000	{Capital assistance: 42%
	6,442,000	{Technical assist.: 58%
	21,842,000	{Capital assistance: 30%
Various volunteer programs	est 3,000,000	{Technical assist.: 70%
EST. TOTAL 1975	<u>133,295,500</u>	

CURRENT DONOR INVESTMENTS IN HEALTH IN THE SAHEL

COUNTRY OR PROGRAM: SENEGAL

Project/Activity	Donor Agency or Country	Total Amount (\$US)	Other Information
Basic health services development	WHO		Continuing assistance in various aspects of health services development since 1968
<u>NATIONAL HEALTH PLANNING/LEGISLATION</u>			
National health planning	WHO		1975 - present
Health statistics	WHO		
Nutritional planning	WHO		
Environmental sanitation planning	WHO	70,000	Dakar University
<u>URBAN HEALTH SERVICES</u>			
Technical assistance	France	128,000	Poly-clinique, Pikine
Water improvement & environmental Sanitation - Dakar	WHO		1968 - present
<u>RURAL HEALTH SERVICES</u>			
Rural health services development	USAID	721,000	
Family planning	USAID	428,000	
Health services	UNICEF	252,333	Equipment, materiel, fellowships - health centers
Basic health care - Gossas	Canada	1,000,000	1976 - 1980: Equipment, pharmaceuticals, technical assistance
Nutrition: food assistance	Canada	1,900,000	grain, milk
Food donations	Yugoslavia		
<u>HOSPITAL SERVICES</u>			
Fann Hospital improvement	Canada	5,000,000	1975 - 1980
Ambulances	Yugoslavia	30,000	
<u>MANPOWER</u>			
90 Technical assistants	France	959,750	
Fellowships	WHO		
Nursing care training	WHO		1968 - present
Odontology & Stomatology Institute, Dakar	WHO		1970 - present
<u>DISEASE CONTROL</u>			
Venereal disease, trepanometosis programs	UNDP	41,000	
Smallpox vaccinations	WHO	59,000	
Smallpox eradication program	USAID		1967 - present
	WHO		

CURRENT DONOR INVESTMENTS IN HEALTH IN THE SAHEL

COUNTRY OR PROGRAM: NIGER

Project/Activity	Donor Agency or Country	Total Amount (\$US)	Other Information
Basic health services development	WHO		Continuing assistance in various aspects of health services development
Medical project	Netherlands	590,000	
Niger health	USAID	1,500,000	
Health projects	France	330,000	
<u>NATIONAL HEALTH PLANNING/LEGISLATION</u>			
Census project	FNUAP		
<u>URBAN HEALTH SERVICES</u>			
PMI Construction - Niamey	Conseil de l'Entente		
Supplies, equipment - Ministry P.H.	UNICEF		
4 Dispensaries - Irhazer	UNDP		
Water sanitation project - Niamey, Zinder, Maradi	Germany	481,000	Long-term loan
<u>RURAL HEALTH SERVICES</u>			
Medications, laboratory equipment, vehicles	UNEO	450,000	
Transport - grain, milk industry	FAO		
Food assistance	PAM		
Dispensary construction & equipment	FED		
100 Hand pumps	Church World Serv.		
Mobile equipment, dispensary equip.	France		
Regional reinforcement of public Health services	USAID		
Health services development, Department of Diffa	USAID		
Wells construction	Canada	720,000	
<u>HOSPITAL SERVICES</u>			
Hospital modernisation	FED		
Hospital assistance - Niamey	PAM		
Hospital assistance - Niamey	CARITAS		
Hospital assistance - Niamey	USSR		
<u>MANPOWER</u>			
3 Physicians - Niamey	USSR		1975 - 1977
National public health school development	UNDP	138,422	
Fellowships	WHO		
Muslim university/Faculty of Medicine	Islamic Conference		
35 Physicians, 3 pharmacists, 1 Dentist	France		
24 Health education volunteers	U.S. Peace Corps		
6 Physicians	Belgium	396,000	
5 Physicians, mechanic	Germany	600,000	

CURRENT DONOR INVESTMENTS IN HEALTH IN THE SAHEL

COUNTRY OR PROGRAM: NIGER, continued

Project/Activity	Donor Agency or Country	Total Amount (\$US)	Other Information
<p><u>(MANPOWER)</u> Medical teams: Tahova Maradi 2 dispensaries Niamey Zinder Niamey Hospital</p>	<p>RFA URSS Saudi Arabia Netherlands Canada China</p>		
<p><u>DISEASE CONTROL</u> Smallpox eradication Cholera, meningitis projects Smallpox Trypanosomiasis Onchocerciasis (regional)</p>	<p>WHO FED OCCGE FAO</p>		1967-present

CURRENT DONOR INVESTMENTS IN HEALTH IN THE SAHEL

COUNTRY OR PROGRAM: MAURITANIA

Project/Activity	Donor Agency or Country	Total Amount (\$US)	Other Information
Basic health services development	WHO		Continuing assist. in various aspects of health services development since 1968
Aid to health	France		
<u>NATIONAL HEALTH PLANNING/LEGISLATION</u>			
Integration of services	UNICEF		1968 - present
Statistics	UNICEF		1968 - present
Census	FNUAP		1976
<u>URBAN HEALTH SERVICES</u>			
Construction medical center, Nouakchott	FAC		
Surgical equipment, vehicles, Kaedi	FAC		
<u>RURAL HEALTH SERVICES</u>			
Rural development & school feeding	PAM	1,700,000	
Community development	UNICEF	98,000	1976 - 1980
Rural health infrastructure	Kuwait	1,000,000	
Personnel, equipment, medications	China		
Equipment, medications	UNICEF	318,000	1976 - 1980
Water development, food assistance	CILSS		
Water development	UNICEF	382,000	1976 - 1980
Nutrition survey - Boutilimit	ORANA		
Nutrition program	UNICEF	10,000	
PMI construction - Ksar	FAC		
PMI development	WHO, UNICEF		1973 - present
Maternity construction - Atar	FAC		
3 Regional health centers	China		1974 - present
Rural medical assistance	USAID	570,000	1976 - 1980
<u>HOSPITAL SERVICES</u>			
Tuberculosis clinic	Kuwait		
Regional hospitals & dispensaries	Kuwait	1,000,000	
Hospital expansion - Nouakchott	FED		
Expansion of l'ENISF	FED		
Hospital construction - Aleg	Algeria		
<u>MANPOWER</u>			
Nursing care - education, recyclage	WHO, UNICEF		1963 - present
Education	UNICEF	70,700	1976 - 1980
Long-term training program (under discussion)	USAID		
25 Physicians, 3 pharmacists, 2 midwives	FAC		
3 Physicians	USSR		
1 Physician	Spain		
6 Physicians	Algeria		
Fellowships	WHO		
Training	IADB		

CURRENT DONOR INVESTMENTS IN HEALTH IN THE SAHEL

COUNTRY OR PROGRAM: MAURITANIA, continued

Project/Activity	Donor Agency or Country	Total Amount (\$US)	Other Information
<u>DISEASE CONTROL</u>			
Smallpox eradication	WHO		1963 - present
Malaria eradication	WHO		1962 - present
Tuberculosis survey, equipment, medications	OCCGE		

CURRENT DONOR INVESTMENTS IN HEALTH IN THE SAHEL

COUNTRY OR PROGRAM: MALI

Project/Activity	Donor Agency or Country	Total Amount (\$US)	Other Information
Basic health services development	WHO		Continuing assistance in various aspects of health services development since 1969
Aid to health	France	340,000	
Health service development	UK	140,000	
<u>NATIONAL HEALTH PLANNING/LEGISLATION</u>			
Consultation to Ministry of Public Health ref. 10 year plan	WHO		1970 - present
<u>URBAN HEALTH SERVICES</u>			
Water & sewerage planning & implementation, Bamako	WHO		
Water supply - urban	Germany	4,260,000	
Water supply - provincial towns	UNDP		1971 - present
Drainage system - Bamako	UNDP		1971 - present
Pediatric unit - health center, Timbuktu	Swiss Red Cross		
Dispensaries - Bamako	Saudi Arab.		
Dental center - Bamako	Saudi Arab.		
<u>RURAL HEALTH SERVICES</u>			
Rural health services	USAID	800,000	
Title X Mali Rural Health	USAID	265,000	
Health center construction - Dire	Follereau		
Health center construction - Ngouma	Germany		
Health center construction - Mopti	FED		
Rural wells construction	CARE		
<u>HOSPITAL SERVICES</u>			
Hospital improvement - Gao	USAID		
<u>MANPOWER</u>			
Health sciences training	WHO		
Nursing education	WHO		1964 - present
Bamako - school of medical pharmacy and dentistry	WHO		1969 - present
<u>DISEASE CONTROL</u>			
Smallpox eradication	WHO		1965 - present

CURRENT DONOR INVESTMENTS IN HEALTH IN THE SAHEL

COUNTRY OR PROGRAM: GAMBIA

Project/Activity	Donor Agency or Country	Total Amount (\$US)	Other Information
<u>DISEASE CONTROL</u> Disease control	USAID	700,000	

CURRENT DONOR INVESTMENTS IN HEALTH IN THE SAHEL

COUNTRY OR PROGRAM: CHAD

Project/Activity	Donor Agency or Country	Total Amount (\$US)	Other Information
Basic health services development	WHO		1964 - present: Continuing assistance in various aspects of health services development
Aid to health	FAC	340,000	
<u>NATIONAL HEALTH PLANNING/LEGISLATION</u> Health statistics development	WHO		
<u>URBAN HEALTH SERVICES</u> Town water supply	EEC	11,940,000	
<u>RURAL HEALTH SERVICES</u> Rural health planning	USAID	669,000	FY 1977
Primary health care	ONG	120,000	
Construction - 5 rural dispensaries	CARE		
Medical materials	Lion's Club Djamena	36,000	
Environmental sanitation	UNDP	1,000,000	
Medications, equipment	UNEO	600,000	
Water evaluation	BAD	20,000	
Rural centers - equipment, supplies	UNICEF	220,000	
Nutrition: feeding program, schools and medical centers	PAM		
<u>MANPOWER</u> Personnel training, fellowships	WHO		
Health training facility modernisation	FED		
Medical personnel & logistics support	France		
20 Physicians	URSS		
2 Physicians	Switzerland		
Nursing training	EEC		
<u>DISEASE CONTROL</u> Smallpox eradication	WHO		1968 - present
Epidemiological surveillance	WHO		

CURRENT DONOR INVESTMENTS IN HEALTH IN THE SAHEL

COUNTRY OR PROGRAM: CAPE VERDE ISLANDS

Project/Activity	Donor Agency or Country	Total Amount (\$US)	Other Information
Rural works (soil/water)	USAID	300,000	
Water resources	USAID	1,300,000	
Desalinization, Mindelo	USAID	600,000	

APPENDIX B

HEALTH STRATEGY PREMISES (SECTION III):
CORROBORATIVE RESEARCH - INFORMATION SOURCES

HEALTH STRATEGY PREMISES (SECTION III):
CORROBORATIVE RESEARCH - INFORMATION SOURCES

The sources below refer back to specific bibliographic contributions which were used in the development of the health strategy premises (Section III) and which represent particularly useful background research material.

Although, in general, most sources provided valuable information for several premises, or were helpful in the formulation of the overall strategy, those which are listed give a particular focus for that area of concern and may be referred back to by readers interested in more detailed information.

PREMISE A: Resource Allocations

AID, "Health in Africa," 1975
AID, Project Paper - Mali, 1976
AID, PROP, 1974
AID, PRP - Niger, 1976
AID, "Report to the Congress," 1976
AID, "Submission to the Congress," 1977
Berg, 1976
INTECH, 1977
Nelson, 1972
Nelson, 1974
OECD, "Health Aid Programmes," 1976
OECD, "Health Problems....," 1976
OECD, "Summary Report," 1977
Stanbury and Childs, 1975
U.N. Economic and Social Council, 1974
U.S. HEW, Syncrisis, 1976
WHO, "Profil - Haute-Volta," 1977
WHO, "Profil - Mali," 1976
WHO, "Profil - Mauritanie," 1976
WHO, "Profil - Niger," 1976
WHO, "Profil - Senegal," 1976
WHO, "Profil - Tchad," 1976
WHO, "6th General Programme," 1976

PREMISE B: Village-Based Health Systems

AID, "Health in Africa," 1975
AID, Memorandum from Harrell, 1977
AID, Project Paper - Mali, 1976
AID, PROP, 1974
AID, PRP - Niger, 1976
AID, "Report to the U.S. Congress," 1976
AID, "Submission to the Congress," 1977
Beier, 1976
Essex, 1975
Fournier and Djermakoye, 1975
INTECH, 1977
Kurup, undated
OECD, "Health Problems . . .," 1976
OECD, "Summary Report," 1977
Power, 1977
Stanbury and Childs, 1975
U.N. Economic and Social Council, 1974
WHO, "Formation et utilisation," 1975
WHO, "Present Situation and Perspectives," 1976
WHO, "Profil - Haute Volta," 1977
WHO, "Profil - Mali," 1976
WHO, "Profil - Niger," 1976

PREMISE B: (Continued)

WHO, "Promotion and Development," 1976

WHO, "Proposals for a Programme," 1974

WHO, "Report of the Consultation," 1976

WHO, "Report of the Technical Discussions," 1976

PREMISE C: Nutrition

AID, "Health in Africa," 1975
AID, PRP - Niger, 1976
AID, "Report to the U.S. Congress," 1976
AID, "Submission to the Congress," 1977
Berthet, 1976
Caldwell, 1975
Fournier and Djermakoye, 1975
INTECH, 1977
Nelson, 1972
OECD, "Health Problems . . .," 1976
OECD, "Summary Report," 1977
Stanbury and Childs, 1975
U.N. Economic and Social Council, 1974
U.S. HEW Syncrisis, 1976
WHO, "Proposals for a Programme," 1974
WHO, Technical papers on nutrition

PREMISE D: Village Water

- AID, "Health in Africa," 1975
- AID, PRP - Casamance Regional Development, 1976
- AID, "Report to the U.S. Congress," 1976
- AID, "Submission to the Congress," 1977
- APHA, 1976
- Henry, 1977
- INTECH, 1977
- OECD, "Health Problems...", 1976
- OECD, "Summary Report," 1977
- OECD, U. N. Water Conference, 1977
- Stanbury and Childs, 1975
- U.N. Economic and Social Council, 1974
- U.S. HEW, Syncrisis, 1976
- WHO, "Profil - Haute-Volta," 1977
- WHO, "Proposals for a Programme," 1974
- WHO, World Health Statistics Report, 1976
- World Bank, "Village Water Supply," 1976

PREMISE E: Environmental Sanitation

AID, "Health in Africa," 1975

AID, "Report to the U.S. Congress," 1976

AID, "Submission to the Congress," 1977

APHA, 1976

Beier, 1976

OECD, "Health Problems....," 1976

OECD, "Summary Report," 1977

Stanbury and Childs, 1975

U.N. Economic and Social Council, 1974

U.S. HEW, Syncrisis, 1976

WHO, "Proposals for a Programme," 1974

WHO, World Health Statistics Report, 1976

PREMISE F: Communicable Disease Control

AID, "Health in Africa," 1975
AID, PROP, 1974
AID, PROP - Onchocerciasis, 1975
AID, PRP - Niger, 1976
AID, "Report to the U.S. Congress," 1976
AID, "Submission to the Congress," 1977
APHA, 1976
Jobin, Negron-Aponte, and Michelson, 1976
McJunkin, 1970
Nelson, 1972
Nelson, 1974
OECD, "Health Problems...", 1976
OECD, "Summary Report," 1977
Retel-Laurentin, 1972
Retel-Laurentin, 1976
Stanbury and Childs, 1975
U.N. Development Fund, 1974
U.N. Economics and Social Council, 1974
U.S. HEW, Syncrisis, 1976
WHO, "Health Component," 1973
WHO, "Onchocerciasis," 1976
WHO, "Profil - Haute-Volta," 1977
WHO, "Proposals for a Programme," 1974
WHO, Technical papers: diseases

PREMISE G: Demographic/Health Planning

- AID, "Health in Africa," 1975
- AID, Project Paper - Mali, 1976
- AID, PROP, 1974
- AID, "Report to the U.S. Congress," 1976
- AID, "Submission to the Congress," 1977
- APHA, 1976
- Beier, 1976
- Caldwell, 1975
- Curran, 1972
- INTECH, 1977
- OECD, "Health Problems...", 1976
- OECD, "Summary Report," 1977
- Stanbury and Childs, 1975
- U.N. Economic and Social Council, 1974
- U.S. HEW, Syncrisis, 1976
- WHO, "Proposals for a Programme," 1974
- World Bank, Chad, 1974
- World Bank, Senegal, 1974

PREMISE H: Non-Health Sector Planning

AID, "Health in Africa," 1975
AID, PP - Mali, 1976
AID, PROP - Onchocerciasis, 1975
AID, PROP, 1974
AID, PRP - Casamance Regional Development, 1976
AID, Report to the U.S. Congress, 1976
AID, Submission to the Congress, 1977
APHA, 1976
Berg, 1976
Caldwell, 1975
INTECH, 1977
Jobin, Negron-Aponte and Michelson, 1976
McJunkin, 1970
OECD, "Health Problems . . .," 1976
OECD, "Proposals for a Strategy," 1977
OECD, "Summary Report," 1977
Peterson, 1969
Stanbury and Childs, 1975
UN Economic and Social Council, 1974
US DHEW, Syncrisis, 1976
WHO, "Health Component," 1973
WHO, "Onchocerciasis," 1976
WHO, "Proposals for a Programme," 1974
World Bank, Senegal, 1974
World Bank, "The Sahelian Countries," 1974

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- Agency for International Development, Department of State, PP, Rural Health Services Development - Mali, August, 1976.
- Agency for International Development, Department of State, PP, Rural Health Planning and Management - Chad,
- Agency for International Development, Department of State, PP, Regional Onchocerciasis - Free Area Planning,
- Agency for International Development, Department of State, PROP, Strengthening of Health Delivery Systems in Central and West Africa, March, 1974.
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- Agency for International Development, Department of State, PRP, Family Planning Program, Senegal.
- Agency for International Development, Department of State, PRP, Senegal Women in Development.
- Agency for International Development, Department of State, PRP, Casamance Regional Development, November, 1976.
- Agency for International Development, Department of State, PRP, Improving Rural Health, Niger, November, 1976.
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