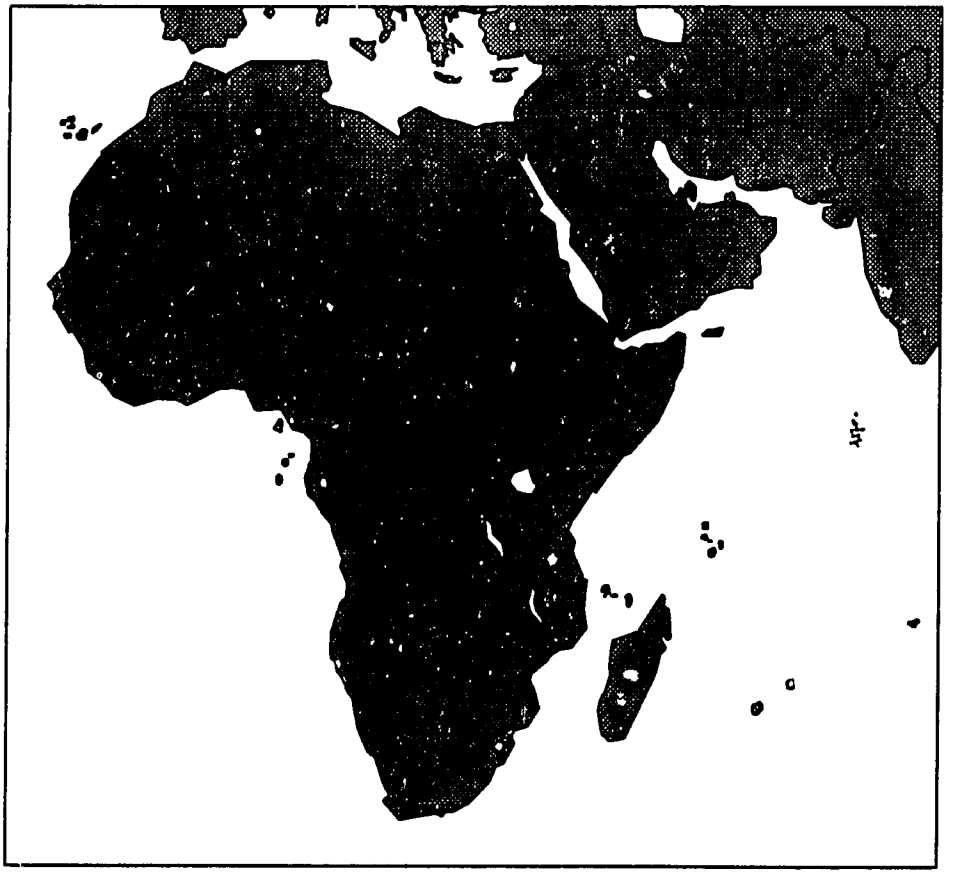
CIHI Country Health Profile Series

MALI

Country Health Profile
1995



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MALI

Country Health Profile

This is one of a series of Country Health Profiles produced by the Center for International Health Information (CIHI). Each profile provides quantitative and qualitative data on current health and demographic conditions and the health care system in a developing country. Profile information is compiled from CIHI's databases and reference library and through research and analysis of other data sources.

CIHI's Country Health Profiles, along with CIHI's Health Statistics Reports, are intended to provide data in a concise format for individuals and organizations involved in health sector policy and decision-making. Contact CIHI at the address on the preceding page for information on the availability of other country health profiles and health statistics reports, or look for these reports on the Internet at the following address: *gopher.info.usaid.gov*.

In order to enable CIHI to report the most current health and demographic data, readers are encouraged to provide any more recent or more accurate information by contacting the center directly or through USAID's Office of Health and Nutrition.

CURRENT DEMOGRAPHIC AND HEALTH INDICATORS

Demographic Indicators			
INDICATOR	VALUE	YEAR	SOURCE
Total Population	9,112,950	1994	BUC9401
Urban Population	2,287,350	1994	CALXX04
Women Ages 15-49	2,349,600	1994	UNP9400
Infant Mortality	114	1994	JEE9505
Under 5 Mortality	228	1994	JEE9502
Maternal Mortality	c. 2000	1987	WHM9100
Life Expectancy At Birth	46	1994	BUC9401
Number of Births	471,960	1994	CALXX00
Annual Infant Deaths	53,803	1994	CALXX01
Total Fertility Rate	7.0	1994	UNP9400

Child Survival Indicators			
INDICATOR	PERCENT	YEAR	SOURCE
Vaccination Coverage			
BCG	77	1993	WHE9403
DPT 3	46	1993	WHE9403
Measles	51	1993	WHE9403
Polio 3	46	1993	WHE9403
Tetanus 2	45	1993	WHE9403
DPT Drop Out	56	1990	MRF9004
Oral Rehydration Therapy			
ORS Access Rate	95	1989	WHD9100
ORS and/or RHF Use	41	1989	WHD9100
Contraceptive Prevalence			
Modern Methods (15-44)	3	1991	MRF9104
All Methods (15-44)	5	1987	DHS8907
Nutrition			
Adequate Nutritional Status	60	1987	WHA8824
Exclusive Breastfeeding	8	1987	DHS8907
Complementary Feeding	45	1987	DHS8907
Continued Breastfeeding	90	1987	DHS8907

Other Health Indicators			
INDICATOR	PERCENT	YEAR	SOURCE
HIV-1 Seroprevalence			
Urban	3.7	1992	BUC9503
Rural	3.4	1992	BUC9503
Access to Improved Water			
Urban	53	1991	JMP9301
Rural	38	1991	JMP9301
Access to Sanitation			
Urban	81	1990	WHO9200
Rural	10	1990	WHO9200
Deliveries by Trained Attendants	32	1987	DHS8907

NA = Data not available.

For definitions of indicators, see data notes in Appendix B. For full citations of sources, see Appendix C.

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Acronyms/Abbreviations

AIDS	acquired immune deficiency syndrome
AIDSCAP	AIDS Control and Prevention Project (USAID)
ARI	acute respiratory infection
BASICS	Basic Support for Institutionalizing Child Survival (USAID)
BCG	Bacillus of Calmette and Guérin vaccine (to prevent tuberculosis)
DPT3	diphtheria, pertussis, tetanus vaccine (three shots)
CIHI	Center for International Health Information
DHS	Demographic and Health Survey
GDP	gross domestic product
GNP	gross national product
GTZ	Gesellschaft für Technische Zusammenarbeit (German Cooperation)
HIV	human immunodeficiency virus
IMR	infant mortality rate
INPS	*Institut National de Prevoyance Social* (social security institute)
MMR	maternal mortality rate
MOH	Ministry of Health (*Ministère de la Santé, de la Solidarité et des Personnes Agées)*
NGO	non-government organization
NNT	neonatal tetanus
ORS	oral rehydration salts
ORT	oral rehydration therapy
PHC	primary health care

(continued on following page)

ACRONYMS / ABBREVIATIONS (continued)

PPM	*Pharmacie Populaire Malienne*
PSPHR	*Projet Santé Population et Hydraulique Rurale* (World Bank)
PSR	*Projet Santé Rurale* (USAID)
RHF	recommended home fluid (for ORT)
STD	sexually-transmitted disease
TB	tuberculosis
TBA	traditional birth attendant
TT	tetanus toxoid vaccine (see data notes for TT2+)
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
U5MR	under-five mortality rate
WHO	World Health Organization

EDITOR'S NOTES

*1. **References & Sources.** Sources in this profile are referred to by a seven-digit code. Generally, the first three letters refer to a source institution, the following two numbers refer to the year of publication or transmittal, and the final two numbers uniquely identify the individual source. A complete list of sources appears in Appendix C.*

*2. **Statistical Appendix.** Much of the quantitative data presented in graph form in this profile also appears in tabular form with specific references in Appendix A.*

*3. **Data Notes.** For definitions of indicators and commentary regarding their derivation, the reader is referred to Appendix B.*

*4. **Comparative Graphs.** Unless specified otherwise, indicator values for country groupings are median values for groups of available country-level values. Where no date is specified, values used refer to most recent available data. The groups are composed as follows: "Sub-Saharan Africa" includes available data for 47 countries comprising USAID's Africa Region, which does not include Egypt, Libya, Tunisia, Algeria, Morocco and Western Sahara. "Low-income Countries" includes available data for 54 countries classified as such in the World Bank's World Development Report 1993 (WDR 1993). "Developing Countries" indicators are drawn from available data for the 152 nations not classified as "Established Market Economies" in the WDR 1993.*

I. COUNTRY OVERVIEW

Geography

Mali is a landlocked republic of about ten million inhabitants in West Africa. Most of Mali lies in West Africa's savanna region, a transition zone between the coastal rain forest and the desert. The northern third of the country lies within the Sahara Desert and is sparsely settled. Central Mali is dominated by the flood-plains of the Niger River, which cover an area of some 103,600 km² (40,000 mi²). The Niger flows eastward through Mali for 1,625 km (1,010 mi.), nearly one-third of the total length of the river, which is West Africa's longest. Western Mali is also traversed by the Senegal River and its tributaries. Mali's terrain is generally flat, although plateaus and spectacular butte outcroppings exist in the far West and in the area south and east of Mopti (see map inside back cover).

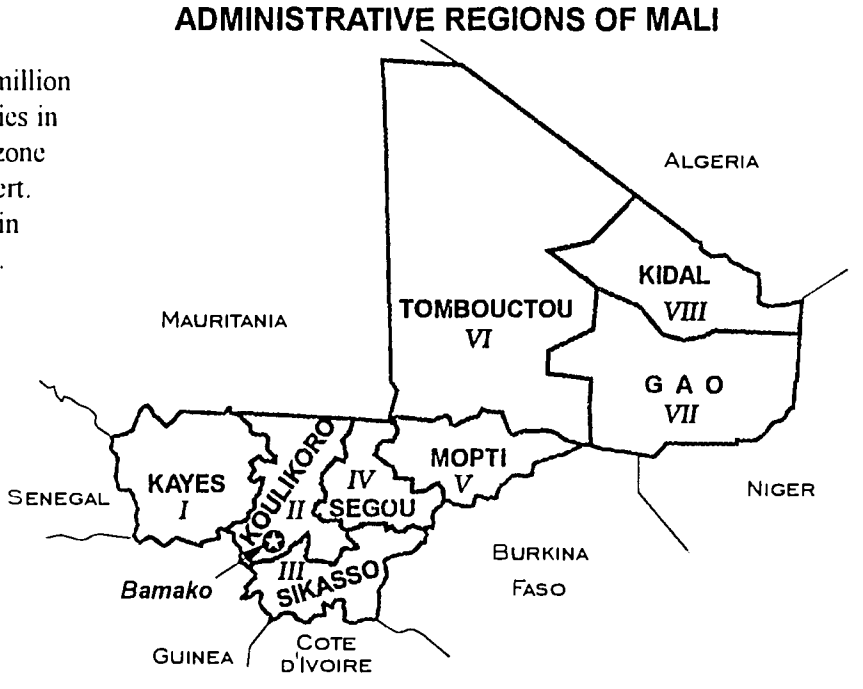
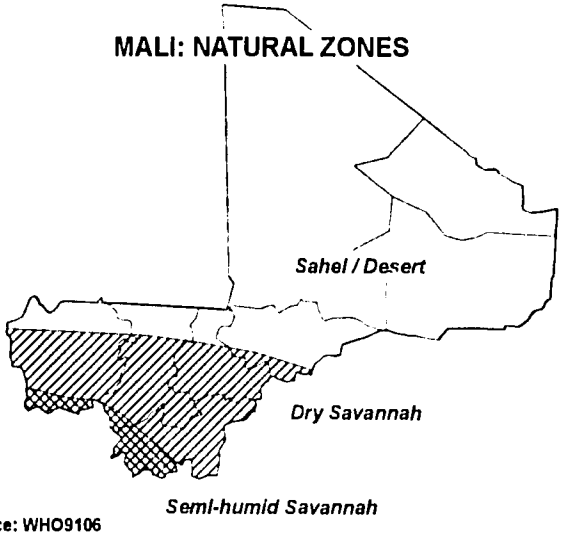


Figure 1.1

Mali and its bordering states – Algeria, Mauritania, Senegal, Guinea, Cote d'Ivoire, Burkina Faso, and Niger – are all former parts of the French territories in Africa and the current borders between them are based on internal French administrative divisions. The capital of Mali is Bamako; other important urban centers are Mopti, Kayes, Segou, Sikasso, Gao, San, and the legendary city of Tombouctou (also known as Timbuktu). Until the 1990s, Mali was divided into seven administrative regions, each named after its capital. An eighth region, Kidal, was recently formed out of the northern half of Gao (see figure 1.1). The eight regions are divided into 49 districts known as *cercles*, which in turn consist of 286 *arrondissements*. Also at the district level are the six communes of Bamako, which is a special capital district apart from the eight regions (AID9508).



Source: WHO9106

Figure 1.2

Mali has three natural climatic zones: desert, dry savannah, and semi-humid savannah (see figure 1.2). These zones can also be defined in terms of rainfall: the Saharan zone receives little or none, the Sahelian Zone 20-40 cm. (8-16 in.) annually, and the Sudanese Zone 70-100 cm. (28-39 in.). Rainfall is heaviest and most regular in the far South at about 127 cm. (51 in.) per year. In general, the year is divided into three seasons: a rainy season from June to October, a cool dry season from November to February, and a hot dry season from March to May. The average temperature in the Sahelian zone is 30 degrees Celsius (86 degrees Fahrenheit), but in the summer temperatures over 40 degrees C. (104 degrees F.) are common. From February through May, the dreaded *harmattan*, a persistent wind from the East and Northeast, begins to blow hot, scorching air from the Sahara, causing temperatures to rise as high as 60 degrees C. (140 degrees F.)(FOF9201).

History

Mali is the cultural heir to a succession of ancient African empires – Ghana, Malinke, and Songhai – that occupied the West African savanna. These empires controlled Saharan trade and were in touch with Mediterranean and Middle Eastern centers of civilization. French military penetration of the area began around 1880. Mali was administered as part of the French colony of *Soudan* within the Federation of French West Africa. In January 1959, Soudan joined Senegal to form the Mali Federation, which became fully independent within the French Community on June 20, 1960, but collapsed two months later when Senegal seceded (DOS9301).

On September 22, 1960, Soudan proclaimed itself the Republic of Mali and withdrew from the French Community. After a group of officers staged a military coup in 1968 and installed Lt. Moussa Traore as president, the political situation remained generally calm through the 1980s. In March 1991, following widespread disturbances by students and workers, President Traore was overthrown by a progressive military group led by Lt. Col. Amadou T. Toure, who subsequently presided over the first multi-party elections in Mali's history (DOS9301). Mali's new president, Alpha Oumar Konare, took office in June 1992. Since then, the country's fragile democracy has struggled with many difficult challenges, including widespread corruption, violent student protests, and armed rebel activities in the North. Despite these difficulties, the government continues to pursue policies of structural adjustment and the decentralization of central power to regional and local authorities (AID9505).

People

Mali's population consists primarily of eight diverse sub-Saharan ethnic groups sharing similar historic, cultural, and religious traditions. Exceptions are the Tuaregs and Moors, desert nomads who are related to the North African Berbers (DOS9301). The proportions of the national population attributable to various major ethnic groups are depicted in figure 1.3. Data from the 1987 Demographic and Health Survey (DHS), the prime source of reliable information on population and health conditions in Mali, is disaggregated along the following ethnic groups (among other demographic classifications): Bambara, Peul, Malinke, Sarakole-Minianka, and Dogon. About 65-90 percent of the population is believed to be Muslim, 10-30 percent pursue traditional animist beliefs, and a small fraction is Christian, including Protestants and a smaller number of Catholics (FOF9001, FOF9201).

Mali's ethnic and linguistic diversity and its significant nomad population have made development of a uniform educational system difficult. School enrollment stands at just 32 percent. About one-third of adults and only one-quarter of women are thought to be literate (AID9509). In an effort to solve linguistic difficulties, Mali adopted French as its official language, but it is doubtful if more than one percent of the population can speak or write it. Bambara qualifies as the *lingua franca* and, since a large proportion of the educated administrators belong to the Bambara tribe, it tends to replace French as the language of administration in certain situations (FOF9201). However, although a written form exists, Bambara is above all a spoken language and French remains the overwhelmingly predominant written language.

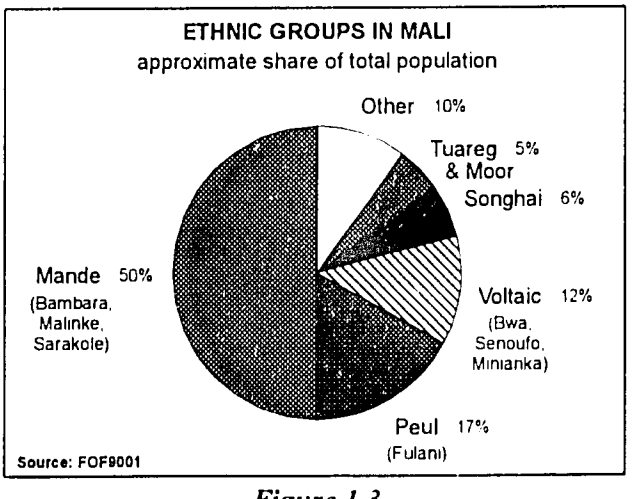


Figure 1.3

Economy

More than 30 years after gaining independence, Mali remains one of the least developed countries in the world. Its per-capita gross national product (GNP) of about $280 in 1991 (see figure 1.4) places it in the ranks of the world's ten poorest countries, more or less the same position it has held since independence. Agricultural activities occupy 75 percent of Mali's labor force and provide roughly 40 percent of the gross domestic product (GDP). About 90 percent of land under cultivation is dedicated to small-scale subsistence farming. Mining activities, particularly gold mining, hold promise for the future (DOS9301).

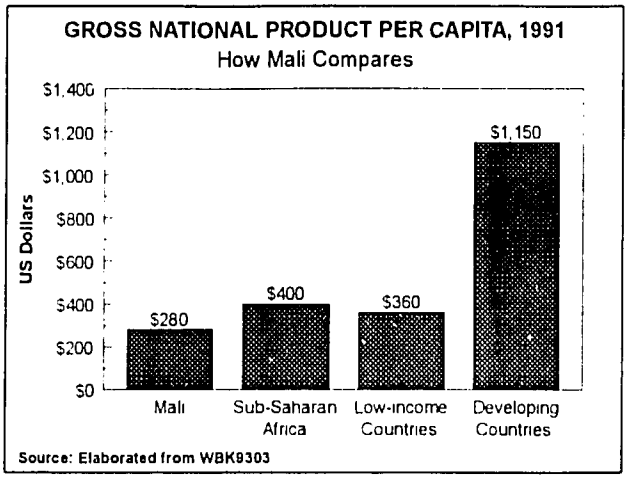


Figure 1.4

The majority of the population ekes a living out of the fragile ecosystem by growing millet, sorghum, and rice, and by tending small livestock. For others, cattle is a mainstay, and considerable quantities are exported to Cote d'Ivoire. Cotton is the leading cash crop and the major foreign exchange earner (AID9019). After an outstanding rainy season in 1994, Mali was able to export 27,000 tons of cereals and was expected to export rice for the first time in 25 years (AID9505). More typically, erratic rainfall, marginal soils, a relatively poor natural resource base, and Mali's landlocked status all work against the country's economic standing (AID9019). With about 70 percent of the country's land area desert or semidesert, economic activity is largely confined to the riverine area irrigated by the Niger. The Niger River is also an important source of fish, providing food for nearby communities; the surplus – smoked, salted, and dried – is exported. Due to drought and diversion of river water for agriculture, fish production has steadily declined since the early 1980s (DOS9301).

When Mali gained independence in 1960, its economy was characterized by centralized regulation, virtually no modern industrial sector, limited private sector opportunities, and a dearth of university-educated workers. Pursuing a strategy of state-led development, the government created sixteen public industrial enterprises in the first decade of independence (AID9019). Economic decline, particularly in the early and mid-1980s, contributed to acute fiscal problems leading Mali to rely heavily on aid and to incur sizable foreign debt (FOF9201). The government's program of structural adjustment in the 1990s, emphasizing deregulation and privatization, has been relatively successful, thanks in part to considerable debt relief from lending governments in Europe, favorable agricultural production, and the 1994 devaluation of the CFA franc, which fueled inflation and harmed local purchasing power but stimulated exports and private investment. The rate of privatization of state-owned enterprises and the level of private sector investment, however, both still leave much room for improvement, according to USAID's mission in Mali (AID9505).

Population Dynamics

Reliable data on population and health trends in Mali is sorely lacking. Much of what is known is derived from just a few sources, including census data, the most recent of which date to 1987, and a Demographic and Health Survey (DHS), also dating to 1987. A second DHS being conducted in 1995 promises to add substantially to our still relatively limited knowledge. Figure 1.5 illustrates projections by the United Nations (UN) of the growth of Mali's total population since 1950. For 1995, Mali is estimated to have roughly 10.8 million inhabitants.

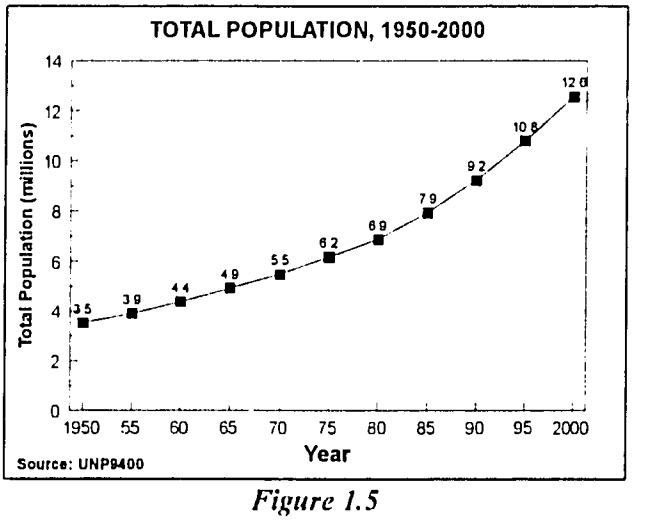


Figure 1.5

Figure 1.6 provides a representation of the breakdown of the population by age and sex. About 47 percent of the total population is thought to be under the age of 15 and nearly twenty percent (19.7%) under the age of five. The population is growing at an average annual rate of 3.1 percent, according to the UN, faster than any other period in recent history (UNP9400). This accelerated growth is the combined product of gradually decreasing mortality rates on one hand and birth rates which remain among the world's highest on the other. Mali's crude birth rate has scarcely lowered since 1950 and the total fertility rate has remained at 7.1 for years, according to UN projections (see table A1 in appendix).

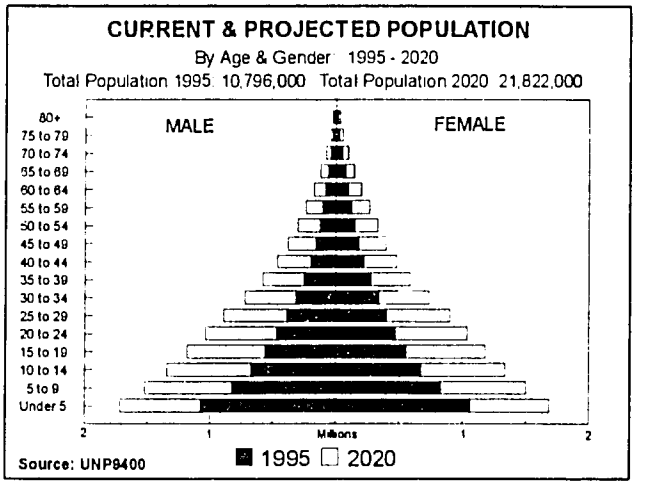


Figure 1.6

With just 8.6 persons per square kilometer, Mali is among sub-Saharan Africa's ten least densely populated nations (UNP9400). The principal reason for this is that vast areas in the North and East are practically uninhabitable. The bulk of the population is concentrated in the South and there is a continuing trend of migration toward the Senegal and Niger Rivers. Mali is a net exporter of international migrants, with the largest numbers of emigrants headed to Cote d'Ivoire and, to a lesser extent, Senegal. Traditionally, all nomadic groups, such as the Fulani, Tuareg, and Maure, move freely across national borders into neighboring countries. Almost all of these migrate only seasonally and eventually return to their homes (FOF9201). While the overall population is growing at a rate of about three percent per year, rural-to-urban migration, estimated to involve about 70,000 people per year, has reportedly pushed the urban growth rate over five percent (AID9019). Still, there are only eight towns with populations over 9,000, accounting for 41 percent of the urban population. Bamako, with a population of 658,000 according to Mali's 1987 census, accounts for about one-quarter of Mali's urban population (FOF9201).

Mali was the first French-speaking country in West Africa to adopt an official family planning program. Family planning activities are now coordinated by the National Family and Public Health Service (FOF9201). The challenges facing the program are formidable. Of 25 Demographic and Health Surveys (DHSs) conducted around the world through 1989, the results of the 1987 Mali DHS indicated that Mali had the highest percentage of women married by age 20 (92 percent), the lowest proportion of women who wanted no more children (17 percent), and, along with Burundi, the lowest contraceptive prevalence rate (CPR) at just over one percent for modern methods (DHS9415). The USAID mission in Mali estimated that the CPR had risen to 2.9 percent by 1991 and four percent by 1994 (see figure 1.7), an increase largely facilitated by the introduction of pills and condoms into private sector pharmacies and other retail outlets (AID9505). While these small rises may be substantial gains in the Malian context, contraceptive prevalence in Mali is still among the region's lowest and will do little to decrease total fertility in the near future. The results of Mali's second DHS promises to shed considerable light on current trends in fertility and use of family planning services.

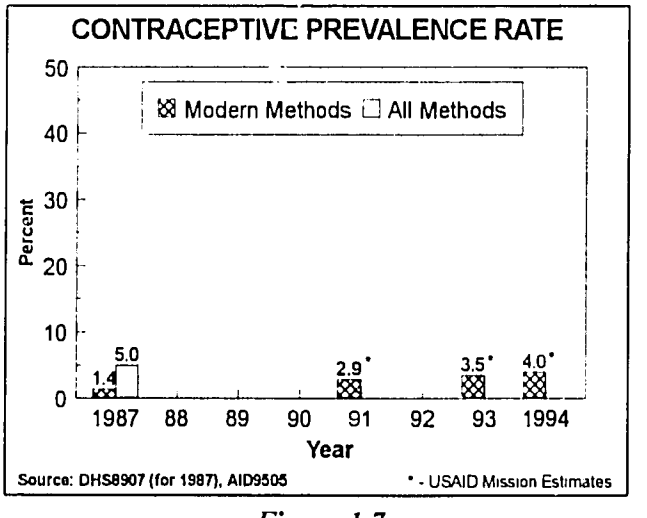


Figure 1.7

II. HEALTH SITUATION ANALYSIS

Basic Health Indicators

The 1994 Human Development Report listed Mali's life expectancy at birth at just 45 years for 1992, one of the lowest in the world and well below median values among sub-Saharan African nations and lower-income countries (see figure 2.1). Lower life expectancy in Mali and other developing nations is largely a result of high infant and child mortality. Of 25 DHSs conducted through 1989, the results of the 1987 Mali DHS indicated that Mali had the highest infant mortality rate (IMR) at 131 deaths per 1,000 live births and the second-highest under-five mortality rate (U5MR) at 278 deaths per 1,000 live births (DHS9415).

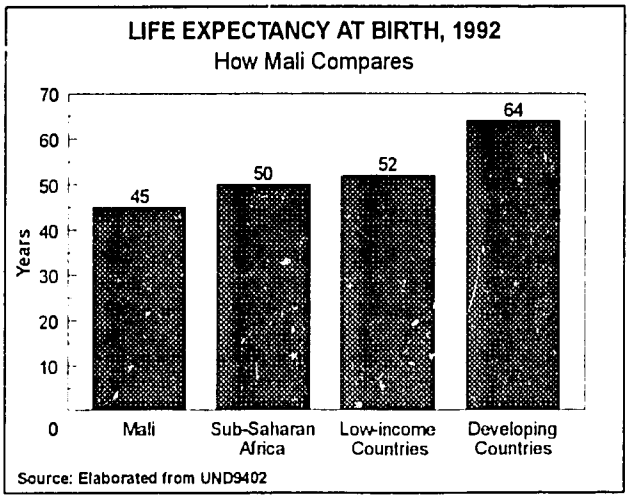


Figure 2.1

Projections based on DHS data and general trend information on mortality in sub-Saharan Africa place Mali's current IMR at 112 deaths per thousand live births and the U5MR at 222. These rates represent a considerable improvement over the past (see figure 2.2), but are still among Africa's highest, with the U5MR standing more than three times higher than the median value among all developing nations (see figure 2.3). The 1987 DHS found IMR and U5MR in rural areas to be about fifty percent higher than in urban areas (see figure 2.4, displaying rates found for the ten-year period before the survey). Conditions in the northeast of the country are truly among the worst in the world: the IMR and U5MR found for the combined regions of Mopti, Gao, and Tombouctou were the highest found by a DHS for any sub-national region in the world except for four regions of Liberia (DHS9415).

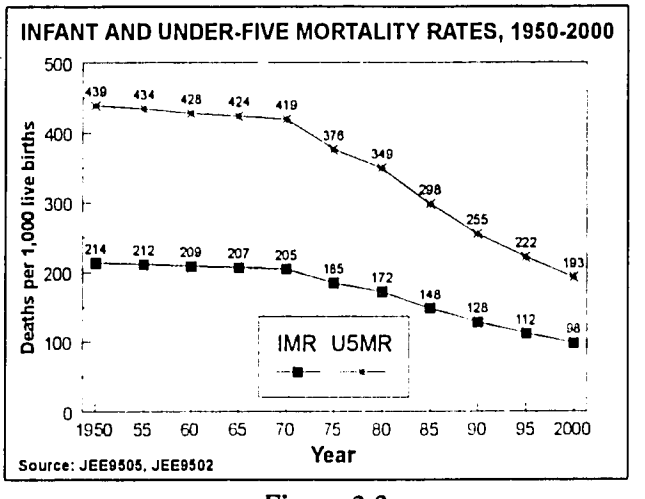


Figure 2.2

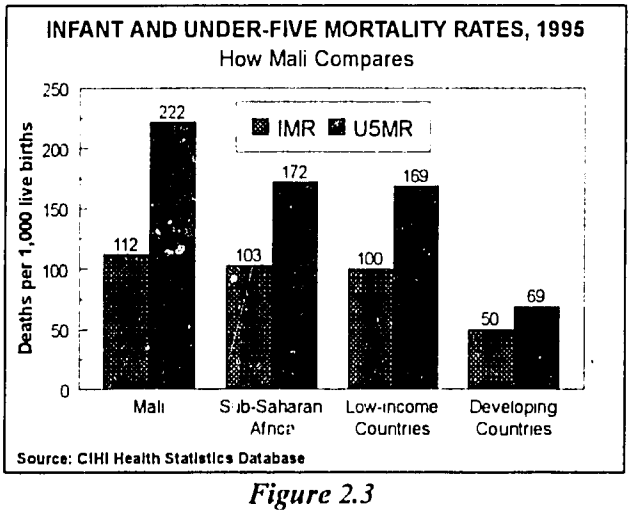


Figure 2.3

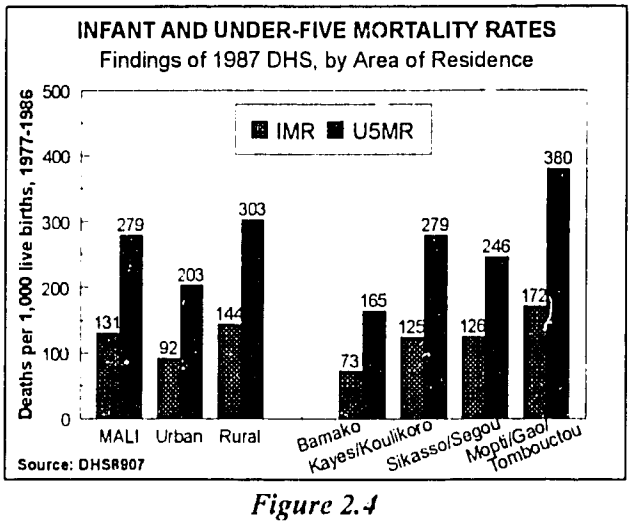


Figure 2.4

A wide variety of local and international efforts are working to hasten the pace of decline of infant and under-five mortality rates in Mali. According to a recent assessment by USAID's mission in Mali, the IMR in project areas in Kolondieba has been reduced by over fifty percent in a span of only four years. Studies by the private voluntary organization (PVO) implementing the USAID project, Save the Children Federation (SCF-US), indicate that the IMR in Kolondieba has dropped from a level of 109 infant deaths per 1,000 live births in 1989 (roughly equivalent to the national IMR estimated by USAID/Mali) to just 49 in 1993 (see figure 2.5).

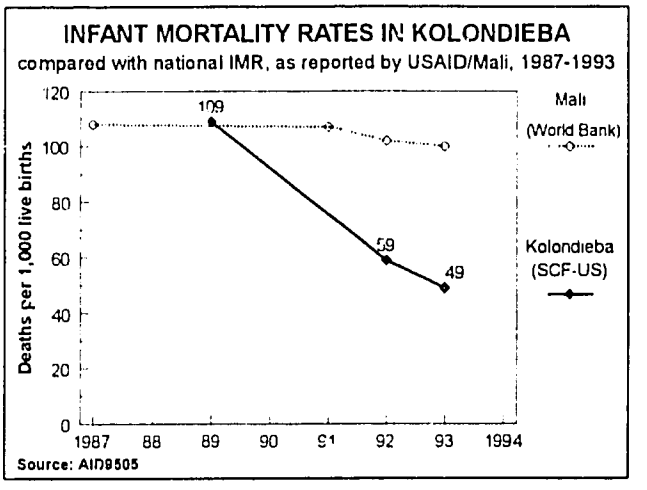


Figure 2.5

Causes of Mortality & Morbidity

As is the case throughout sub-Saharan Africa, the vast majority of deaths and illnesses in Mali result from preventable diseases. A study conducted for the World Bank in 1992 concluded that at least 70 percent of infant and child deaths are caused by diseases that are preventable through low-cost interventions, including malaria, measles, tetanus, respiratory diseases, diarrhea, and malnutrition. In addition to these common childhood diseases are a wide variety of other afflictions with significant public health impact. Blinding disorders such as vitamin A deficiency and trachoma, for example, handicap more than 10 percent of the inhabitants of certain villages. A great deal of adult and child suffering is also attributable to specific parasitic diseases such as schistosomiasis and Guinea worm (WBK9204).

Although Mali has a national health information system in place, summary reports of national-level data on causes of death and morbidity rates are seldom produced. Furthermore, the information which does exist is based on reported diagnoses in a heavily burdened health care system which sees and reports on only a very limited number of the total illnesses and deaths which occur. As a result, it is difficult to construct any useful, detailed accounting of causes of death or morbidities in Mali. The information presented in the following sub-sections is thus intended to provide a general but qualified view of the relative importance of various causes of death and morbidity in Mali.

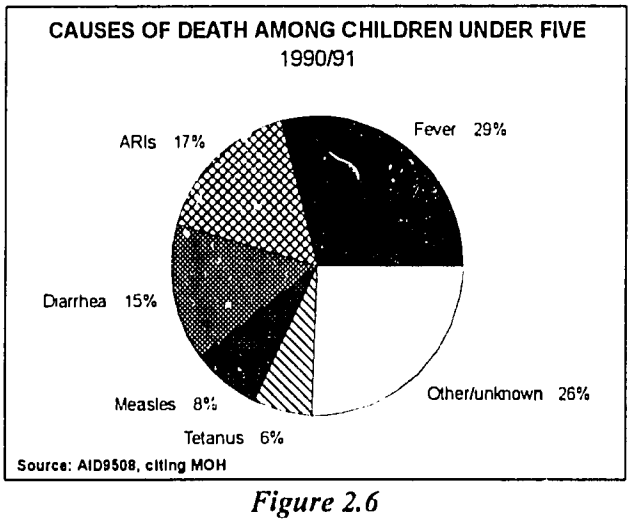


Figure 2.6

Mortality among Children

According to a recent USAID project paper, the three main causes of death among children are malaria, acute respiratory infections (ARIs), and diarrheal diseases. Citing Mali's Ministry of Health (MOH), the paper provided a brief list indicating that nearly 30 percent of child deaths in 1990/91 were due to fever, a condition which is commonly equated with malarial attacks in Africa but can result from a number of other causes as well. The list also provided the shares of child deaths attributed to ARIs, diarrheal diseases, measles, and tetanus (see figure 2.6). Other factors which contribute to high child mortality include inadequate maternal nutrition, other maternal ailments, an unhygienic environment, and local customs and beliefs prescribing modes of patient care (most notably feeding practices) that aggravate the disease (MAL9001).

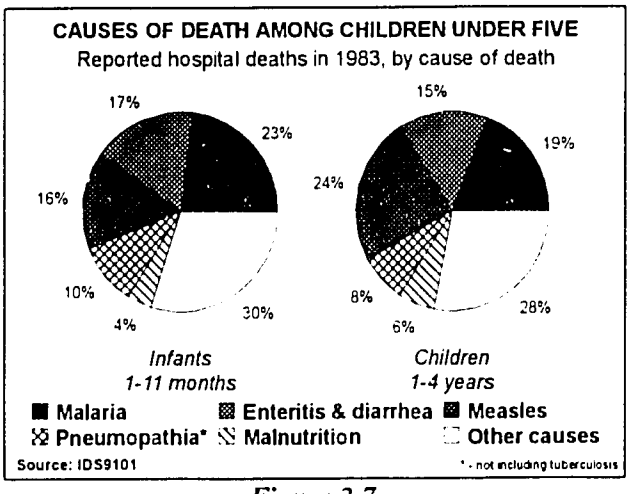


Figure 2.7

A ten-year development plan produced by the MOH in 1983 included a list of causes of reported hospital deaths among children under five years of age. For the neonatal period (0-4 weeks), "difficult deliveries" (45%) and "obstetric lesions" (9%) accounted for more than half of reported deaths, while an additional 14 percent were attributed to congenital malformations, four percent to tetanus, and 28 percent to other causes. For the remainder of infanthood and childhood up to five years of age, the primary causes of death were identified as malaria, measles, and diarrheal diseases, followed closely by respiratory infections and malnutrition (see figure 2.7).

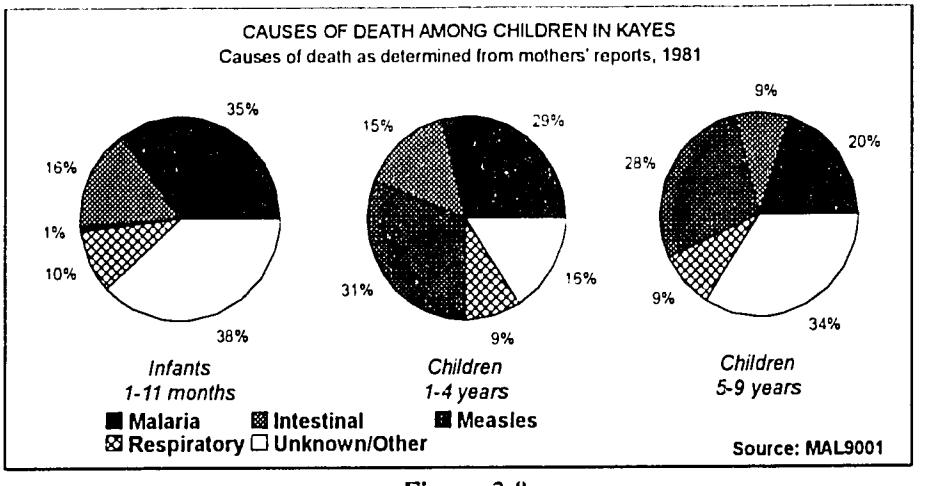


Figure 2.8

In a survey conducted in 1981 in three districts in Kayes region in preparation for a World Bank project, symptoms described by mothers were interpreted by surveyors to determine the cause of nearly 1,500 deaths among children. Results for three age groups are illustrated in figure 2.8. Once again, malaria, measles, and diarrheal diseases (intestinal infections) are identified as the main killers, followed by respiratory infections.

Morbidity among Children

Morbidity is normally measured in terms of tallies of causes of outpatient visits. As this data is lacking on a summary, nationwide basis in Mali, we rely here on a 1986 assessment of the impact of major diseases among children in rural Mali. The assessment, which incorporates the impact of mortality as well as morbidity, found that all health problems combined resulted in 111 "healthy days lost" per child per year. The assessment found that malaria, diarrheal diseases, "neonatal affections," ARIs, and measles were respectively the diseases with greatest impact among children under the age of fifteen. Figure 2.9 illustrates the number of "healthy days lost" assigned to each of these five conditions as well as eight other common afflictions among Malian children (IDS9101).

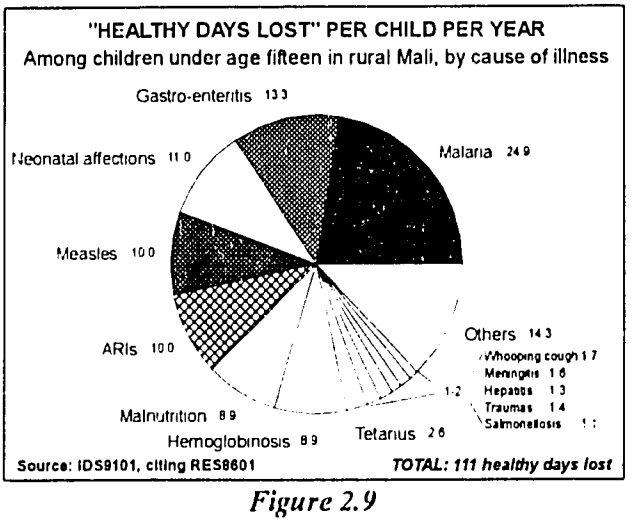


Figure 2.9

Maternal Mortality

Maternal mortality is the leading cause of death among women of child-bearing age in Mali (WBK9204). Calculating a given country's maternal mortality rate (MMR) is notoriously difficult and variations in methodolgy inevitably lead to widely varying figures (see data notes). Recent estimates of Mali's MMR range as high as 2,900 per 100,000 live births (WHM9100); a figure of 2,000 is the highest given by UNICEF for any country worldwide (UNI9501). The recent paper by USAID's BASICS project cited an MMR of 1,000 (AID9508). In other words, according to this estimate, for every 100 live births, one woman dies due to complications related to pregnancy or childbirth. Other estimates for Mali are slightly lower but still far exceed the median among African and other developing countries (see figure 2.10).

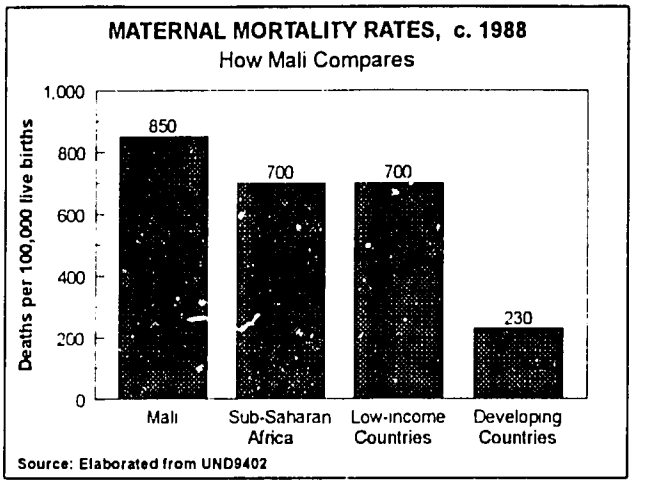


Figure 2.10

A major reason behind Mali's exceptionally high MMR is the preponderance of high-risk births, particularly among mothers who are too young. Mali's 1987 DHS found that 45 percent of girls between the ages of 15 and 19 had already had at least one child and that nine percent of girls in this age group, and ten percent of all women surveyed between the ages of 15 and 49, had had their first child at age fourteen or less (DHS8907). The tendency of Malian women to bear many children is rewarded by various social and economic incentives, but the practice exacts a toll on maternal health. A review of DHS data from 28 surveys through 1990 found that Sudan and Mali had the highest share of births fall into at least one "high-risk" category (based on age of mother, period of birth spacing, and number of children) at 72 percent (DHS9311).

Ill health and malnutrition of women are major contributing factors to high infant, child, and maternal mortality. Also of great significance as a risk factor for maternal mortality is the wide acceptance and practice of female genital mutilation. Prevalence is estimated at 75 percent of women in Mali, one of the highest levels in the world (FGM9301). Another major contributing factor to high maternal mortality in Mali is limited access to effective maternal health services. Severe complications on delivery can mean almost certain death if the condition has not been previously diagnosed and the patient evacuated to a hospital, for services at the district level are not designed to perform difficult procedures such as Caesarian sections (MAL9001).

Specific Health Problems

Vector-Borne Diseases

Among Mali's greatest public health hazards are several diseases carried by mosquitos and flies. In Mali, as throughout sub-Saharan Africa, malaria is by far the most devastating. Also of great significance are onchocerciasis (river blindness) and trypanosomiasis (sleeping sickness). Dengue fever is known to exist in southern Mali but no data is available on prevalence or incidence. Other common vector-borne diseases, such as schistosomiasis and Guinea worm disease, are discussed later under diseases related to water and sanitation. Public health measures such as vector control or child immunization may help prevent transmission of vector-borne diseases, but the expensive medications currently required to treat many of these ailments are not handled at the district level in Mali and thus may not be available to most of the population (MAL9001).

Malaria. Malaria is the single most commonly identified cause of death in Mali. Incidence is highest during the June-October rainy season, but stagnant pools of water and liquid wastes nurture the mosquito vector year-round. Young children and pregnant women are the most vulnerable groups. Most of the adult population has developed an immunity enabling toleration of a few days of malaria-induced fever each year. Children are most vulnerable up to the age of three, by which time the majority have developed immune responses (MAL9001).

Malaria transmission occurs throughout the country except in the far north (see figure 2.12 on following page). Seeking data on the prevalence of malaria, the 1987 DHS asked mothers whether their children had suffered a fever in the previous four weeks. The overall four-week prevalence rate was found to be roughly one-third. Prevalence among children in rural areas was found to be only slightly higher than in urban areas. Children in Kayes and Koulikoro, two populous regions with ample irrigated agricultural areas, were found to suffer a fever prevalence rate of over 40 percent, while children in Bamako and in the northeastern regions exhibited prevalence levels well below the national average (see figure 2.11).

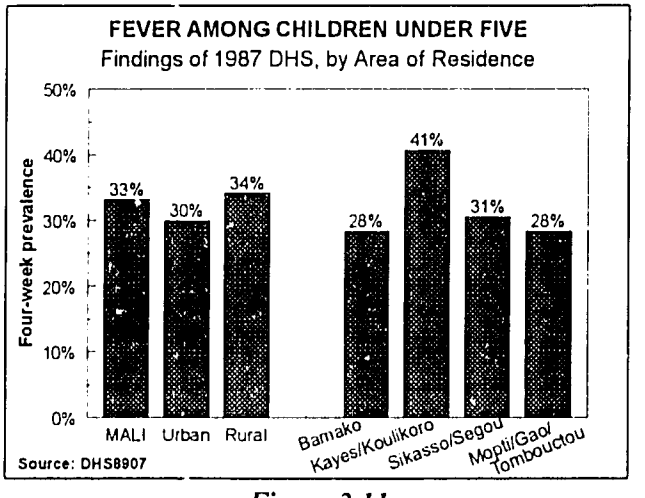


Figure 2.11

The two major strategies to prevent and control malaria are vector control and the administration of anti-malarial drugs. The DHS found that 36 percent of childen with fever were given antimalarial drugs (*nivaquine*), 20 percent received aspirin, and 35 percent were treated through medicinal plants, while nearly one-quarter (24.5%) received no treatment at all (DHS8907). Chloroquine-resistant strains of malaria arrived in Mali around 1987-88 and have increased the need for new anti-malarial drugs (VBC8801). Recent research by the Mali's National School of Medicine and Pharmacy (ENMP) has found resistance levels to vary according to geographic area between 0-28 percent for chloroquine and between 0-23 percent for sulfadoxipyrimetrine. Chloroquine remains the recommended first-line anti-malarial drug (AID9508).

Under USAID's Mali Rural Health Project (PSR) in 1978-82, village health workers were encouraged to promote cool baths and aspirin as a simple treatment of fever to replace the traditional custom of wrapping a fever-ridden child in warm clothes to "bring the fever out." Having recommended weekly administration of chloroquine tablets during the rainy season as a preventive measure for pregnant women and children under age six, the PSR identified several obstacles to this practice in the Malian context. These included the reluctance of mothers to spend money on drugs when children are not suffering from fever, a traditional belief that pregnant women should not take medicines orally (except for preparations purported to accelerate birth), and fears arising from the common knowledge that chloroquine, taken in large quantities, could be used to induce abortion (MAL9001).

More recently, USAID's mission in Mali reports that the MOH's Malaria Research and Training Center has had great success in reducing the case fatality rate (CFR) for malaria in Bamako hospitals, where two percent of malaria cases resulted in death in 1993 but only 0.9 percent in 1994 (AID9505).

The main vectors transmitting malaria in Mali are *A. gambiae* mosquitos. An experimental study in 1990-91 undertaken in two villages in Mali's hyperendemic savannah area found that curtains impregnated with pyrethoids, having been accepted and used by the population, were still not successful in interrupting the transmission of malaria (BSP9101).

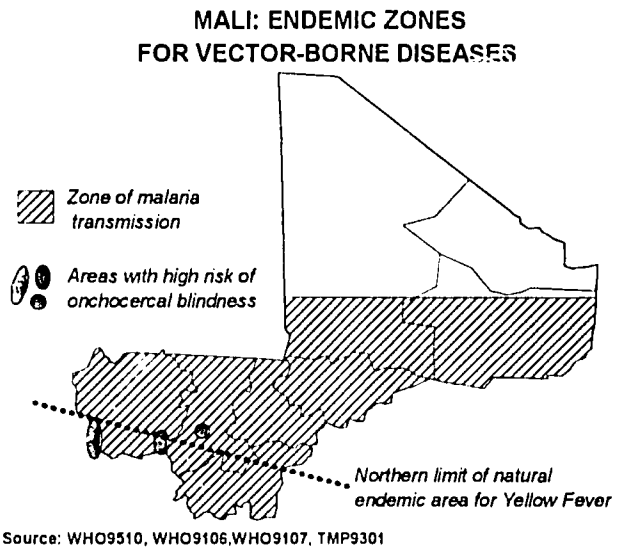


Figure 2.12

Onchocerciasis (River Blindness). Onchocerciasis, known as *mara* in Bambara, is a chronic but non-fatal eye disease transmitted to humans by blackflies, which breed in fast-flowing rivers. The disease typically leads to blindness and has been responsible for the abandonment of vast fertile agricultural land throughout West Africa. The Onchocerciasis Control Program in West Africa (OCP), founded under the WHO in 1974 with the sponsorship of the United Nations Development Program (UNDP), the Food and Agriculture Organization (FAO), and the World Bank, has worked in eleven countries, including Mali, to eliminate onchocerciasis both as a public health problem and as an obstacle to socioeconomic development. Strategies to control and eventually eradicate the disease have included vector control through larvicides and distribution of the drug ivermectin where onchocerciasis persists. Prevalence is now insignificant in the major part of the original program area except for some reinvaded zones and foci where larviciding met with operational problems. Even in these areas, the number of infections has been 10-20 percent of what would have been expected in the absence of larviciding. According to the World Bank, the tillable "new lands" that have been, or are expected to be, made available as a result of the OCP cover a total of 250,000 square kms (25 million hectares) for the entire program area (WHO9411).

Once widely present in southwestern Mali, "oncho" is now limited to a few tributaries to the Niger and Senegal Rivers in the savannah areas of the far West of the country and along a brief stretch of the Niger northeast of Bamako (see figure 2.12). In an effort to identify remaining areas where oncho persists, the OCP began a detailed surveying and mapping of a "western extension" of its original program area in the early 1990s. Surveys of suspected endemic areas in the upper basins of the Bakoye and Foleme Rivers, tributaries to the Senegal River near Mali's border with Guinea, found only a moderately significant prevalence of the microfilarials which cause the disease in some of the southernmost villages. A mass ivermectin treatment area was identified along the Bakoye straddling the Guinean border. As for the Foleme River basin to the West, the study concluded that local health authorities could be responsible for treating the handful of villages where prevalence was significant (TMP9301).

Sleeping Sickness (African Trypanosomiasis). Sleeping sickness is a disease borne by tsetse flies which prohibits the use of large areas of central and eastern Africa. One variety of the disease known as *T.b. gambiense* occurs in parts of West Africa as well. Much of the Niger River valley in southern Mali as well as areas in the country's western extreme are considered endemic. In 1991, WHO estimated that 2.5 million Malians were at risk of contracting the disease. Unfortunately, statistical data on trypanosomiasis is limited; Mali stopped reporting case totals to WHO after 1982, when only 80 new cases were reported. Two years earlier, in 1980, Mali had reported 934 new cases of trypanosomiasis, the fourth-highest country total reported that year (VBC9101).

Yellow Fever. Yellow fever virus in west Africa generally follows a sylvatic cycle starting with primates and mosquitos. Unimmunized humans may become infected when they are fed upon by infected mosquitos, a mode of transmission which typically occurs in rural environments. Urban epidemics also occur, largely as a result of transmission between humans. Southern Mali is in the endemic zone for yellow fever (see figure 2.12) and outbreaks of the disease occur at intervals of several years. Areas just north of endemic zones are at higher risk because human immunity levels are negligible and epidemics can run rampant. Exact prevalence and incidence of the disease are not known since many cases are not recognized and therefore go unreported. Studies have shown that cases and deaths are underreported by 10 to 500 percent in Africa (WHO9503).

The most memorable outbreak of yellow fever in Mali was in 1969, with 21 confirmed cases and 12 reported deaths (WHO8601). A more recent epidemic occurred around Kita (Kayes Region) in 1987. Seventy percent of cases reported in 1987 occurred among children under the age of fifteen (WHO9106,WHO9203). Mali has not reported any cases of yellow fever to the WHO in the 1990s, but the disease continues to be a major threat in all endemic and epidemic zones because it can reappear even after long periods of quiescence (WHO9503). Although an effective vaccine exists to prevent yellow fever, many African countries have abandoned expensive immunization programs for the far less effective strategy of emergency control during outbreaks.

Acute Respiratory Infections (ARIs) and other Airborne Diseases

Acute respiratory infections (ARIs) are among the top three causes of infant mortality in Mali (AID9508). As previously indicated in figures 2.6-2.9, respiratory infections consistently account for about 8-10 percent of recorded child mortality and morbidity in Mali. ARIs include a wide variety of diseases, two of the most dangerous of which are measles and pneumonia. Measles primarily affects children and is easily preventable through immunization (more on measles appears under vaccine-preventable diseases). Pneumonia, a serious and potentially fatal lower respiratory infection, most frequently afflicts the very young and the very old (OUP9301).

To obtain information on the prevalence of respiratory infections among children in Mali, the 1987 DHS asked mothers whether each of their children had experienced rapid or difficult breathing in the four weeks preceding the survey. (Most other DHSs, on the other hand, focus on presence of a cough with or without rapid or difficult breathing.) Overall prevalence in Mali was found to be 6.6 percent, with children in rural areas suffering significantly more than those in urban areas (see figure 2.13), a pattern similar to that found by other DHS surveys conducted in sub-Saharan Africa. Among age groups, prevalence was highest among infants less than six months old (8.7 %) and children ages 12-23 months (7.6%)(DHS9115).

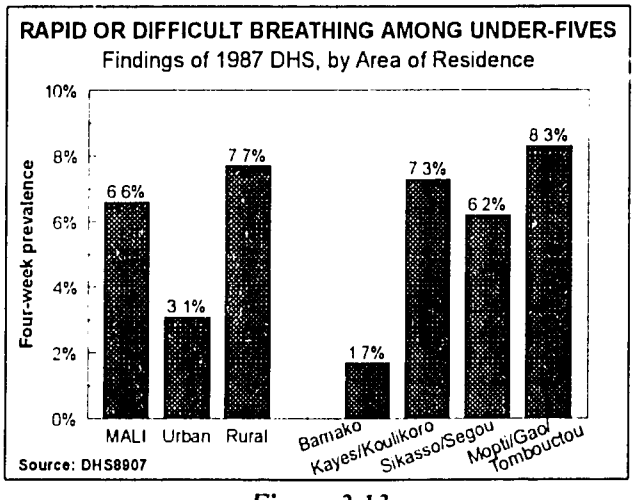


Figure 2.13

The survey found that just six percent of children with rapid or difficult breathing were taken to a medical facility, seven percent were given a syrup, and only two percent received antibiotics (DHS9115). According to mothers' responses, 37 percent of the children with rapid or difficult breathing did not receive any treatment at all and a full 50 percent received an "other" treatment, a response which usually indicated self-treatment at home or consultation with a traditional practitioner (DHS8907).

Other airborne diseases of significance in Mali include meningitis, which has recently had severe impact in neighboring Niger. Unfortunately, little data is available on prevalence of meningitis in Mali. USAID reports that the PVO Africare vaccinated 35,000 children against meningitis during an epidemic in Dioro in 1994 (AID9505).

Diseases Related to Water and Sanitation

Deficiencies in water supply and sanitation measures are responsible for a great deal of suffering and mortality in Mali. Diarrheal diseases in particular are responsible for a high proportion of deaths among children. A host of other conditions, such as parasitical infections, skin diseases, and some eye diseases, greatly affect the health of children and adults alike. As indicated in figures 2.6-2.8 above, intestinal problems, including diarrheal diseases, are the specified cause of at least 15-17 percent of reported child deaths in Mali.

Less than half of the population of Mali is thought to have reasonable access to safe water and less than one-third has access to adequate sanitation measures, according to figures tracked by WHO. Both figures are well below median reported levels among sub-Saharan nations, low-income nations, and developing nations in general (see figure 2.14). Figures 2.15 and 2.16 indicate access levels reported over time for rural and urban areas since 1980. Apparent improvements in rural access to safe water, rising to 38 percent of the population by 1991, accompany a level of urban access stagnating at around 50 percent. As indicated in figure 2.16, only ten percent of rural households were thought to have adequate sanitation measures in 1990, up from the abysmally low level of three percent reported for 1988 and earlier.

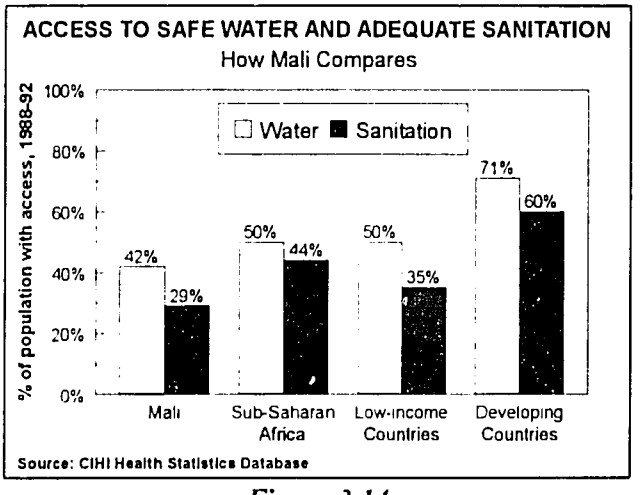


Figure 2.14

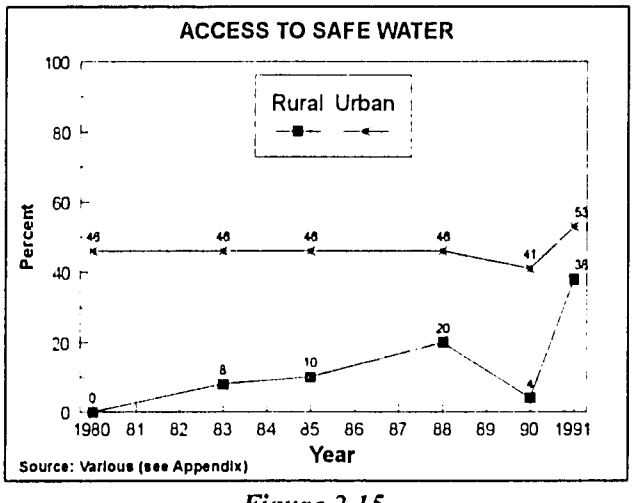


Figure 2.15

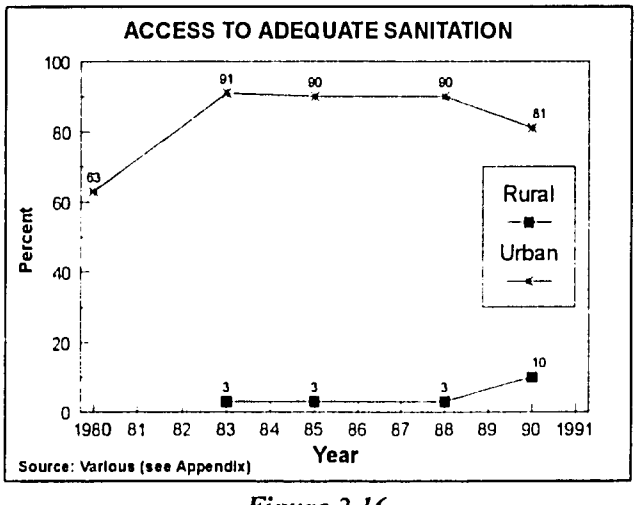


Figure 2.16

Diarrheal Diseases. Diarrheal diseases are most common among children at the time of weaning and as they start to become more mobile. A survey conducted by WHO in 1991 found that Malian children under five years of age suffer an average of four episodes of diarrhea each year. This figure is slightly lower than the average finding among sub-Saharan African nations and just half the incidence rate of eight found for Mali in 1989. Earlier surveys in Mali had found annual incidence rates of around five or six episodes per year in the 1980s (WHD9100, WHD9201).

Demographic and Health Surveys typically calculate diarrhea prevalence rates among children under five years of age based on mothers' reports of their children's diarrheal episodes during the two weeks preceding the survey as well as the twenty-four-hour period before the survey. A report summarizing DHS findings through 1989 listed

Mali's two-week prevalence for diarrhea at 35.9 percent, the second-highest rate found by any DHS conducted to date. Prevalence rates of over forty percent were found among children aged 6-35 months, an unusually wide range of ages for such a high prevalence rate (see figure 2.17). Twenty-four-hour prevalence was found to be 20.2 percent, the highest value found by any of the 19 DHSs seeking this rate (DHS9115). As indicated in figure 2.18, differences in prevalence rates found for children in urban and rural areas in Mali were not very significant, though rates found for Bamako were appreciably lower than those for the rest of the country (DHS8907).

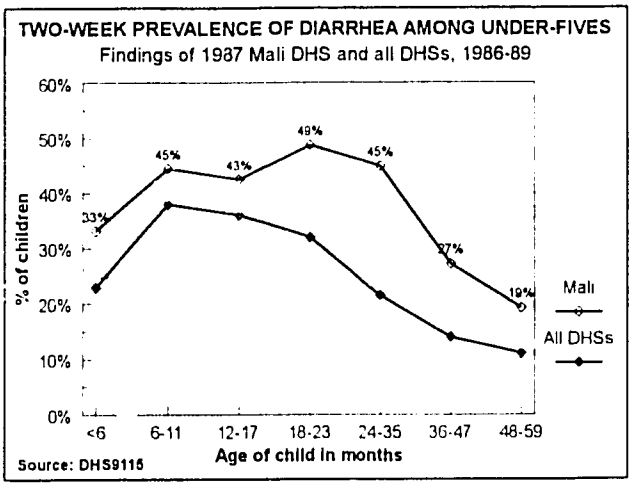


Figure 2.17

USAID's mission in Mali has recently reported improvements in diarrheal prevalence in areas where PVOs are implementing projects to improve child survival. In Dioro, Africare found prevalence to have been halved from 41.1 percent in 1989 to 20.6 percent in 1993. In Macina, CARE reports an even more dramatic drop from 48 percent prevalence in 1991 to just 14 percent in 1993 (AID9505). (The type of prevalence rate being reported and the population groups sampled were not specified.)

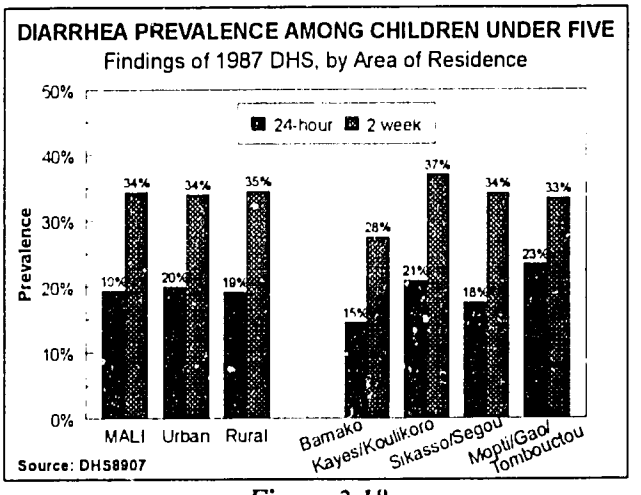


Figure 2.18

In Mali, as elsewhere, most diarrheal disease is caused by contaminated water. High mortality from diarrhea, however, is typically the product of incorrect or inappropriate treatment: children die as parents follow traditional practices based on the belief that one stops diarrhea by withholding food and liquids In the early 1980s, USAID's Rural Health Project (PSR) worked to educate village health workers about the benefits of oral rehydration therapy (ORT) using pre-packaged oral rehydration salts (ORS) or, more commonly, a home-made solution of water, salt, and sugar. The PSR also stressed the importance of continued feeding during episodes of diarrhea (MAL9001).

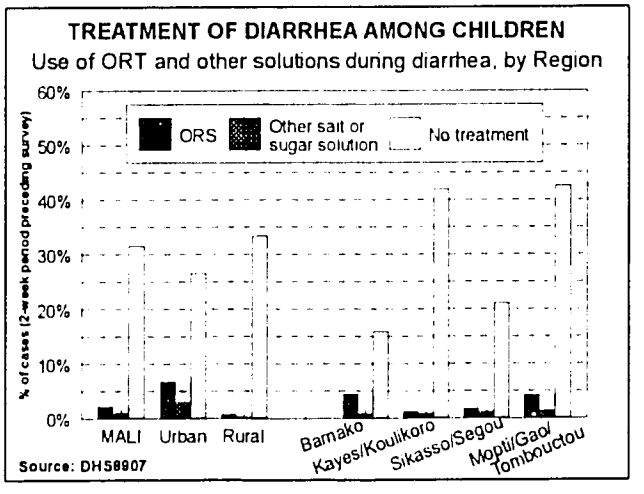


Figure 2.19

The 1987 DHS found that nearly one-third (31.6%) of Malian children with diarrhea did not receive any treatment at all, according to mothers' reponses, while 42.5 percent were treated through medicinal plants and 26.8 percent through modern drugs. Only 2.2 percent received ORS packets, one of the lowest levels in sub-Saharan Africa, and just one percent received a home solution containing sugar and salt. As illustrated in figure 2.19, the areas exhibiting the most frequent use of ORS packets or home solutions to treat children's diarrhea were the city of Bamako and the three northeast regions of Mopti, Gao, and Tombouctou. However, use of ORS packets was still under five percent in those areas, and in

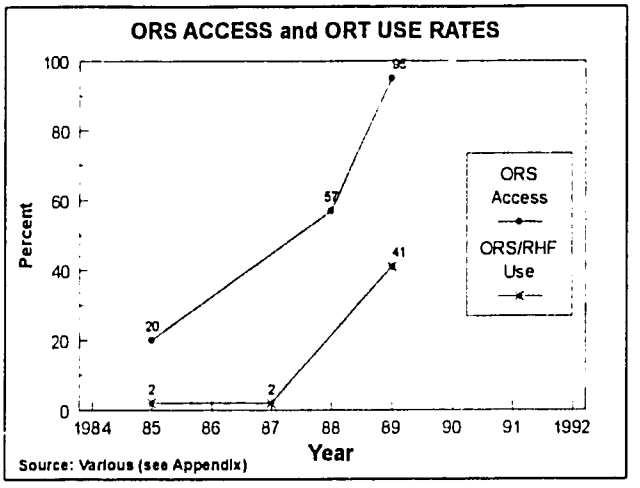


Figure 2.20

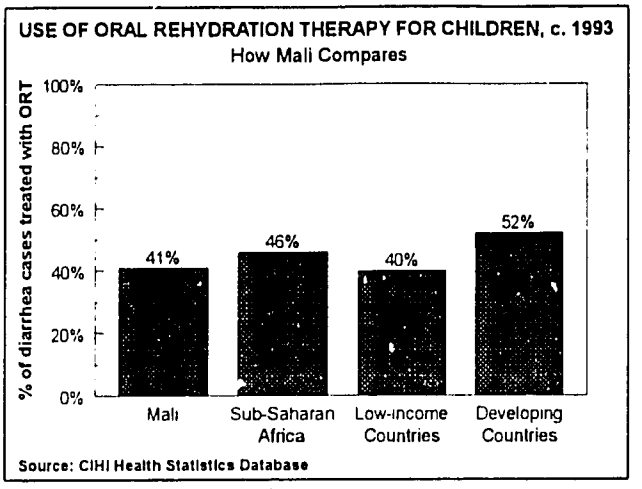


Figure 2.21

the northeast regions (along with Kayes and Koulikoro) the share of children with diarrhea who received no treatment at all was over forty percent (data for figure 2.19 appear in table A3 in Appendix A). More recent surveys indicate that ORT use in Mali has risen appreciably (see figure 2.20). The most recent reported level of 41 percent, which dates to 1989, stands just below the median level for all sub-Saharan African countries' ORT use rates around 1993 (see figure 2.21). With assistance from UNICEF, ORS packets are now produced locally and are available at a reasonable cost at pharmacies and health centers throughout the country (CAB9501).

Cholera. Cholera, an acute diarrheal disease, appears sporadically in Mali. In the 1980s, Mali was considered an area of "medium" prevalence, meaning that the disease was known to be present somewhere in the country for about half of the decade (LAN9101). For most of the 1990s, Mali had not reported any cases, but in March 1995, cholera was reported to be present in Kayes Cercle (Kayes region) and Nara Cercle (Koulikoro)(WHO9503).

Trachoma. Trachoma is caused by repeated reinfection with *Chlamydia trachomatis*, an obligate intracellular bacterium. It is one of the major cause of blindness in Mali. Trachoma is hyperendemic in dry, dusty communities with poor sanitation and hygiene, where water is scarce and viewed as a precious resource. Transmission of infection occurs during contact with infected ocular or other secretions. Flies may act as physical vectors for transmission and a large fly population contributes to the risk of trachoma (GPI9001).

In 1984, ten percent of the cases of trachoma reported in Mali occurred among children (IDS9101). The community pool of active inflammatory trachoma resides in pre-school children. Rates of active disease decline rapidly after age ten, with mothers or caretakers of pre-school children being the primary group of adults with active trachoma. Typically, patients with trachoma do not complain of symptoms until the scarring is significant enough to cause *trichiasis*, or inturned eyelashes. *Trichiasis* and *entropion* can occur in young adults, but are typically seen in middle aged or older adults (WHO8902).

Two surveys in Mali in 1985 identified trachoma as a leading cause of blindness. A survey of nearly 3,500 inhabitants of rural areas in Kayes region found prevalences of 1.3 percent for blindness and 3.6 percent for low vision. Trachoma was identified as the cause of blindness in 28 percent of the cases while cataracts accounted for 33 percent and corneal scarring 16 percent. Examination of 3,299 residents of Mopti region found prevalence of blindness at 1.0 percent and low vision at 2.5 percent. This survey attributed 34 percent of the cases of blindness to trachoma, twenty percent to "ocular infections," and 15 percent to cataracts. Each survey found glaucoma to be responsible for about ten percent of the cases of blindness (WHO9410).

Helminth Infections. Helminth infections include a wide variety of diseases caused by worms which contribute to malnutrition, anemia, and other health disorders. While many are treatable on a case-by-case basis, the most effective strategy against helminths is prevention through improved water supply, sanitation and hygiene practices. Typical examples of helminth infections are ascaris, hookworms, and trichuris. Very little hard data exists on prevalence or incidence of most types of helminth infections, but Guinea Worm has been tracked closely as part of an international effort to eradicate the disease. Other worm infections discussed below are schistosomiasis and distomiasis, both of which can result from poor sanitation conditions.

Guinea Worm (dracunculiasis). Dracunculiasis, also known as Guinea Worm disease, is a water-borne parasitic disease which until recently plagued millions of adults and children in rural Africa, India, and the Middle East. Mali is part of the core area of West Africa where dracunculiasis is endemic. From December 1991 to March 1992, national village-by-village searches detected 16,060 cases of dracunculiasis in 1,264 villages in five of Mali's seven regions (Gao and Tombouctou were not searched)(see figure 2.22). Over half of the cases were found in Mopti region and over one-third in Kayes (WHO9408).

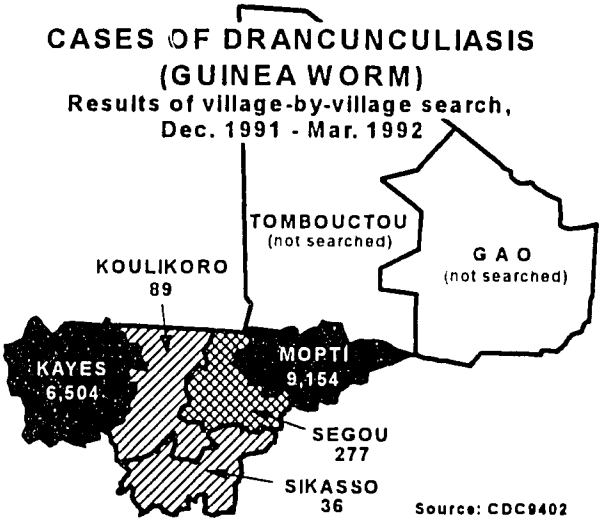


Figure 2.22

Transmission occurs year-round but is especially frequent early in the year in Mopti. Mali ranked sixth worldwide in reported cases of Guinea Worm disease in 1993 with 12,011. The provisional total for 1994 was less than half of that count at 5,581 cases, even though 76 percent of endemic villages were reporting monthly. By April 1995, the number of villages considered endemic had lowered to 647 (CDC9502).

Although Mali joined the campaign to eradicate dracunculiasis with fewer than three years remaining until the target date for eradication, it has been successful in rapidly establishing a national Guinea Worm Eradication Program (GWEP). Implementation of the GWEP's interventions, however, including health education, cloth filters, and improved supplies of safe drinking-water, will be insufficient alone to eradicate dracunculiasis before the original target date of December 1995. Success has been reported in curbing Guinea Worm particularly when installation or improvement of wells enables the population to decrease use of surface water (MAL9001). By December 1994, all villages considered endemic had participated in health education activities and received cloth filters and more than ninety percent had a trained, village-based health worker helping to prevent and control the disease. Implementation of vector control activities has been minimal, covering only one percent of endemic villages at the end of 1994. According to a report by the national program coordinator, case containment activities designed to interrupt transmission of the disease covered 22 percent of the total of over 5,500 cases reported by Mali in 1994 but only 16 percent of the 122 cases reported in the first three months of 1995 (CDC9502).

Schistosomiasis (Bilharziasis). Schistosomiasis is a blood fluke (trematode) infection acquired from water containing worm larvae (*cercariae*) which develop in snails. Mali is considered to be an area of high endemicity (MTM9101). Immediate effects of the infection, which include anemia and impaired cognition, can now be rapidly reversed through low-cost, single-dose oral therapy. While control of the snail vector is very difficult and expensive, infection can be limited if the population is sensitized to stay out of water courses (MAL9001).

Schistosomiasis is most prevalent in irrigated areas and near man-made bodies of water. Construction of irrigation schemes, particularly where rice cultivation is involved, and both large and small dams have been shown to increase risk for the disease dramatically. After twenty small dams were built in Bandiagara district, surveys indicated a rise in prevalence from 79.4 percent in 1976 to 93.4 percent in 1977. The later survey also showed prevalence not only of the *S. haemotobium* variety of the disease but also the *S. mansoni* variety, which was not previously known to exist in Mali. Increases in prevalence were also indicated after the construction of the Selingue Dam in 1980. *S. haemotobium* appeared in four villages which had shown zero prevalence in a baseline survey and prevalence rates grew substantially in other villages which had shown prevalence of less than twenty percent before the dam (WHO9307). Figure 2.23 illustrates the increased risk of schistosomiasis infection in areas with small dams, such as Bandiagara, with a large dam (Selingue), and areas where rice is cultivated, particularly along the flood plain of the Niger, as compared to traditional riverine and savannah villages where no such developments have taken place.

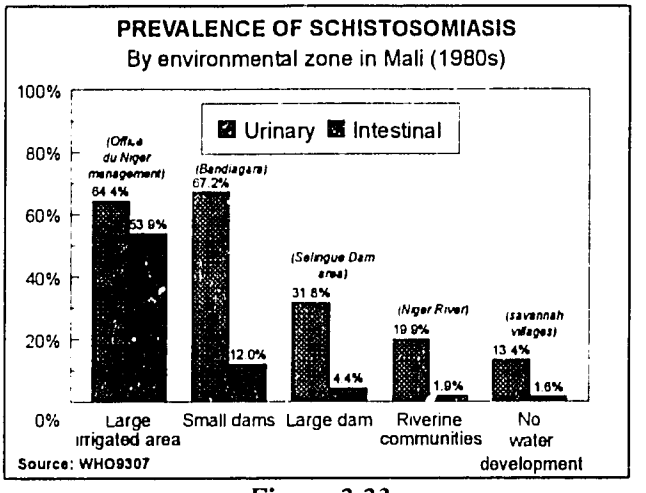


Figure 2.23

A national schistosomiasis control program has been in operation since 1978. The program provides chemotherapy and health education for local populations at risk and coordinates improvements in water supply and application of molluscicide in focal areas. Prevalence has been demonstrably reduced in areas where the program is active (100 villages around 1993)(WHO9307). The program is financed and supported by the German Society for Technical Cooperation (GTZ)(IDS9101).

Distomiasis (human). The presence of antibodies in persons in the central area of the Niger delta shows that human fascioliasis is a reality in Mali. *Fasciola gigantica*, the species affecting livestock, is probably the parasite concerned. This parasitic disease in humans is greatly underestimated, obscured by schistosomiasis (MTM9101).

Vaccine-Preventable Diseases

Vaccine-preventable diseases account for at least 15-25 percent of reported child deaths, according to the tallies illustrated in figures 2.6-2.8 above. Measles is the deadliest of these afflictions, but other diseases such as tetanus and tuberculosis also have enormous impact among children as well as adults. Case totals reported to the WHO's Global Programme for Vaccines (GPV) between 1989 and 1994, presented in table 2.1, are a better indication of how little we know about actual incidence, for complete annual reporting occurred for only three of the six diseases, measles, tetanus, and polio. Rises and falls in these figures may thus better reflect fluctuations in reporting than actual changes in incidence.

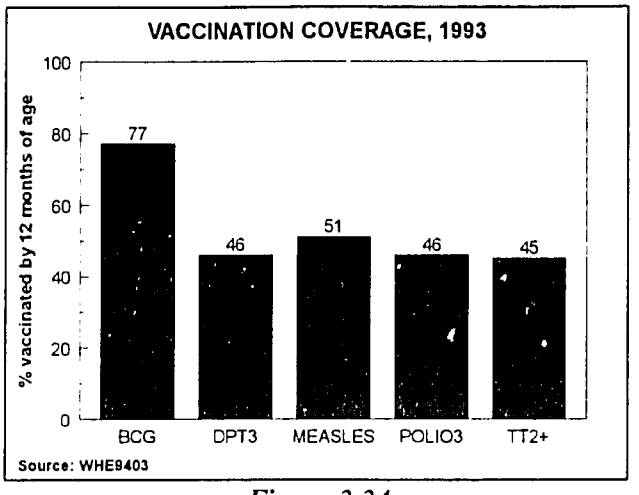


Figure 2.24

According to WHO/GPV, vaccination coverage by age one stands at about fifty percent for each of the four major childhood vaccines except BCG, for which reported coverage is 77 percent (see figure 2.24). Coverage of pregnant women to prevent neonatal tetanus has reached a comparable level. These coverage rates represent a marked improvement over those reported in the recent past (see figures 2.27-2.31 on following pages). Figure 2.25 compares Mali's current level of immunization for DPT3 with median values reported for sub-Saharan African nations, low-income nations, and all developing countries. Although Mali has lagged in the past, its current reported level of 46 percent coverage is approaching the median value among sub-Saharan African nations. Mali's second DHS, scheduled for late 1995, promises to reveal much-needed data on different levels of vaccination coverage among various demographic groups.

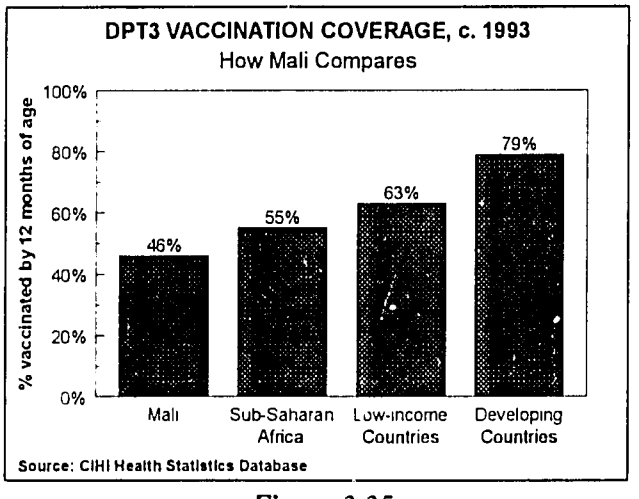


Figure 2.25

Unlike more recent DHSs conducted elsewhere, Mali's 1987 DHS only recorded vaccination coverage data for children with vaccination cards. In addition, the DHS report published for Mali in 1989 does not provide vaccination coverage rates at one year of age, as is now customary, but reports rates for all children up to five years of age. Despite these sampling and reporting techniques, which would seem to favor higher coverage rates, the 1987 DHS found complete coverage with all four childhood vaccines

MALI: REPORTED ANNUAL INCIDENCE OF VACCINE-PREVENTABLE DISEASES

Disease	1989	1990	1991	1992	1993	1994
Measles	3,605	1,388	13,473	7,830	10,595	2,183
Pertussis	1,047	430	230	-	-	-
Total Tetanus	617	365	350	311	40	-
Neonatal Tetanus	230	203	171	73	40	18
Tuberculosis	1,626	-	-	-	3,309	-
Poliomyelitis	178	63	145	63	26	6
Diphtheria	13	5	6	-	-	-

Source: WHO9401 (for 1989, Polio through 1991), WHO9511, Reported Cases as of Sept. 18, 1995

Table 2.1

among children ages one through four at just 16 percent nationwide. The main reason for this low figure is that none of the 1,575 rural children whose mothers were surveyed had received the recommended third injection for polio (Polio3) or diphtheria, pertussis, and tetanus (DPT3). Children found to have complete coverage were thus exclusively from urban areas (DHS8907). A subsequent DHS report calculated Mali's 1987 vaccination coverage data for children at one year of age. DPT3 coverage rates for each of the three regions outside of the capital (see figure 2.26) were the absolute lowest among 148 sub-national figures for 28 countries surveyed by DHSs through 1989 (DHS9415). Again, it should be noted that the sample only included children with vaccination cards.

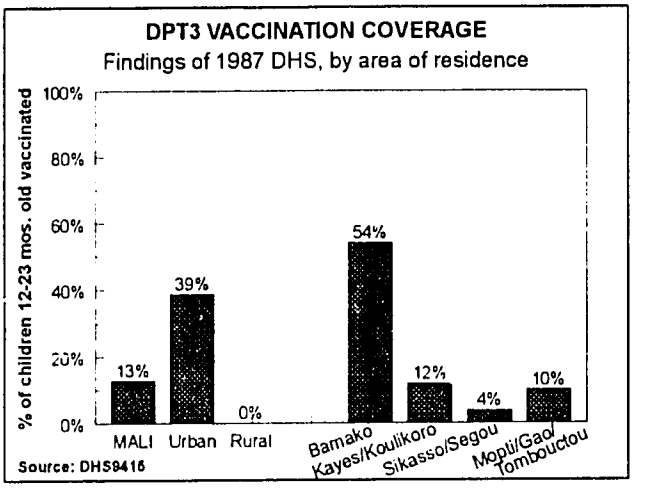


Figure 2.26

Measles. Measles is a highly communicable viral disease which appears both endemically and epidemically in Mali. The most recent massive epidemic occurred in 1991 in several regions throughout the country (AID9508). Measles has its most severe impact in infants and malnourished children. The WHO estimates that roughly six percent of measles cases in Mali are fatal (WHO9103). While the impact of non-fatal measles infection is not very well understood, long-term disabilities known to follow measles infection include blindness and malnutrition (OUP9301). Annual reported incidence of measles in Mali for the years 1989-1994 appears in table 2.1. Reported cases hit a high of over 13,000 in 1991, but actual totals are undoubtedly considerably higher.

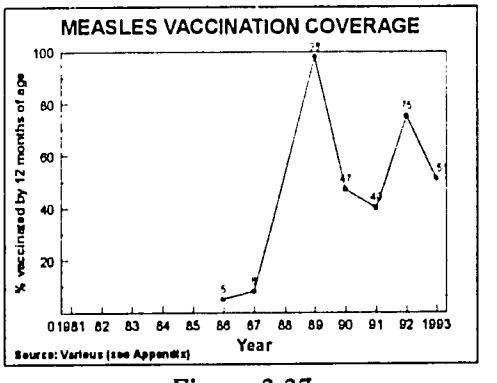


Figure 2.27

Levels of vaccination coverage against measles have fluctuated greatly in recent years but reportedly dropped to just over fifty percent in 1994 (see figure 2.27). One of the greatest challenges to expanding coverage in Mali is the absence of a working cold chain to safely transport and store vaccines in rural areas. A study in a rural area in Mali in about 1990 tested the feasibility of using a freeze-dried vaccine with combined antigens for measles and yellow fever. The test reportedly demonstrated the satisfactory immunogenicity and safety of the combined vaccine, spurring hope that it could help to improve immunization coverage in Mali (BSP9102).

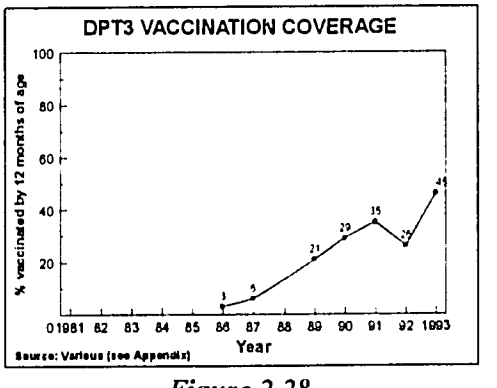


Figure 2.28

Diphtheria. The epidemiology of diphtheria in the developing world is poorly understood. Although the causative organism is widely present in Africa, there are few reported cases of this childhood disease. Coverage rates for the DPT vaccine were minimal in Mali throughout the 1980s and have only recently approached the fifty percent level (see figure 2.28). Nonetheless, only 13 cases of diphtheria were reported to WHO in 1989, and even fewer in 1990 and 1991 (see table 2.1). These numbers, and the lack of more recent data, are reflective of the poor state of development of diagnostic and health information systems in Mali.

Pertussis. The majority of cases of the pertussis syndrome, better known as whooping cough, are infections preventable through the DPT vaccine. Although pertussis occurs endemically, it tends to produce epidemics every

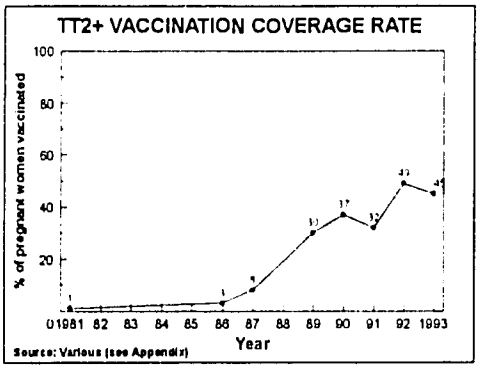


Figure 2.29

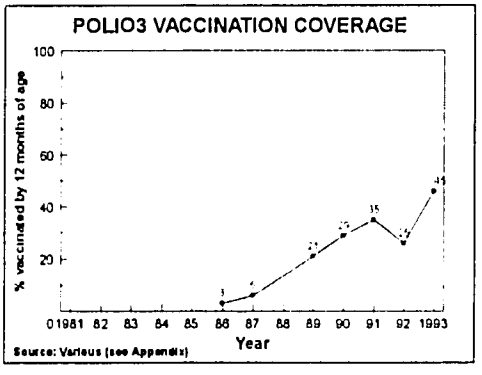


Figure 2.30

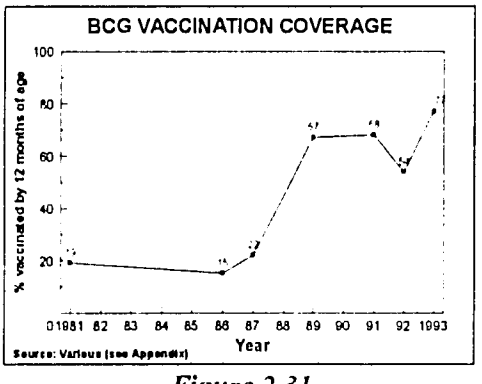


Figure 2.31

three to four years, with up to 90 percent of those at risk developing the disease. Incidence is generally higher among girls than boys. The case-fatality rate for pertussis in African nations is typically about one percent, with the highest mortality observed among children under two (OUP9301). Case totals reported from Mali have declined markedly since reaching over 1,000 in 1989 (see table 2.1).

Tetanus. Tetanus is a completely preventable disease caused by contamination of wounds with an anaerobic bacillus. Case totals reported to WHO vastly understate the actual incidence of tetanus and neonatal tetanus (NNT). NNT may be the most underreported lethal infection in the world, for its victims are rarely registered or seen within the formal health care system. After measles, NNT kills more children worldwide than any other vaccine-preventable disease, but routine surveillance systems in most developing countries detect less than five percent of actual cases, according to WHO. Tetanus is also a significant cause of preventable maternal mortality. In Mali, vaccination of pregnant women to prevent NNT began to reach significant levels at the end of the 1980s but still has yet to reach the fifty percent mark, according to WHO (see figure 2.29). The 1995 BASICS document cited a level of 30 percent coverage for NNT in 1990 but reported that coverage had dropped to an abysmal six percent of pregnant women by 1993 (AID9508).

Polio. Although case totals have declined in recent years, Mali is still a relatively high-incidence country for polio. As with other vaccines, coverage against polio in Mali has been among the lowest in the world. The most recent report by WHO/GPV that coverage with the recommended three doses reached a level of nearly fifty percent in 1994 (see figure 2.30) is encouraging. However, with more than half of Mali's children still susceptible to contracting the disease, and with neighboring countries such as Niger exhibiting even lower rates of coverage, there is little chance that polio can be eradicated in West Africa any time in the near future.

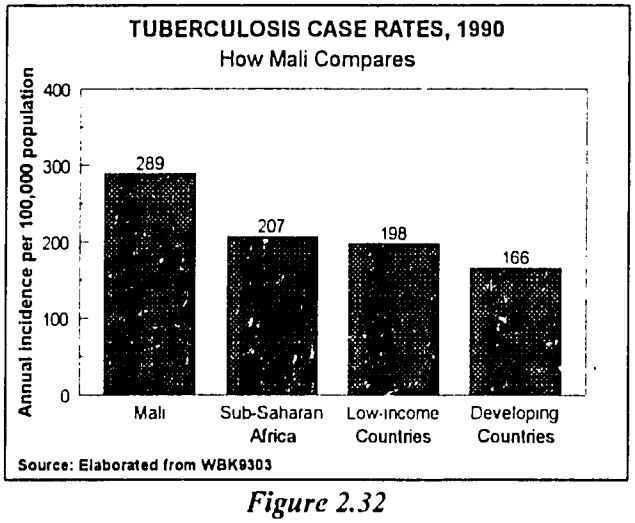


Figure 2.32

Tuberculosis (TB). In the developing world, TB is generally concentrated in the adult age groups (OUP9301). As illustrated in figure 2.32, the annual incidence rate estimated for Mali, 289 cases of TB per 100,000 population, far exceeds median levels among African nations as well as developing nations in general. This figure implies an annual total of at least 25,000 cases, nearly ten times higher than the number of cases reported to WHO in 1993 (see table 2.1). In 1989, two-thirds of children at age one had reportedly received the BCG vaccine to prevent tuberculosis. After a brief decline, coverage climbed to 77 percent in 1993, according to WHO/GPV (see figure 2.31).

Leprosy. The BCG vaccine has also been shown to be partially effective in preventing leprosy. In mid-1995, WHO reported that Mali had 5,626 registered cases of leprosy. Based on this figure, Mali's prevalence rate of 5.55 registered cases per 10,000 inhabitants is significantly higher than rates found for most African countries but comparable to those in two neighboring countries, Guinea (5.68) and Niger (4.74)(WHO9508). These latest figures for Mali represent a substantial decline from the 8,000 registered cases and 8.15 prevalence rate reported for 1993 (WHO9507) and 22,121 cases and 23.6 prevalence rate for 1991. Multi-drug therapy (MDT) was introduced in a specialized center in 1981 and became the basis of the national leprosy control program in 1987. Although MDT has reportedly been integrated into Mali's primary health care (PHC) system since 1985, coverage of leprosy patients through MDT was minimal into the early 1990s (WHO9105). More recently, however, coverage levels have grown dramatically, rising to 72 percent by 1995. A cumulative total of 8,583 leprosy patients had been cured through MDT by 1995, according to WHO (WHO9508).

Nutritional Deficiencies

Throughout sub-Saharan Africa, malnutrition and disease are closely interrelated contributors to high morbidity and mortality. Their effects are mutually reinforcing: most diseases interfere with their victims' ability to take in or retain nutrients, on one hand, while poor nutritional status, in turn, increases susceptibility to disease. The cycle often begins before a child's birth, for poor nutritional status and illness among mothers are primary contributors to low birthweights, which are a major risk factor for infant and child mortality. Poor nutritional status can result not only from protein-energy malnutrition (PEM) but also from deficiencies of certain micronutrients. According to a recent report by the World Bank, Mali is one of 14 sub-Saharan African countries where disorders from all three major micronutrient deficiencies – Vitamin A, iodine, and iron – are significant public health problems (WBK9405).

According to the Human Development Report 1994, roughly ten percent of Malian babies were born with low birthweight in the late 1980s, a share which is actually far better than the regional figure given for sub-Saharan Africa (14%)(UND9402). In Mali, infants are often healthy and well-fed during their first four to six months. However, reluctance among mothers to supplement their breastmilk during a child's first year as well as the limited quality and quantity of breastmilk in the harsh environment of rural Mali, especially in women having already borne several children, commonly lead to nutritional deficiencies among infants (MAL9001). As a child grows older, bouts with malaria, measles, diarrhea, intestinal infections, and other diseases can further jeapordize the child's nutritional status.

The 1987 DHS obtained data on children's nutritional status based on the relationships between weight, height, and age. Measuring for low height for age, or "stunting," is a common method for determining the prevalence of chronic, long-term malnutrition. The DHS found that nearly one-quarter of Malian children suffered stunting and one-tenth suffered severe stunting (see figure 2.33). Chronic malnutrition was higher in rural areas than urban and increased with distance from the capital. In the distant regions of Mopti, Gao, and Tombouctou, which are predominantly desert zones, the share of children suffering stunting exceeded thirty percent (DHS8907).

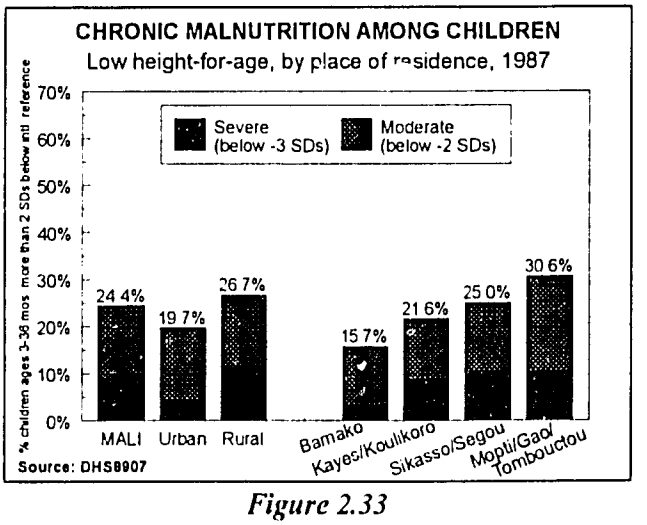


Figure 2.33

A more recent nutritional survey of infants ages 0-36 months in Bamako District (Koulikoro) in 1994 found prevalence rates of 24.5 percent for stunting (low height for age), 16.7 percent for wasting (low weight for height), and 22.3 percent for low weight for age (AID9508). USAID's mission in Mali has recently reported impressive

declines in malnutrition rates among children in various project areas where PVOs have been working to improve nutritional status (see figure 2.34).

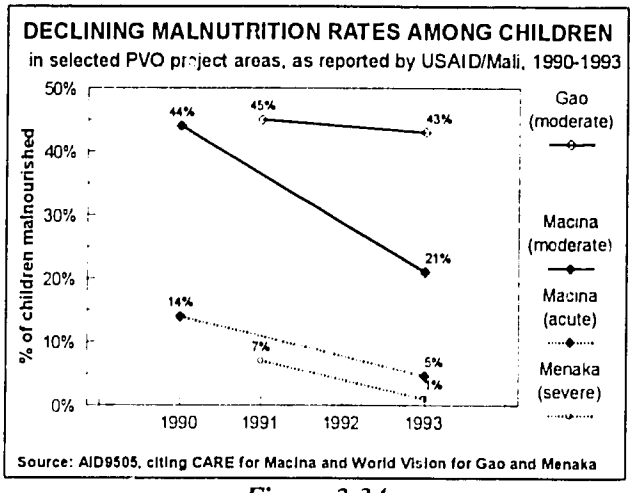


Figure 2.34

Protein-Energy Malnutrition (PEM). PEM results from two mutually-reinforcing causes: infectious diseases and insufficient intake of energy and protein. *Kwashiorkor* is a form of severe PEM occurring in early childhood, typically between the ages of one and three years. It is characterized by edema (excessive fluid in tissues) and failure to grow. Various infections may assist in producing kwashiorkor, such as diarrheal diseases, intestinal worms, and respiratory infections, including tuberculosis and pertussis. These conditions increase the body's need for energy and nutrients and may affect appetite. *Marasmus* is a distinct form of severe PEM usually occurring in the first three years of life. The main cause is a diet severly lacking both in protein and calories. In contrast to kwashiorkor, children with marasmus tend to be under one year old and are visibly thin (ARN8501).

The typical diet in Mali, consisting mainly of bulky, staple foods such as millet, sorghum, rice, and corn, is very low in protein, especially animal protein. Many regions suffer from the *soudure*, a near-famine that prevails just before the harvest when the stocks of food are exhausted (FOF9201). However, overall food consumption levels reportedly exceeded per-capita needs in 1990 (UND9402); subsequent record agricultural production years in the 1990s may help to reduce PEM among children in Mali.

Iron Deficiency (anemia). Iron deficiency, when severe, can result in anemia, a shortage of iron in the blood which reduces physical productivity and children's learning capacity and, by reducing appetite, may diminish children's intake and growth. Malaria is also a major contributor to anemia. Women are particularly susceptible to anemia because menstruation and childbearing raise their need for iron; anemia among pregnant women increases the risk of death from hemorrhage in childbirth. According to estimates published in the World Development Report 1993, nearly two-thirds of pregnant women in Mali suffer anemia, a level far above the median values for sub-Saharan Africa and developing countries in general (see figure 2.35).

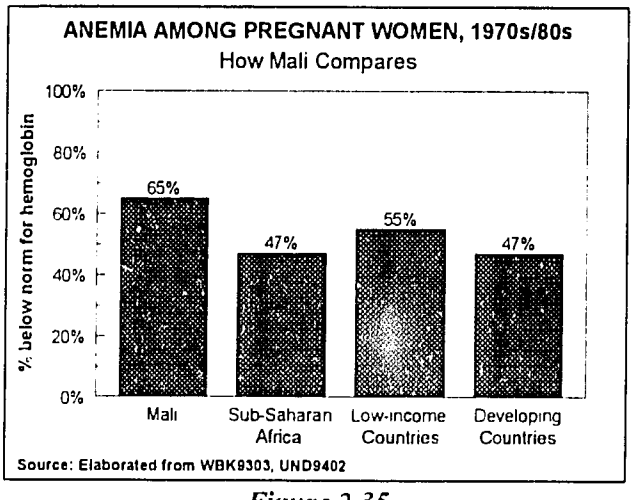


Figure 2.35

Vitamin A Deficiency (VAD). Both diet and disease contribute to Vitamin A (retinol) deficiency in Mali, making VAD a a major public health problem in Mali which frequently results in changes in the physiology of the eyes (xerophthalmia), resulting in blindness. Mangos are the primary source of Vitamin A in Mali but are available only on a seasonal basis. Even if a child's vitamin reserves at a given moment protect him or her from eye disease, onset of an ailment such as measles provokes a depletion of those reserves, creating opthamological vulnerability (MAL9001). Of 18 countries in Africa where VAD has been documented or is suspected to be significant, Mali is classified by the WHO as a "category 1" country, indicating the highest level of public health significance. A four-year national plan was developed in 1988 for the control of vitamin A deficiency among

children 0-6 years of age and pregnant women. This plan specified the regions of Gao, Mopti, Segou, and Tombouctou as having endemic vitamin A deficiency problems. The government has worked closely with Helen Keller International (HKI), CARE, Africare, Save the Children Federation, and World Vision Relief and Development, among others, to address vitamin A deficiency at the community level (AID9218).

Iodine Deficiency (goiter). In Africa, prevalence of iodine deficiency is highest in mountainous and flood-prone areas where iodine-deficient soils prevail. Women and children are the most vulnerable to the serious and irreversible consequences of iodine deficiency (OUP9301). Goiter is a particularly common and grave problem in Mali. Two studies published in the 1990s have shown the effectiveness of innovative interventions against goiter, including the experimental treatment of water with iodine-diffusing materials (see references BSP9103 and APP9201).

Sexually-Transmitted Diseases (STDs)

Data on STDs in Mali are limited. A 1993 study supported by USAID's AIDSCAP project focussed on determining prevalence levels for various STDs among prostitutes. The study found that nearly half of a sample of 122 prostitutes tested positive for HIV but found relatively low levels of infection with gonorrhea and active syphilis (see figure 2.36). According to the U.S Bureau of the Census, which has recently created a database on STD prevalence rates in sub-Saharan Africa, testing of 103 prositutes in 1991 had found much higher prevalence levels for gonorrhea (48%) and syphilis (24%), but the sampling and diagnostic techniques used to arrive at these higher figures are unclear. The 1991 sample also indicated a 7.8 percent prevalence of trichomoniasis, significantly lower than the 13.1 percent prevalence found in 1993. In one of the only published reports on STD prevalence among lower-risk groups, testing among 304 pregnant women in 1991 indicated a 6.7 percent prevalence for syphilis. This rate most likely reflects not only active syphilis but any history of the disease (BUC9502).

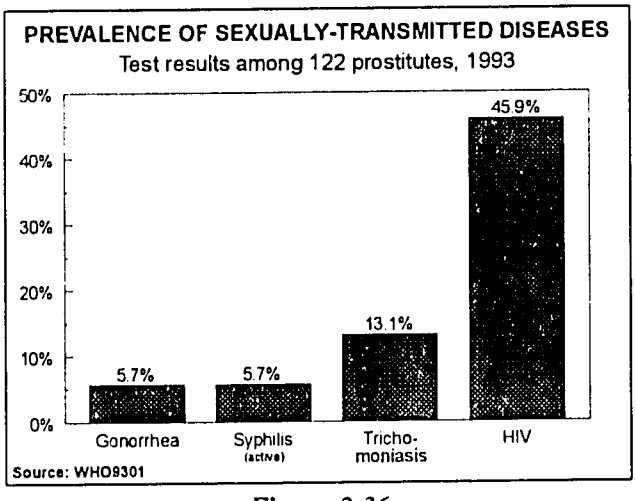


Figure 2.36

HIV/AIDS. As of May 1994, Mali had reported nearly 2100 cases of AIDS to WHO, a figure which represents only a fraction of the true number of cases. HIV infection levels are increasing in Mali, particularly in areas bordering coastal nations to the South. While seroprevalence levels in Mali are higher than in most neighboring countries, they are still well below those found in Cote d'Ivoire (see figure 2.37), Burkina Faso, and the more heavily impacted nations of East and Southern Africa. Unlike most countries affected by HIV, Mali exhibits similar seroprevalence rates in urban and rural areas alike. This phenomenon is likely a result of the strong role played by rural migrants in the spread of HIV infection. More information on the HIV/AIDS pandemic in Mali and efforts to combat it appears in Section IV.

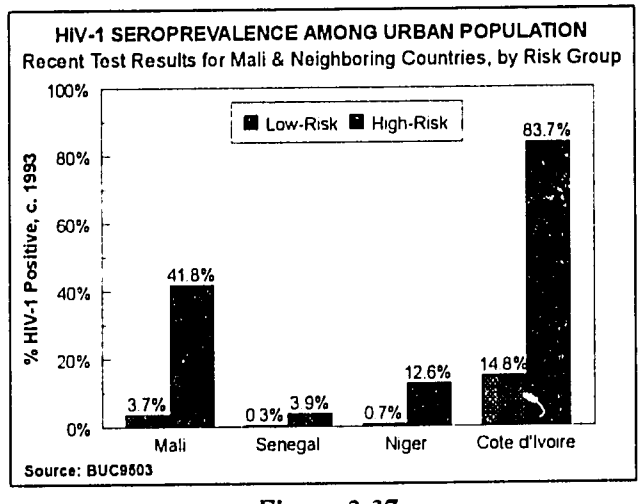


Figure 2.37

III. HEALTH SECTOR ASSESSMENT

Health Care Services

Access and Utilization of Services

According to statistics used by the UN, just 35 percent of the population of Mali lived within one hour's travelling time to modern health services in the late 1980s (UND9402). This is one of the lowest levels of access in the world, standing at just over half of the median level among sub-Saharan Africa nations (see figure 3.1). One of the goals of the World Bank's Health, Population, and Rural Water Supply Project (PSPHR) is to raise geographic access to community health centers from a reported level of 40 percent to 60 percent of the population. Implementers envision the creation or rehabilitation of 120 such health centers to reach this goal (AID9508).

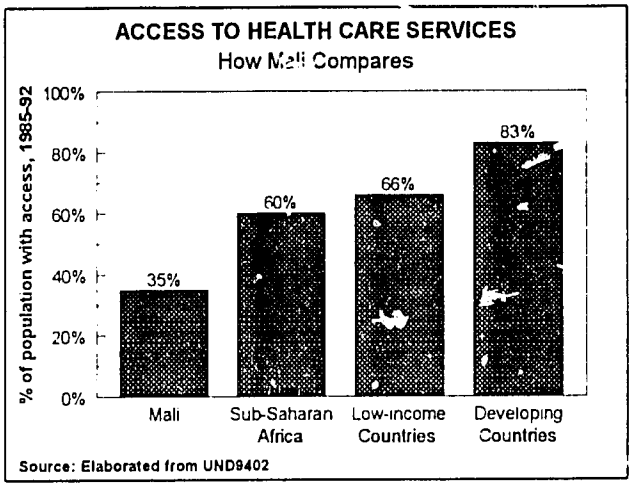


Figure 3.1

Figures 3.2 and 3.3 indicate that utilization of maternal and child health care services is equally low if not worse: according to the Human Development Report 1994, just eleven percent of pregnant women receive prenatal care in Mali and less than one-third of births are delivered by trained medical personnel. The latter figure appears to be derived from the 1987 DHS, which found that 32 percent of births were attended by medical personnel, 30 percent by traditional birth attendants (TBAs), 21 percent by another person, and 13 percent by no one at all. The DHS found that one-third of births were preceded by a prenatal consultation (DHS8907). More recently, the BASICS project reports prenatal consultations at 15 percent and births attended at just 16 percent (AID9508).

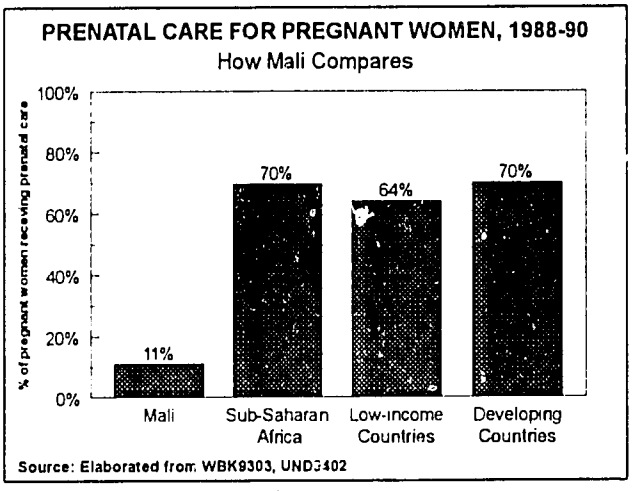


Figure 3.2

BASICS also reports that overall utilization of curative and preventive service is extremely low, calculating an annual rate of 0.3 consultations per person for district-level services. In rural areas, as many as two-thirds of the population may go an entire year without using modern health services. The project attributed these low use levels to a combination of cultural obstacles, limited economic and geographic access, and the perception that service quality is poor, particularly because of the scarcity of modern drug supplies at local-level facilities (AID9508). Low levels of access and utilization of child health services are also indicated by Mali's consistently low levels of vaccination coverage.

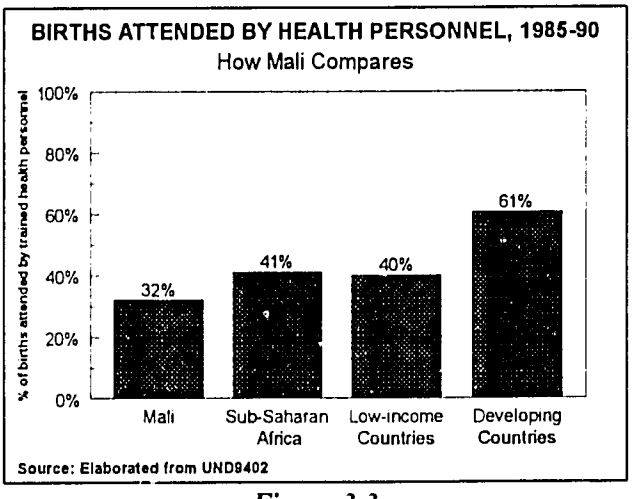


Figure 3.3

Health Care Personnel

According to the Human Development Report 1994, there are roughly 20,000 inhabitants per physician in Mali, a better ratio than found in most neighboring countries (except Senegal), but still far short of the the median of 12,500 among low-income countries (see figure 3.4). The ratio given for nurses – 8,000:1 – points to an even more acute dearth of trained medical personnel. These figures can vary greatly according to the definition used for a given category of personnel. In 1995, BASICS gave a much more favorable population-to-nurse ratio (1,900:1) but reported a staggeringly high figure of 44,000 Malians for each physician (AID9508), which would make Mali's ratio among the worst in the world.

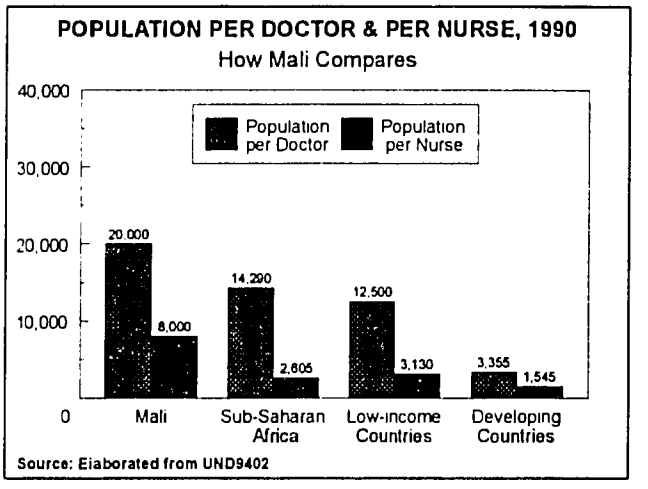


Figure 3.4

As one might expect, health care personnel and facilities are concentrated in the capital and are much more scarce in more remote areas. A health ministry document reported that in 1986 Bamako had 161 physicians and 576 nurses (including state-nurses) while the seven regions ranged from 12-29 physicians and 53-154 nurses each. Population ratios calculated from these figures for Bamako and each region are presented in figure 3.5. Figures provided on hospital beds provided a similar view of the concentration of resources in Bamako, which had 876 beds in 1986, second only to Segou region's 936 beds. While Bamako was calculated to have 13.5 hospital beds per 10,000 inhabitants, with the exception of Segou (7.0) and Gao (14.0), the regions ranged from three to five beds per 10,000 inhabitants (IDS9101).

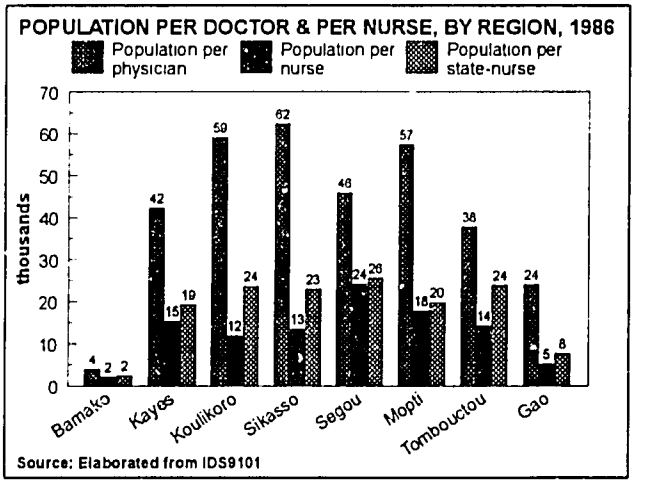


Figure 3.5

Public Sector Services

The primary public health care provider in Mali is the Ministry of Health (MOH). The Social Security Institute (INPS), which covers the health care needs of only three to four percent of the population, was operating three preventive clinics and 15 medical centers in the late 1980s. The armed forces also have their own health services (WHO8901). A parastatal enterprise, the People's Pharmacy of Mali (PPM), once held a monopoly on drug supply but now primarily operates outlets supplying MOH facilities with essential drugs (AID9326). Another autonomous parastatal, UMPP (*Usine Malienne des Produits Pharmaceutiques*), locally manufactures and distributes drugs and essential health goods such as ORS packets (AID9508,CAB9501).

Ministry of Health. The MOH – officially *le Ministère de la Santé, de la Solidarité et des Personnes Agées* – provides curative and preventive public health services in urban and some rural areas. Service delivery is said to be constrained by insufficient financial, material, and human resources as well as institutional divisions fostering rivalries and confusion about responsibilities (AID8804). Within the larger ministry are the National Directorate of Public Health (DNSP) and the National Institute for Public Health Research. The DNSP includes the Division of Family and Community Health (DSFC), the Division of Epidemiology (DE), the Division of Health

Administrative Levels of Mali's Health Care System			
Level (# of units)	Health Unit	Titular Head	Facilities
1. National (1)	Ministry of Public Health	Minister of Health	Natl. Hospitals (3), Specialized Services
Republique	*Ministère de la Santé, de la Solidarité et des Personnes Agées*		*Hôpitaux nationaux*
2. Regional (8)	Regional Directorate of Public Health	Regional Director	Regional Hospitals (6)
Région	*Direction Regional de la Santé Publique et des Affaires Sociales*		*Hôpitaux régionaux*
3. District (49)	District Health Service	District Physician	Dist. Health Ctrs., Secondary Hospitals(4)
Cercle	*Assistance Medicale*	*Medecin Chef*	*Centre de Santé du Cercle (CSC)*
4. Sub-district (286)	Dispensary	*Conseil de gestion de santé*	Dispensaries, HealthCtrs, Maternity Ctrs
Arrondissement	*Dispensaire*		*Dispensaire, Centre de Santé d'A. (CSA)*
5. Village (20-40 per sub-district)		*Conseil de gestion de santé*	*Centre de Santé Communautaire (CSCOM)*
Niveau communautaire			
Source: MAL9001, updated with AID9508			

Table 3.1

Care Services (DS), and the Division of Public Hygiene and Sanitation (DHPA), as well as several specialized services. Within each region, the MOH is represented a Regional Directorate for Public Health and Social Affairs. At each local level is a management council known as *Conseil de Gestion* (AID9508)

Table 3.1 provides a simplified overview of the public health care system. At the most basic level, village health centers and drug stores are staffed by village health workers or traditional birth attendants (TBAs). In some cases, groups of villages have rural maternity centers and dispensaries staffed by auxiliaries and trained TBAs. At the subdistrict level, professional nurses manage health centers. At the district level, principal health centers operate along with either a district hospital or an attached surgical unit. More complex curative care is provided in regional and national hospitals. The three national hospitals are Point G, Gabriel Touré, and Kati. Also at the national level are specialized services for blood transfusion, dermatology and opthamology (SMP9201,AID9508).

Public hospital facilities are generally poorly maintained and underutilized. Hospitals outside of the capital suffer particularly acute shortages of supplies and typically lack modern, functional equipment (CAB9308). Overall hospital bed occupancy rates are particularly low, averaging only about 37 percent between 1983 and 1986. In this period, the only hospital with over half of its beds occupied was Sikasso Hospital, which was the second most frequently visited hospital in the country after Gabriel Touré (WHO8901).

For most of the rural population, the closest MOH outpost is a dispensary which may or may not have drug supplies, depending on allocations from the district health center. Periodic exhaustion of supplies is responsible for regular shutdowns of dispensaries and decreased utilization of district health centers, despite the presence of a physician and qualified nurses (MAL9001). Donor agencies and non-governmental organizations (NGOs) have spearheaded efforts to improve local services in rural and urban areas alike through community management and financing of health centers and pharmacies. According to USAID/Mali, the number of locally-financed village health centers staffed with trained personnel rose from just three in 1989 to nearly 60 in 1992, and was projected to double again by the end of 1994 (AID9326).

Private Sector Services

The private health sector includes for-profit services under formal, clandestine, and traditional providers as well as non-profit activities under international PVOs and local NGOs. Also in the formal for-profit sector are private pharmacies, including 300 former PPM facilities which have been converted to private ownership following the break-up of the parastatal drug monopoly. Private pharmacies now import and distribute all non-essential drugs (AID9326).

Traditional medicine makes up a significant segment of the private health care sector in Mali and receives offical recognition through the National Institute on Pharmacopeia and Traditional Medicine. For rural residents in particular, traditional healers and herbal medicines are the primary recourse for treatment of illness. A 1982 study by the Harvard International Institute for Development (HIID) determined that traditional medicine served as the only recourse for 80 percent of the population. One estimate of the role played by TBAs claims that they attend 90 percent of all births, though the figures presented above would dispute this (MAL9001). In any case, UNICEF's recent estimate of access to modern health services implies that 65 percent of the national population has access only to traditional medicine, if any at all (UNI9401).

With the gradual lifting of government restrictions on private medicine and the general failure of the public health care system, modern private health services have begun to flourish in Mali. In 1987, there were reportedly 52 private dispensaries operating in Mali, including 26 run by NGOs as well as some factory-based services (IDS9101). Private medical practice had been forbidden until 1985; in 1989, there were still few doctors with wholly private practice but many government health workers who were permitted to practice privately on a part-time basis. The bulk of private practice continued to be clandestine, conducted by unauthorized public health personnel or by persons lacking any formal qualifications (WHO8901). In the meantime, formal for-profit services have been gradually expanding, according to USAID/Mali, which reported nine private clinics (all in Bamako) operating in 1990, 41 in 1992 and 116 in 1993 (AID9505). A multi-donor program promoting the transfer of medical practitioners from the MOH to private practice secured voluntary retirement of over 100 government physicians by 1993 (AID9326).

According to USAID/Mali, there has also been a proliferation of semi-private, non-profit community health centers in Bamako since 1993. In rural areas, many more communities have begun to construct their own non-profit health centers with some assistance from international donors. At the end of 1994, USAID was supporting five functioning community health centers, assisting twelve more which had not started operations yet, and was planning to assist a total of 120 by the end of 1995. Mali's first association of community health centers, the National Federation of Community Health Associations (FENASCOM), was formed in 1994 and has over 100 members (AID9505).

Non-profit health care activities have primarily served to supplement the insufficient modern services provided by the public sector in rural areas. International PVOs with child survival activities funded by USAID include CARE, Save the Children Federation (SCF-US), World Vision, Plan International, and Africare. These five PVOs are organized into a "Child Survival Pivot Group" which also includes about 60 Malian NGOs (AID9508). Some of the other major PVOs working in the health sector in Mali are Medecins Sans Frontieres (MSF) of Belgium, with projects in Gao and Tombouctou, Medecins du Monde (MDM), active in Banakass and Koro, Association Française des Voluntaires du Progres (AFVP), SCF-UK, and Alliance Mission (SMP9201, AID9508).

Health Care Financing

The World Bank's World Development Report 1993 reported that total expenditures on health amounted to 5.2 percent of Mali's Gross Domestic Product (GDP) in 1990, one of the highest levels in sub-Saharan Africa. Figures 3.6 compares this total to the average levels for sub-Saharan Africa and for developing countries in general. Mali's higher total is largely due to much greater expenditures of private funds on health, estimated by the Bank at 2.8 percent of GDP, the third-highest in the region (WBK9303).

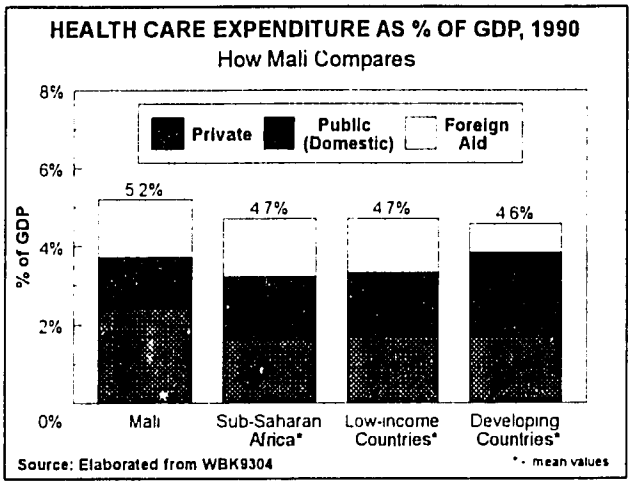


Figure 3.6

Sources of Funding for Health

As indicated in figure 3.7, private funds accounted for 46 percent of total health spending, while domestic public spending provided just under 25 percent. Official foreign aid for health amounted to $36 million, over one-quarter of the estimated $130 million spent on health (WBK9303). Figures 3.10 and 3.16 on the following pages provide earlier, more detailed assessments of each sector's share of funding for recurrent, capital, and total health expenditures in 1986.

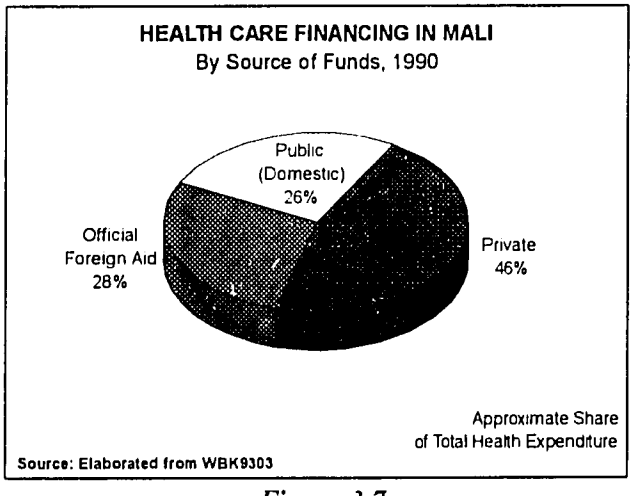


Figure 3.7

Foreign Aid. Figures 3.8 and 3.9 provide comparisons of Mali's estimated level of foreign aid for health in 1990 with those found for developing countries in general. Surprisingly, both as a share of total health spending (28%) and calculated as a per-capita level ($3.93), donors' levels of contribution to the health sector in Mali are equivalent to the median value among all sub-Saharan nations (WBK9303).

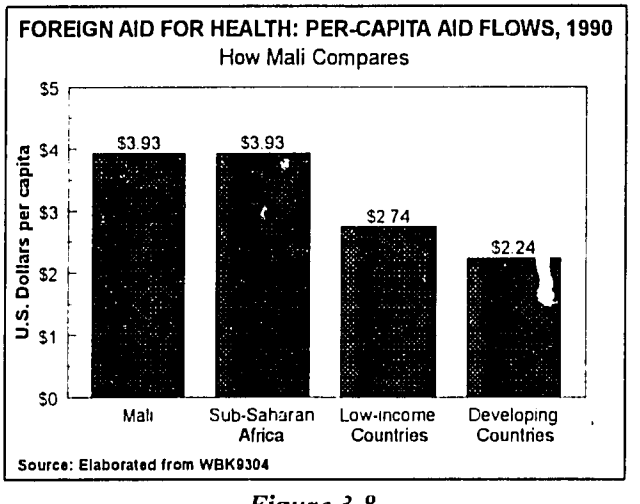


Figure 3.8

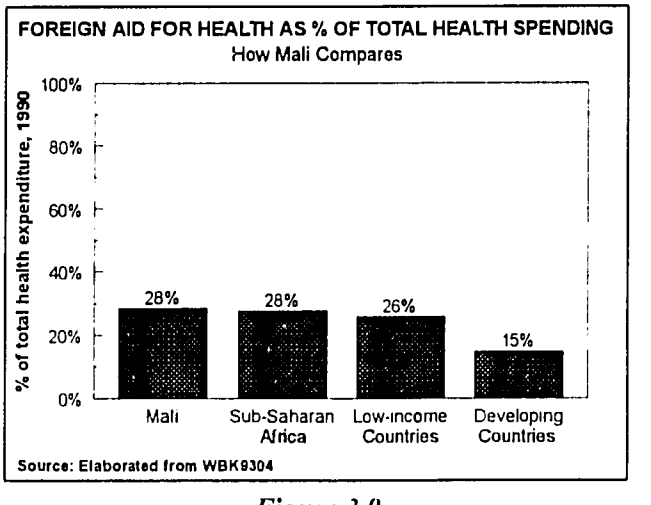


Figure 3.9

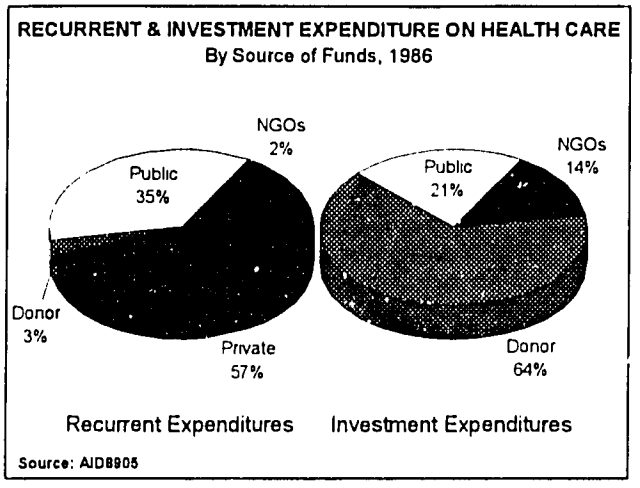


Figure 3.10

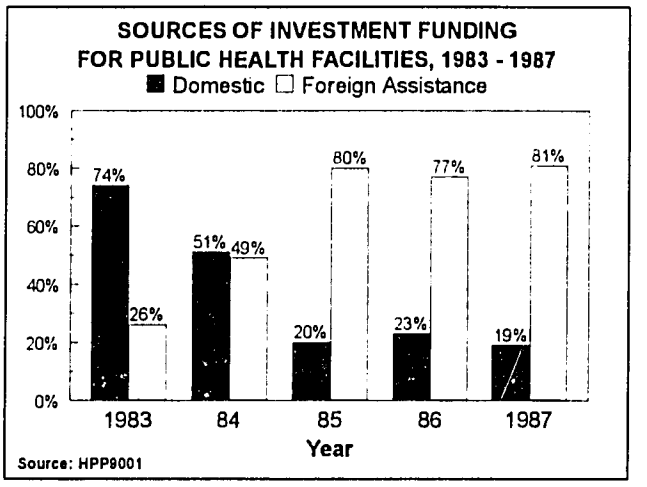


Figure 3.11

In addition to providing a significant level of recurrent funding for health care, foreign aid played an increasingly greater role in financing development costs at public health facilities in the 1980s, rising from a one-quarter share in 1983 to over 80 percent in 1987 (HPP9001)(see figure 3.11). As indicated in figures 3.10 and 3.16, external contributions to recurrent funding were estimated at around three percent of total recurrent health costs in 1986.

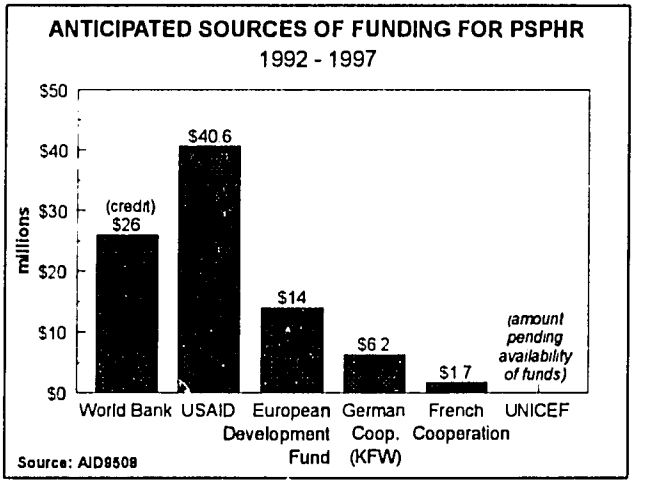


Figure 3.12

Current donor activities in the health sector are largely coordinated through the World Bank's Health, Population, and Rural Water Supply (PSPHR) project. Anticipated funding levels to be carried by specific donors for activities planned under the project for 1992-1997 are illustrated in figure 3.12. In addition to these agencies and organizations, WHO contributes through diverse activities in 13 distinct programs (investing $1.5 million in 1994), UNDP supports immunization efforts ($510,000 in 1994), the Canadian government assists with Mali's essential drugs program (along with the European Community, the French government, and UNICEF), and various other bilateral organizations participate in specific regional areas (e.g., Italian Cooperation, GTZ in Mopti, Dutch Volunteers in Segou, Swiss Cooperation in Sikasso) (AID9508,AID9509).

Domestic Government Funding. Figures 3.13 and 3.14 on the following page depict changing levels of public spending on health in the 1980s. For most of the decade, health care commanded less than three percent of total government expenditures, reaching a low of just 1.7 percent in 1985, according to the International Monetary Fund (see figure 3.13)(IMF9300). Another source places the budget of the MOH at just under four percent of the total government budget in 1987, noting a sharp and steady decline since the early 1970s, when the health sector's budget share started near nine percent (HPP9001). Mali's level of per-capita public health expenditure is one of Africa's lowest, falling to just $1.20 in 1984 and 1985, according to the World Bank (see figure 3.14)(WBK9203). Although more recent data on expenditure levels is not available, the BASICS project reported in 1995 that the Government of Mali is allocating 5.6 percent of its budget to the health sector (AID9508). Actual expenditure levels may be substantially lower.

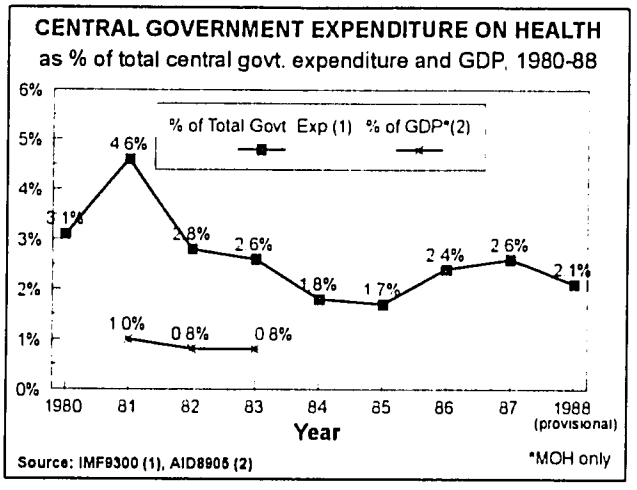


Figure 3.13

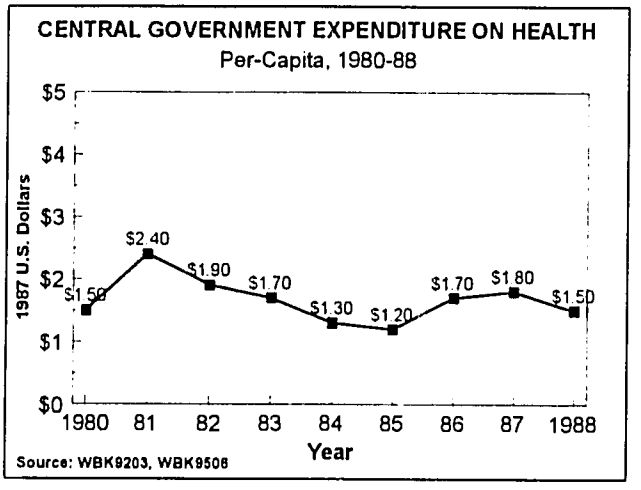


Figure 3.14

Cost Recovery. Because the government of Mali has historically followed a socialist perspective on the provision of public services, MOH policies to recover costs through user fees have only recently taken shape. The success of these policies has been limited. Health care facilities at all levels collect and retain fees to apply to recurrent costs. Hospital inpatients desiring various amenities can pay higher charges. Exemptions apply to pupils, students, health personnel and their families, civil servants, and patients with certain diseases (tuberculosis, leprosy, psychiatric problems). Further exemptions are widespread and are suspected to serve the private gain of health care workers (WHO8901).

After the first introduction of fees in 1983, experience at health centers produced mixed results. Facilities varied greatly in their ability to collect funds, fee levels were far from uniform, revenue generated was insufficient to restock pharmaceuticals, and uncertainty remained regarding the equitability of the fee system (AID8804). Charges at hospitals more closely followed rigid fee scales set by government decree. At best, income from fees would permit facilities to recover the costs of drugs and supplies. At Hopital du Point G, statutory exemptions reportedly applied to 70 percent of inpatient days in 1986. By the end of the 1980s, the results of cost recovery initiatives in public health units had been negligible (WBK8801,WHO8901).

According to a recent report by the World Bank, 46 districts in Mali now have special pilot programs in place in order to supplement diminishing central government expenditures on local health care systems. Following the lead of the international Bamako Initiative, public services retain fees in order to improve drug availability and quality of service. Exemption policies are determined locally but reportedly apply to 30-50 percent of patients. Revenues cover the full cost of drugs purchased, but due to the scarcity of drugs in the public health system, fees collected are primarily for services, reportedly covering just 1-2 percent of recurrent expenditures (WBK9503). Community-financed health centers (estimated to number nearly 100 in 1993) and pharmacies have been promoted in both the public and private sectors by international donors and NGOs (AID9326).

Social Insurance. The *Institut National de Prevoyance Social* (INPS) covers curative and preventive health care costs incurred by enrolled private and public sector employees and their families. INPS provides free preventive care through its own services, though clandestine charges may apply. In 1986, INPS was reported to have 60,000 members and cover a total of up to 250,000 people, or 3.3 percent of the national population, with 2.1 percent of total recurrent expenditures. Coverage is financed through employers' contributions, equal to two percent of salaries, and premiums which vary according to salary levels (WBK9004). Administrative expenses consumed roughly half of contributions in the mid-1980s (WHO8901).

In addition, government ministries are expected to pay 80 percent of their employees' health care costs. While this scheme was designed to cover an additional 200,000 employees and their families (in 1986), in practice the ministries rarely pay their share and the costs of treatment are absorbed as a loss by government health facilities, (which typically grant public sector employees a full or partial exemption from their share of the fee)(WBK9004).

Local Government Funds. District and other local level health services generally depend on central government funds and some cost recovery receipts to cover expenses. On occasion, revenues from special levies at the district level are used for local social programs, including health initiatives. At the sub-district level, the local population may occasionally raise capital for special health projects such as a maternity clinic (MAL9001). Under the World Bank's PSPHR project, participating health districts are expected to reserve at least seven percent of local taxes for implementation of local health plans (AID9508).

Allocation of Public Health Funds

Public finance in Mali is highly centralized: revenues and expenditures of regional administrations fall within the national government's budget and are subject to central control. Thus expenditures by regional directorates of health are subject to the discretion of central-level MOH decision-makers. District-level authorities have control over revenues from special levies and cost recovery programs, but district health services generally do not control any significant discretionary funds (MAL9001).

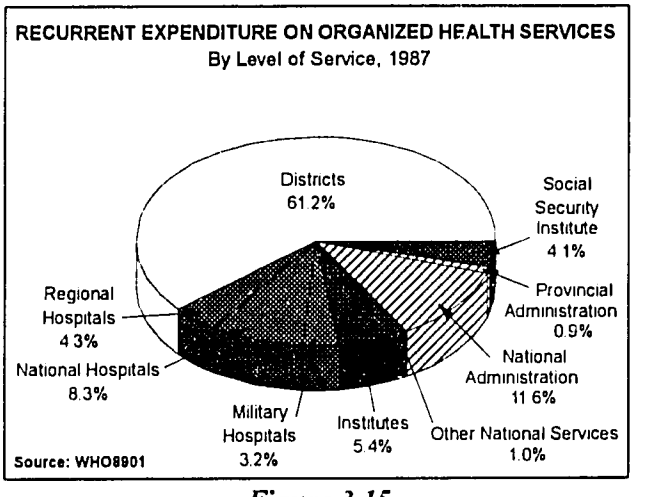


Figure 3.15

Recurrent costs absorb the vast majority of total health expenditure by the govenrment of Mali, averaging a share of 92 percent during the period between 1983 and 1987 (HPP9001). Figure 3.15 illustrates the distribution of public expenditure for recurrent health costs in 1987 by level and type of facility. Expenditures by the government of Mali have historically been dominated by wage and salary payments. In the health sector, personnel costs absorbed 64 percent of recurrent funding in 1986. This proportion naturally limits the amount of funds available for drugs, supplies, equipment and other recurrent needs (MAL9001).

Drugs are typically in short supply and must generally be purchased by patients on the private market; when public stocks of drugs are depleted, utilization of government health services has been shown to decrease accordingly (MAL9001). Essential drugs are distributed within the public health system through the PPM, which until 1991 had a monopoly on all drug imports and distributed essential and non-essential drugs through its own outlets as well as private pharmacies (AID9326). Intended supply through MOH facilities has been hindered in the past by a lack of MOH credits (AID8804); contracts between the MOH and the PPM have failed to ameliorate the situation (AID9508). In the past, poor management at the central and local levels of PPM was blamed for recurring drug shortages. Because PPM was unable to access generic drugs or to import sufficient quantities of drugs at wholesale prices, its prices were often three to four times higher than those of NGOs and international organizations permitted to supply drugs outside of the parastatal monopoly (SMP9201).

The social security institute and the armed forces also directly import drugs for their health care systems (WHO8901). Illegal imports supplying the private sector commonly enter the country from Algeria, Cote d'Ivoire, Guinea, Senegal, and Mauritania (HPP9001). Non-essential drugs are now imported and distributed by private pharmacies, many of which were converted from PPM facilities (AID9326), but the private sector has yet to contribute significantly to the supply of affordable essential drugs (AID9508).

Private Financing

Previous estimates of the private sector's share in total health spending in Mali have been even higher than the figure of 46 percent arrived at by the World Bank. The WHO, for example, has cited estimates of private expenditure on health at over half of total health spending in the late 1980s (WHO9304). A detailed study published in 1989 found that private funds accounted for nearly three-quarters of recurrent expenditures, including payments for pharmaceuticals (60 percent of the total) and traditional medicine (10 percent)(see figure 3.16)(WHO8901). Private expenditures are made almost exclusively on a fee-for-service basis; no private health insurance is known to exist in Mali (WBK9004). According to USAID/Mali, community financing of health services, both for initial construction and to support operation costs, is becoming increasingly important in the 1990s in Bamako and throughout Mali's eight regions (AID9505).

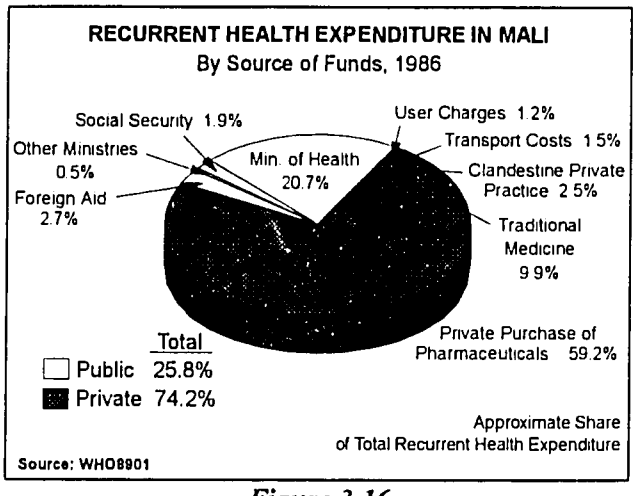


Figure 3.16

IV. HIV INFECTION AND AIDS

Although Mali has yet to experience an epidemic on the scale of many eastern and central African nations, AIDS is a major health concern. Figure 4.1, charting the growth in cumulative cases reported since 1988, indicates that nearly 2,100 cases had been reported by mid-1994. A recent report by the World Bank notes that most if not all of these cases were reported from Bamako's two national hospitals and that the actual total number of cases is certain to be considerably higher. The Bank estimated that Mali had a cumulative total of over 17,000 AIDS cases and over 250,000 current HIV infections in 1994. Cumulative cases were projected to swell to over 60,000 by the end of 1997 (see figure 4.2) (WBK9502). Despite the limited degree of case reporting, the 1993 incidence rate of 6.6 new cases reported per 100,000 inhabitants is significantly higher than rates found in all neighboring nations apart from Cote d'Ivoire (28.3) and Burkina Faso (30.3 for 1992)(WHO9501).

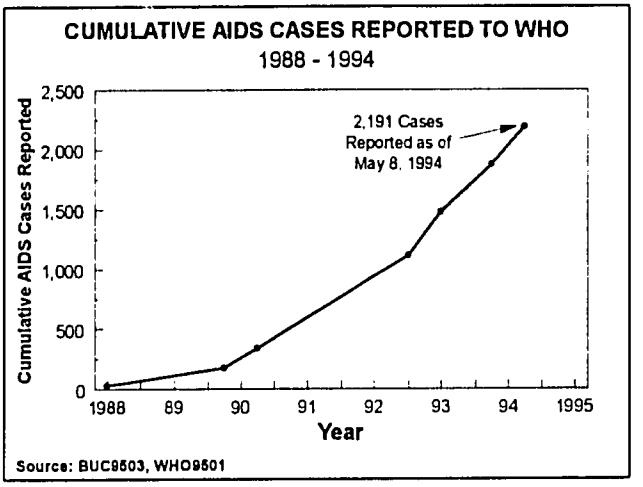


Figure 4.1

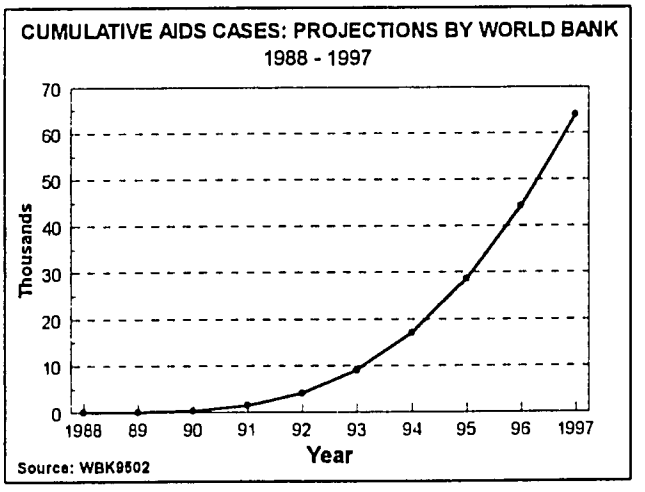


Figure 4.2

Results of HIV seroprevalence studies provide a somewhat better indication of HIV/AIDS trends. The latest results, drawn from the U.S. Bureau of the Census HIV/AIDS Surveillance Database and illustrated in figure 4.3, indicate overall seroprevalence at around three percent. HIV seroprevalence among higher-risk groups has been found to exceed 40 percent. As indicated above in figure 2.33, both of these rates are somewhat higher than those found in most neighboring countries. The large discrepancy between relatively low levels of HIV infection in most West African nations and the very high rates indicated in Cote d'Ivoire in particular are worrisome for the region as a whole.

Figures 4.4 and 4.5 on the following page illustrate test results among low- and high-risk groups since 1987. Although the data are not as reliable as those selected for figure 4.3, these figures present a fairly clear picture of rising HIV seroprevalence in Mali. As throughout West Africa, both major strains of the virus - HIV-1 and HIV-2 - are present in Mali, but infection with HIV-1 is far more predominant (see figure 4.6). Data gathered by the Bureau appears to indicate that infection with HIV-1 is rapidly expanding in certain groups while HIV-2 is declining in significance.

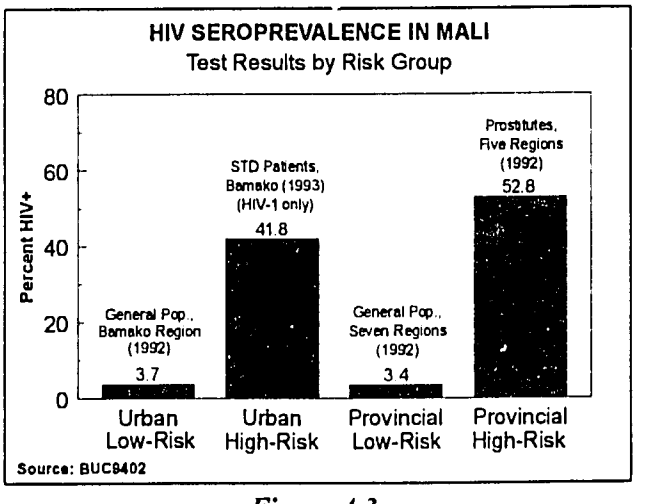


Figure 4.3

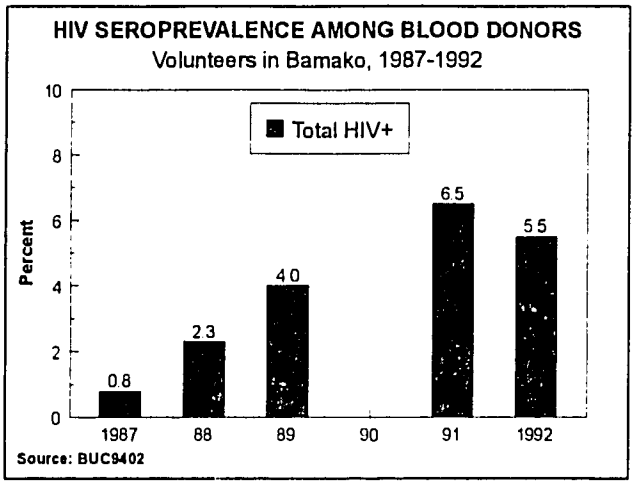


Figure 4.4

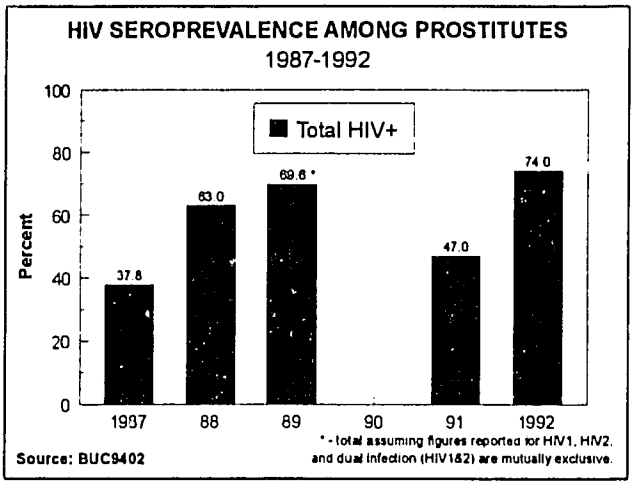


Figure 4.5

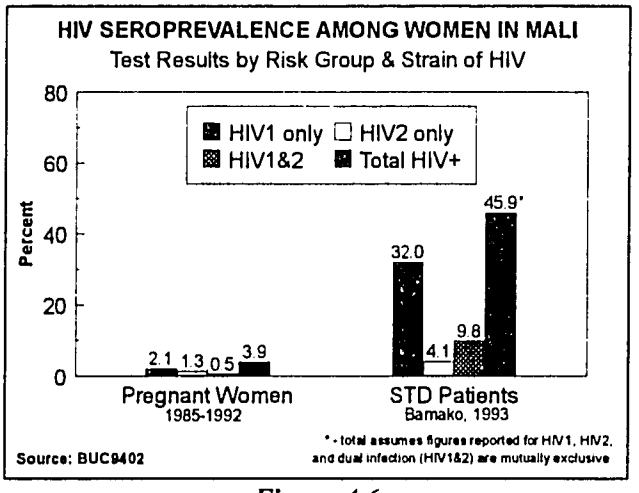


Figure 4.6

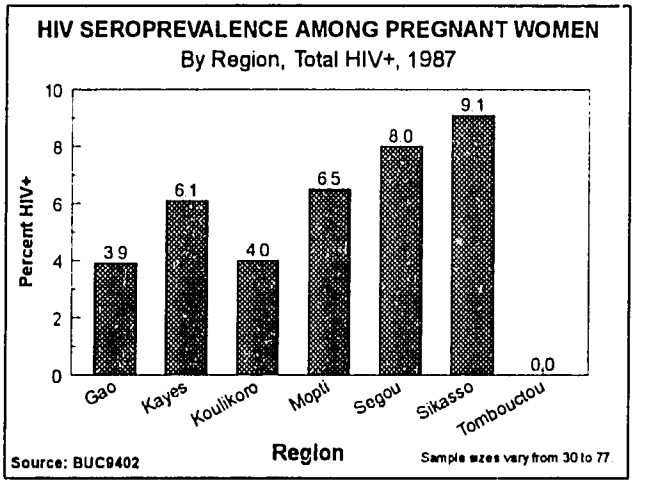


Figure 4.7

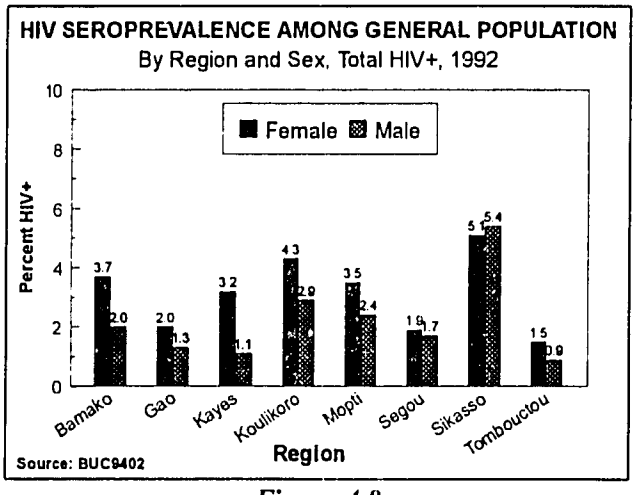


Figure 4.8

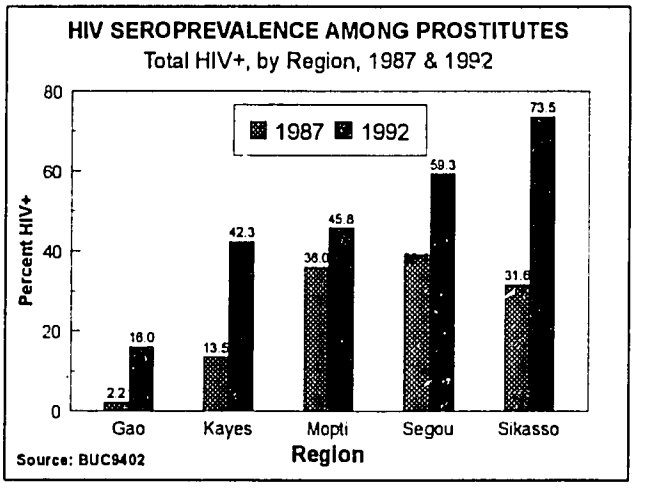


Figure 4.9

Within Mali, testing of pregnant women, the general population, and prostitutes has consistently found the region of Sikasso, which borders Cote d'Ivoire, to have the highest levels of HIV seroprevalence (see figures 4.7 - 4.9). Seasonal migrants to coastal areas such as Cote d'Ivoire and Guinea are thought to be the primary group responsible for the entry of HIV into rural parts of Mali (CAB9308).

National AIDS Control Program

Programme National de Lutte contre le SIDA (PNLS), Ministry of Health, Bamako. Among the first activities of the PNLS after its founding in 1987 was the establishment of the national blood bank as a strategic point for HIV detection and follow-up to prevent further transmission of the virus. Subsequent interventions focussing on high risk populations such as prostitutes and bar clients include health education, condom distribution and peer educator training. The PNLS has also supported research by CARE International on migrant laborers and their risk factors for HIV infection (WHO9301). More recently, the Ministry of Health has been encouraging the involvement of the private sector in the struggle against AIDS by funding local NGO activities with the assistance of USAID's AIDSCAP project (AID9311).

Local Non-Governmental Organizations with AIDS Activities

Croix Rouge Malienne (Red Cross of Mali), a member of Mali's National AIDS Committee, promotes AIDS awareness through educational programs for specific risk groups and the general public and provides HIV/AIDS training for health workers and local NGOs (WHO9102).

Plan International/Mali, with support from USAID, is working with 17 NGOs and four Women's Associations to conduct information, education, and communication activities on HIV prevention in Sikasso. Plan also intends to provide grants to HIV+ community support and self-help groups (PLN9501).

SWAA/Mali (Society for Women and AIDS in Africa, Mali Chapter) has promoted the role of mass media to prevent the spread of HIV/AIDs (WHO9301).

International NGOs with AIDS activities in Mali

(NCI9201,WHO9102,AID9407,PLN9501)

CARE
Center for International Cooperation on Health and Development (CCISD), Quebec
Family Health International
French Association of Volunteers for Progress (AFVP)
Medical Mission Institute of Würzburg, Germany
Norwegian Church Aid
Pan-African Anti-AIDS Organization (OPALS), Paris
Plan International
Population Council

International Donors supporting AIDS activities in Mali

(AID9509)

French Cooperation
The Government of Switzerland
United States Agency for International Development (USAID)
The World Bank
World Health Organization, Global Programme on AIDS (WHO/GPA)

APPENDIX A: STATISTICAL APPENDIX

Trends in Selected Demographic and Health Indicators

INDICATOR	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	SOURCE
Total Population (000s)	3,911	4,375	4,922	5,484	6,169	6,863	7,915	9,212	10,795	12,559	UNP9400
Infant Mortality	212	209	207	205	185	172	148	128	112	98	JEE9505
Under Five Mortality	434	428	424	419	376	349	298	255	222	193	JEE9502
Crude Birth Rate	53	52	52	51	51	51	51	51	49	46	UNP9400
Crude Death Rate	31	29	28	26	25	23	22	20	18	16	UNP9400
Avg. Annual Growth Rate	2.5	2.3	2.3	2.3	2.2	2.5	2.9	3.1	3.1	3.0	UNP9400
Total Fertility Rate	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.9	6.4	UNP9400

Table A1. Population Growth and Mortality Trends, 1955-2000

YEAR	ACCESS TO SAFE WATER		ADEQUATE SANITATION		SOURCE
	Rural	Urban	Rural	Urban	
1980	0	46	NA	63	AID9012
1981	NA	NA	NA	NA	
1982	NA	NA	NA	NA	
1983	8	46	3	91	WHO9101
1984	NA	NA	NA	NA	
1985	10	46	3	90	WHO9101
1986	NA	NA	NA	NA	
1987	NA	NA	NA	NA	
1988	20	46	3	90	AID9012
1989	NA	NA	NA	NA	
1990	4	41	10	81	WHO9200
1991	38	53	NA	NA	JMP9301
1992	NA	NA	NA	NA	

Table A2. Access to Safe Water and Adequate Sanitation, 1980-1991

Area of residence	ORS	Other salt or sugar solution	No treatment
MALI (national)	2.2%	1.0%	31.6%
Urban	6.7%	3.0%	26.5%
Rural	0.7%	0.3%	33.3%
by regional group:			
Bamako	4.4%	0.9%	15.8%
Kayes/Koulikoro	1.2%	0.8%	41.9%
Sikasso/Segou	1.7%	1.1%	21.1%
Mopti/Gao/Tombouctou	4.2%	1.3%	42.5%
Source: DHS8907			

Table A3. Treatment of diarrhea among children, by place of residence, 1987.

YEAR	ORS Access	ORS/RHF Use	SOURCE
1984	NA	NA	
1985	20	2	WHD8700
1986	NA	NA	
1987	NA	2	DHS8907
1988	57	NA	CAB8903
1989	95	41	WHD9100
1990	NA	NA	
1991	NA	NA	
1992	NA	NA	
1993	NA	NA	

Table A4. ORS Access and ORS/RHF Use, 1985-1989

YEAR	VACCINATION COVERAGE					SOURCE
	BCG	DPT3	Measles	Polio 3	TT2+	
1981	19	NA	NA	NA	1	WHE8700
1982	NA	NA	NA	NA	NA	
1983	NA	NA	NA	NA	NA	
1984	NA	NA	NA	NA	NA	
1985	NA	NA	NA	NA	NA	
1986	15	3	5	3	3	WHE8800,WHE8801
1987	22	6	8	6	8	WHE8900
1988	NA	NA	NA	NA	NA	
1989	67	21	98	21	30	WHE9001
1990	NA	29	47	29	37	MRF9004,WHE9200
1991	68	35	40	35	32	WHE9202
1992	54	26	75	26	49	WHE9301
1993	77	46	51	46	45	WHE9403

Table A5. Vaccination Coverage, 1981-1993

PUBLIC EXPENDITURE ON HEALTH CARE IN MALI			
Year	as % of total govt. expenditure	as % of GDP (MOH only)	$US (1987) per-capita
1980	3.1%	NA	$1.50
1981	4.6%	1.0%	$2.40
1982	2.8%	0.8%	$1.90
1983	2.6%	0.8%	$1.70
1984	1.8%	NA	$1.30
1985	1.7%	NA	$1.20
1986	2.4%	NA	$1.70
1987	2.6%	NA	$1.80
1988	2.1%	NA	$1.50
Source	IMF9300	AID8905	WBK9203 (1980-83), WBK9506

Table A6. Public Expenditure on Health Care in Mali, 1980-1988

I. Note On Mortality Estimation

Various organizations produce mortality estimates for the developing countries and regions. The three largest sources are the United Nations Population Division, the World Bank and the United States Bureau of the Census. CIHI's Health Statistics Database draws upon the work of these three larger organizations as well as other sources in order to reconcile the various estimates and provide the most reasonable current and historical estimates available.

CIHI has also created the only comprehensive time series of under-five mortality estimates for all developing countries. This has been accomplished by developing mathematical equations from empirical data that describe the relationship between infant and under-five mortality. Using these equations it is possible to make estimates of under-five mortality from infant mortality or *vice-versa*. More details regarding CIHI's methodology for specific data sets are provided in the source references.

II. Definitions

Demographic indicators:

Annual Infant Deaths: An estimate of the number of deaths occurring to children under age one in a given year.

Average Annual Rate of Population Growth: An estimate of the rate at which a population is increasing (or decreasing) in a given year.

Children Under Age 1: Mid-year estimate of the total number of children under age one.

Contraceptive Prevalence Rate: Estimate of the proportion of women aged 15 through 44 (sometimes 15 through 49) currently using a modern method of contraception. For some countries, this data is only available for women in union or married. Where sources fail to distinguish modern and traditional methods, the combined rate is shown.

Crude Birth Rate: An estimate of the number of live births per 1,000 population in a given year.

Crude Death Rate: An estimate of the number of deaths per 1,000 population in a given year.

Infant Mortality Rate: The estimated number of deaths in infants (children under age one) in a given year per 1,000 live births in that same year. This rate may be calculated by direct methods (counting births and deaths) or by indirect methods (applying well-established demographic models).

Life Expectancy At Birth: An estimate of the average number of years a newborn can expect to live. Low life expectancies in developing countries are, in large part, due to high infant mortality.

Maternal Mortality Rate (or Ratio): Estimated number of maternal deaths per 100,000 live births where a maternal death is one which occurs when a woman is pregnant or within 42 days of termination of pregnancy from any cause related to or aggravated by the pregnancy or its management. Extremely difficult to measure, maternal mortality can be derived from vital registration systems (usually underestimated), community studies and surveys (requires very large sample sizes) or hospital registration (usually overestimated).

Total Population: Mid-year estimate of total number of individuals in a country.

Total Fertility Rate: Estimate of the average number of children a woman would bear during her lifetime given current age-specific fertility rates.

Under 5 Mortality Rate: The estimated number of children born in a given year who will die before age five per 1,000 live births in that same year. May be calculated by direct or indirect methods.

Urban Population: Population living in urban areas as defined according to the national definiton used in the most recent population census.

Child survival indicators:

Adequate Nutritional Status: An individual child of a certain age is said to be adequately nourished if his/her weight is greater than the weight corresponding to "two Z-scores" (two standard deviations) below the median weight achieved by children of that age. The median weight and the distribution of weights around that median in a healthy population are taken from a standard established by the National Center for Health Statistics, endorsed by WHO. The indicator for the population as a whole is the proportion of children 12 through 23 months of age who are adequately nourished.

Appropriate Infant Feeding: A composite estimate of the proportion of infants (children under age one) being breastfed and receiving other foods at an appropriate age according to the following criteria: breastfed through infancy with no bottle-feeding, exclusively breastfed through four months (120 days) of age, and receiving other foods if over six months of age (181 days). Water is not acceptable in the first four months (120 days). ORS is considered acceptable at any age. A number of sub-indicators may be calculated from the data used to form the composite, of which two may be presented here:

Complementary Feeding: An estimate of the proportion of infants six to nine months of age (181 days to 299 days) still breastfeeding but also receiving complementary weaning foods.

Continued Breastfeeding: An estimate of the proportion of children breastfed for at least one year. Values presented in this report are the proportion of children 12 to 15 months of age at the time of the survey still receiving breast milk.

DPT Drop-out Rate: An estimate of the proportion of living children between the ages of 12 and 23 months who received at least one DPT vaccination but who did not receive the entire series of three vaccinations before their first birthdays.

Exclusive Breastfeeding: An estimate of the proportion of infants less than four months (120 days) of age who receive no foods or liquids other than breast milk.

ORS Access Rate: An estimate of the proportion of the population under age five with reasonable access to a trained provider of oral rehydration salts who receives adequate supplies. This indicator is particularly difficult to measure and may fluctuate dramatically as various

methods of estimation are devised.

ORT Use Rate: Estimate of the proportion of cases of diarrhea in children under five treated with **ORS and/or RHF** (a recommended home fluid). ORT use may be determined using administrative means or surveys. Administrative estimates are generally based on estimates of the number of episodes of diarrhea in the target population for a given year and the quantity of ORS available; these estimates are highly sensitive to changes in estimates of the frequency of diarrhea episodes. Surveys more precisely focus on the actual behavior of mothers in treating diarrhea in the two-week period prior to the survey.

Vaccination Coverage In Children: Estimate of the proportion of living children between the ages of 12 and 23 months who have been vaccinated before their first birthday (three times in the cases of polio and DPT and once for both measles and BCG). Rates are calculated in two ways: Administrative estimates are based on reports of the number of inoculations of an antigen given during a year to children who have not yet reached their first birthday divided by an estimate of the pool of children under one year of age eligible for vaccination. Survey estimates are based on samples of children between the ages of 12 and 23 months.

Vaccination Coverage In Mothers: Estimate of the proportion of women in a given time period who have received two doses of tetanus toxoid (TT) during their pregnancies. A revised indicator, referred to as **TT2+**, is now commonly used to account for the cumulative effect of TT boosters. A woman and her baby are protected against tetanus when a mother has had only one or perhaps no boosters during a given pregnancy so long as the woman had received the appropriate number of boosters in the years preceding the pregnancy in question. (This number varies with number received previously and the time elapsed.) Rates are computed using administrative methods or surveys.

Other health sector indicators:

Access to Adequate Sanitation: Definitions vary over time. In the past, this has been an estimate of the proportion of the population with sanitation service provided through sewer systems or individual in-house or in-compound excreta disposal facilities (latrines). After WHO changed its indicators and definitions in the late 1980s, this is now defined as the proportion with reasonable access to sanitary means of excreta and waste disposal, including outdoor latrines and composting.

Access to Health Services: An estimate of the proportion of the population that can reach appropriate local health services by local means of transport in no more than one hour. Recently WHO has revised its definition to the proportion of the population having treatment for common diseases and injuries and a regular supply of the essential drugs on the national list within one hour's walk or travel.

Access to Safe Water: Proportion of the population with reasonable access to safe water supply, including treated surface waters or untreated but uncontaminated water such as that from springs, sanitary wells or protected boreholes. Reporting can be highly subjective. Varying definitions are used for reasonable access in urban/rural areas:

Access to Safe Water, Urban: Estimate of the proportion of all persons living in urban areas (defined roughly as population centers of 2,000 or more persons) who live within 200 meters of a standpipe or fountain source of water.

Access to Safe Water, Rural: Estimate of the proportion of all persons not living in urban areas with a source of water close enough to home that household members do not spend a disproportionate amount of time fetching water.

Anemia among Pregnant Women: (prevalence): Estimate of the proportion of pregnant women whose blood hemoglobin level is below the WHO norm of 110 grams per liter.

Births Attended by Trained Personnel: An estimate of the proportion of births attended by at least one physician, nurse, midwife, trained primary health care worker, or trained birth attendant.

Gross Domestic Product: Total output of goods and services for final use produced by residents and non-residents, regardless of allocation to domestic and foreign claims.

Gross National Product: Total domestic and foreign value added claimed by residents.

Health Care Expenditure. Data from the World Development Report 1993 on health expenditure include "outlays for prevention, promotion, rehabilitation, and care; population activities; nutrition activities; program food aid; and emergency aid specifically for health." Spending on water and sanitation is not included. Expenditure is expressed in official exchange rate U.S. Dollars. **Public Expenditure** includes government and parastatal health expenditure and foreign aid. Domestic public expenditure does not include foreign aid. Where IMF data is used for time series, these definitions may vary. **Private Expenditure** comprises total household spending on health based on surveys or (where indicated) imputed from regressions based on GDP per capita. **Foreign Aid** represents total official aid flows, the sum of all assistance for health by bilateral and multilateral agencies and by major international NGOs.

HIV Seroprevalence: Estimate of the proportion of a given population infected with HIV. Where specified, data are disaggregated by strain (HIV-1 or HIV-2) and by risk group. **Low-Risk Population** includes persons with no known risk factors; estimates are typically drawn from test results among pregnant women, the general population, or blood donors. **High-Risk Population** includes persons with known risk factors; these estimates are typically drawn from test results among commercial sex workers, their clients, or patients at STD clinics.

Population per Doctor & per Nurse: Estimates of the ratios of total population per doctor and total population per nursing person. Because definitions of doctors and nursing personnel vary, the data for these two indicators are not strictly comparable across countries. "Nursing persons" may include auxiliary nurses and paraprofessional personnel such as trained traditional birth attendants.

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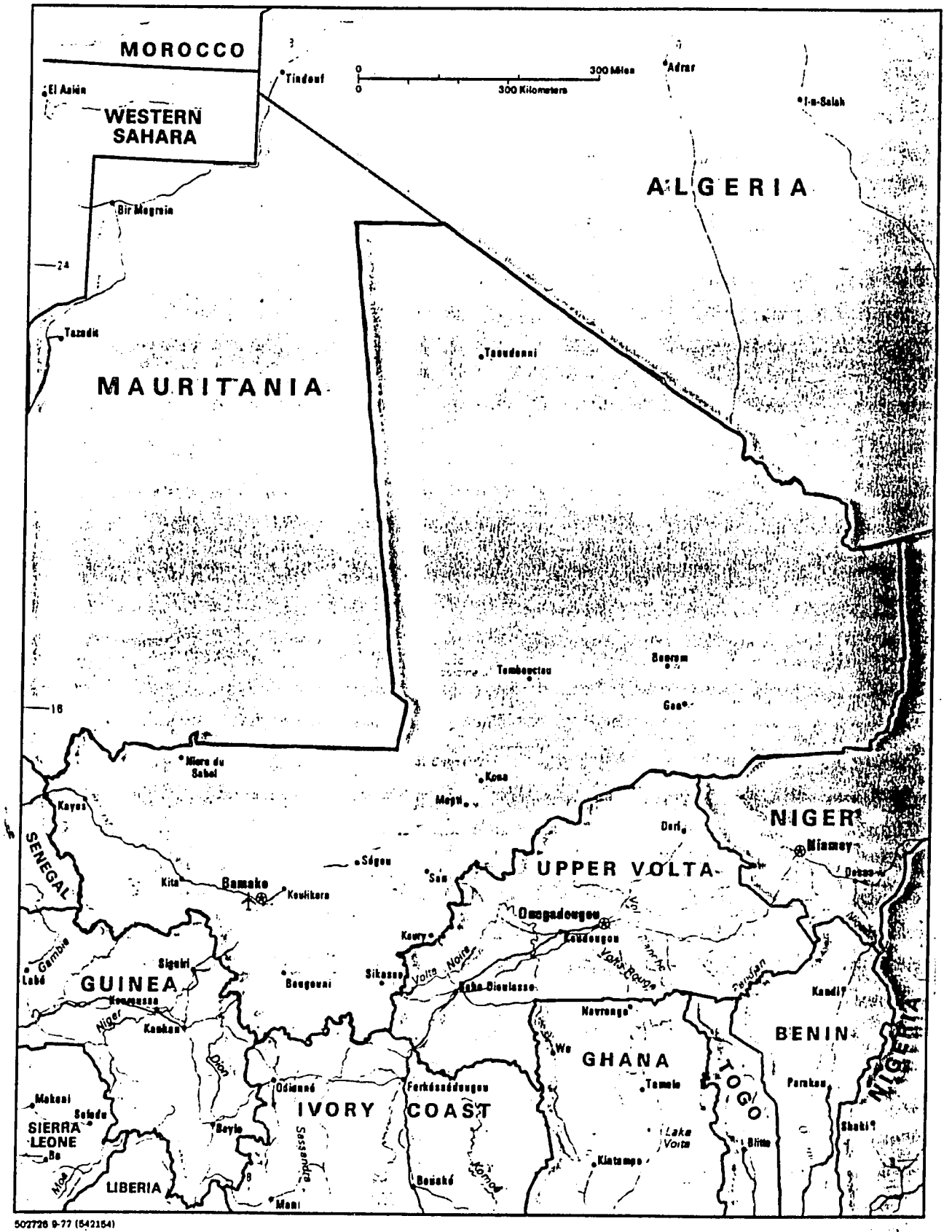
Mali



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Scale 1 11,000,000
Boundary representation is not necessarily authoritative

Railroad
Road
Airport

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