

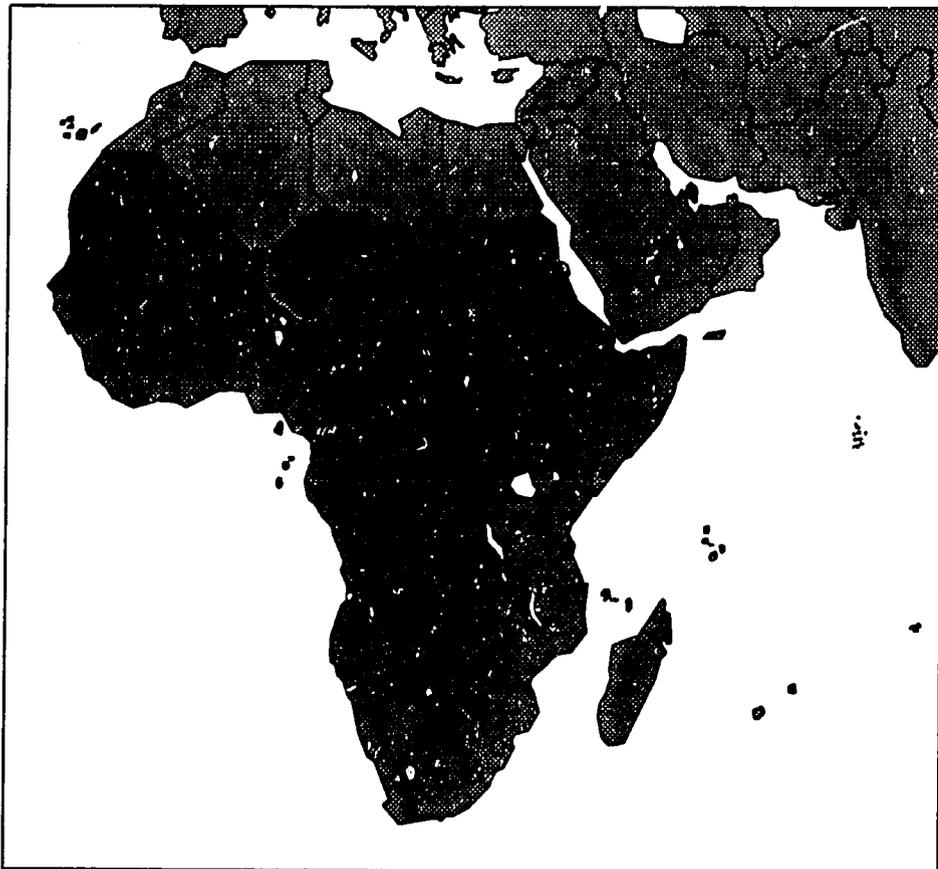
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CIHI Country Health Profile Series

SENEGAL

**Country Health Profile
1995**



Center for International Health Information
1601 N. Kent Street, Suite 1014
Arlington, VA 22209

The Center for International Health Information (CIHI) is a project managed by Information Management Consultants, Inc. (IMC), with the International Science & Technology Institute (ISTI) and The Futures Group (TFG). CIHI prepared this document under the Data for Decision Making Project (936-5991.05), under contract number HRN-5991-C-00-3041-00 with the Office of Health and Nutrition, Center for Population, Health and Nutrition, Bureau for Global Programs, Field Support and Research, U.S. Agency for International Development (USAID).

Additional research for this expanded country profile was supported by USAID's Bureau for Africa through the Health and Human Resources Analysis for Africa (HHRAA) Project (698-0483).

The Center for International Health Information

1601 N. Kent Street, Suite 1014

Arlington, VA 22209

(703) 524 - 5225

FAX (703) 243 - 4669

E-Mail address: cihi@gaia.info.usaid.gov



SENEGAL

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	8,730,508	1994	BUC9401
Urban Population	3,562,047	1994	CALXX04
Women Ages 15-49	1,847,000	1994	UNP9400
Infant Mortality	76	1994	JEE9512
Under 5 Mortality	147	1994	JEE9502
Maternal Mortality	510	1992	DHS9407
Life Expectancy At Birth	57	1994	BUC9401
Number of Births	376,721	1994	CALXX00
Annual Infant Deaths	28,631	1994	CALXX01
Total Fertility Rate	5.9	1994	UNP9400

Child Survival Indicators			
INDICATOR	PERCENT	YEAR	SOURCE
Vaccination Coverage			
BCG	71	1994	WHE9501
DPT 3	55	1994	WHE9501
Measles	49	1994	WHE9501
Polio 3	55	1994	WHE9501
Tetanus 2	32	1994	WHE9501
DPT Drop Out	26	1993	DHS9407
Oral Rehydration Therapy			
ORS Access Rate	16	1988	WHD9001
ORS and/or RHF Use	16	1993	DHS9309
Contraceptive Prevalence			
Modern Methods (15-44)	5	1993	DHS9407
All Methods (15-44)	8	1993	DHS9407
Nutrition			
Adequate Nutritional Status	NA		
Exclusive Breastfeeding	6.6	1993	DHS9407
Complementary Feeding	41	1993	DHS9407
Continued Breastfeeding	93	1993	DHS9407

Other Health Indicators			
INDICATOR	PERCENT	YEAR	SOURCE
HIV-1 Seroprevalence			
Urban	0.3	1993	BUC9503
Rural	0.1	1993	BUC9503
Access to Improved Water			
Urban	84	1991	JMP9301
Rural	26	1991	JMP9301
Access to Sanitation			
Urban	85	1991	JMP9301
Rural	36	1991	JMP9301
Deliveries by Trained Attendants	47	1993	DHS9407

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)
CFA	<i>Communauté Financière Africaine</i>
CIHI	Center for International Health Information

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ACRONYMS / ABBREVIATIONS (continued)

DHS	Demographic and Health Survey
GDP	gross domestic product
GNP	gross national product
HIV	human immunodeficiency virus
IMR	infant mortality rate
MMR	maternal mortality rate
MPHSA	Ministry of Public Health and Social Assistance
NGO	non-government organization
NNT	neonatal tetanus
ORS	oral rehydration salts
ORT	oral rehydration therapy
PHC	primary health care
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
WHO/GPV	WHO/Global Program for Vaccines

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. "Lower Middle Income Countries" includes available data for 65 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

Senegal, the westernmost country in Africa, has a population of about 8.5 million living within a total land area of 197,161 km² (76,124 mi²)(FOF9201). Although Senegal is considered a relatively prosperous country in West Africa, social conditions do not necessarily reflect this standing. The Human Development Index, which is published by the United Nations Development Program (UNDP) to rate countries using various health and education indicators, found Senegal to rank 143rd out of 173 countries in 1994. This rates far below Senegal's economic performance in terms of per-capita gross national product (GNP), a category in which Senegal ranked 114th place (UND9402).

SENEGAL: GEOGRAPHIC DIVISIONS USED FOR DEMOGRAPHIC AND HEALTH SURVEYS

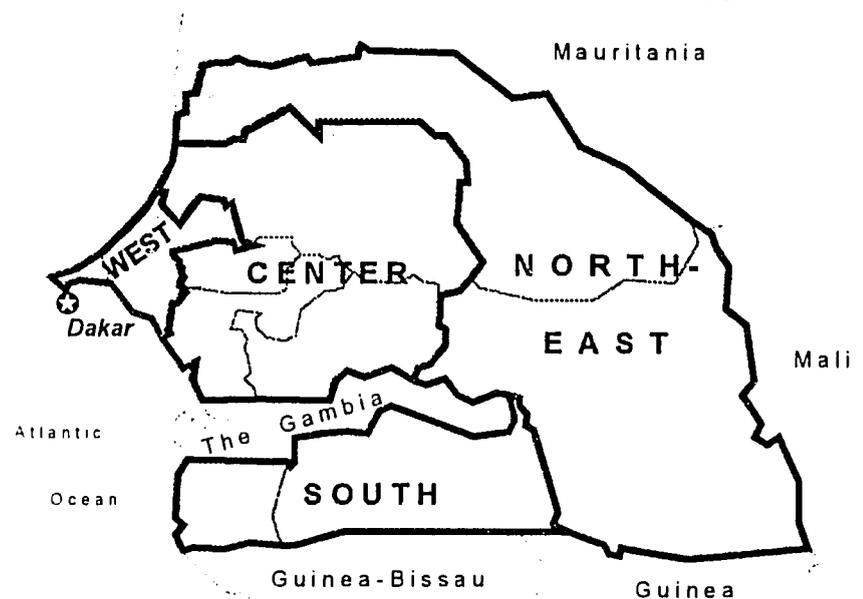


Figure 1.1

Geography

Senegal shares international boundaries with Mauritania, Mali, Guinea (Conakry), Guinea-Bissau, and The Gambia, the latter of which forms an enclave partially separating the South of Senegal from the bulk of the country to the North. Senegal is divided into ten administrative regions (see map inside back cover) and over thirty further divisions (*departements*) which roughly correspond to the country's health districts (*circonscription medical*)(HPP9002). Two of the most useful sources of data on population and health conditions in Senegal, Demographic and Health Surveys (DHSs) conducted in 1986 and 1992-93, disaggregate findings geographically into four broad regions illustrated in figure 1.1.

Senegal is located along the western segment of the Sahel, a desert fringe area extending across the southern edge of the Sahara. Droughts and overuse of land have contributed to the noticeable southward drift of the Sahel, a phenomenon with ominous ramifications for agriculture and development in general in Senegal. Figure 1.2

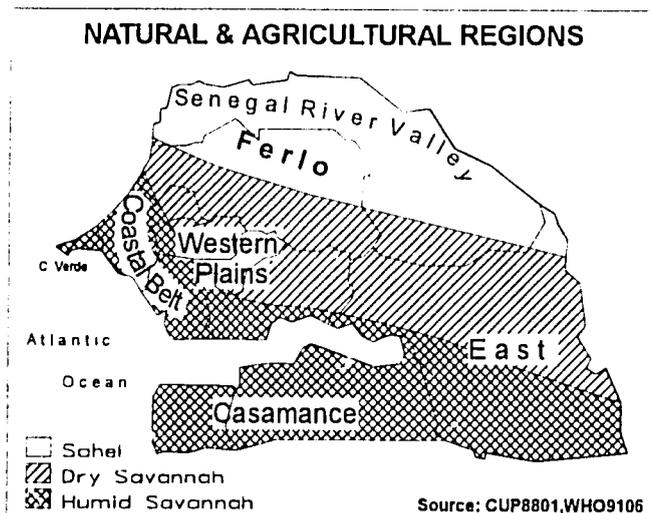


Figure 1.2

illustrates the general location of Sahelian and savannah zones within Senegal as well as the country's six primary natural and agricultural regions. Senegal's Atlantic coastline stretches 466 km. (277 mi.) and includes the westernmost point of the African continent, Cape Verde, a volcanic peninsula and the site of Senegal's capital, Dakar. The coast is characterized by dunes north of Cape Verde, joined by mangrove forests, estuaries, and mudbanks to the South. Moving inland, the North is an extensive low-lying basin of savannah and semi-desert vegetation with seasonal streams draining to the River Senegal. The South is also mostly low-lying but rises to around 500m toward the Guinea frontier. Senegal's main rivers are the Senegal, Ferlo, Saloum, and Casamance (CUP8801).



Senegal has a tropical climate with a rainy season between June and September. Average temperatures in Dakar range from 18-27 degrees C. (64-87 degrees F.) in January and 25-33 degrees C. (77-91 degrees F.) in August. Temperatures rise rapidly inland, reaching over 38 degrees C. (100 degrees F.). In Casamance, in the South, which lies on the fringe of the tropical monsoon area, the rainy season extends from May to December. Winds of gale strength occur at the beginning and end of the rainy season as storms known as *tornadoes* are accompanied by thunder, lightning, and squalls (FOF9201, CUP8801). Annual rainfall decreases from 100-150 cm (40-60 in.) in the south to 30-35 cm in the dry north. In the dry season, the dust-laden Saharan *harmattan* wind blows hot, dry air from the northeast. Along with other Sahelian countries, Senegal is periodically affected by serious drought. The cumulative effects of these droughts made the early 1970s, particularly 1973, a period of unprecedented disaster which damaged Senegal's fragile ecology irreparably (FOF9201).

History

Archeological findings throughout the area indicate that Senegal was inhabited in prehistoric times. Islam established itself in the Senegal River valley from neighboring Arab lands of the Sahel in the 11th century. In the 13th and 14th centuries, the area came under the influence of the great Mandingo empires to the east, during which the Jolof Empire of Senegal was founded. The Empire comprised the states of Cayor, Baol, Oualo, Sine, and Soloum until the 16th century, when they revolted for independence (GRI9301).

The Portuguese were the first Europeans to trade in Senegal, arriving in the 15th century, soon followed by the Dutch and French. During the 19th century, France gradually established control over the interior regions and administered them as a protectorate until 1920, and as a colony thereafter. After 1902, Dakar was the capital of all of French West Africa (GRI9301). After slavery was abolished by the French revolution of 1848, the Senegalese became "second class citizens" of the French Empire, with one political representative in Paris. At this time Senegal was exporting thousands of tons of peanuts each year and supplying the French army with soldiers (TWI9501). Senegal was the only French colony where the policy of assimilation was applied to a relatively large segment of the population and was also the only African colony in which the French made a determined effort to educate the natives. The French also introduced social institutions that brought about fundamental changes in the Senegalese way of life (FOF9201).

In 1946 a territorial assembly was elected by a restricted franchise and given advisory powers. After 1958, Senegal became a member of the French Community with virtually complete internal autonomy. After a brief membership in the independent Mali Federation, Senegal proclaimed itself independent in 1960 (GRI9301). Leopold Sedar Senghor, a former representative to the French National Assembly and founder of the Senegalese Progressive Union, was elected president and stayed in power through successive re-elections for two decades. He was finally replaced by Abdou Diouf on January 1, 1981 (TWI9501).

President Diouf has since remained in power, most recently winning re-election in 1993. Among the greatest challenges faced by the current Government of Senegal have been coming to terms with the structural adjustment programs promoted by the World Bank and the International Monetary Fund, widespread civil unrest following the devaluation of the CFA franc in January 1994, and negotiating a peaceful settlement with a separatist movement based in the South, where the Dioule ethnic group has traditionally taken great pride in their independence and resistance to the hierarchical Islamic societies of the North (AID9511).

People

Senegal's ethnic configuration is diverse. Figure 1.3 illustrates the proportions of the national population attributable to various major ethnic groups. Members of the major tribe, the Wolof, are fairly evenly dispersed but concentrated in the northwestern quarter of the country, including Dakar. The Wolof tend to dominate the political and economic life of the country. Senegal's 1988 census found the Wolof to constitute 43 percent of the



national population (DHS9407). The Serer (15% in 1988) are the largest non-Muslim group, consisting mostly of cultivators. The Peulh, or Fulani, and the related Toucouleur (together, 23% in 1988) are mostly stock-raisers and cultivators who are less involved in national politics and the national economy. The Diola are the people of Casamance, divided into at least seven linguistic subgroups. The Mandingo and the Bambara are ethnically related, but the former are Muslims, while the latter are mainly animists. Living along the coast, the Lebu have a number of cultural and social traits in common with the Wolof and Serer (FOF9201). Some 40,000 Europeans (mostly French) and Lebanese live in Senegal, primarily in cities (GRI9301). Data from the two DHSs are available disaggregated along the following ethnic groupings: Wolof (including Lebou), Poular (including Peulh, Toucouleur, and Foulbe), Serer, Mandingo (including Malinke and Soce), Diola, and "other."

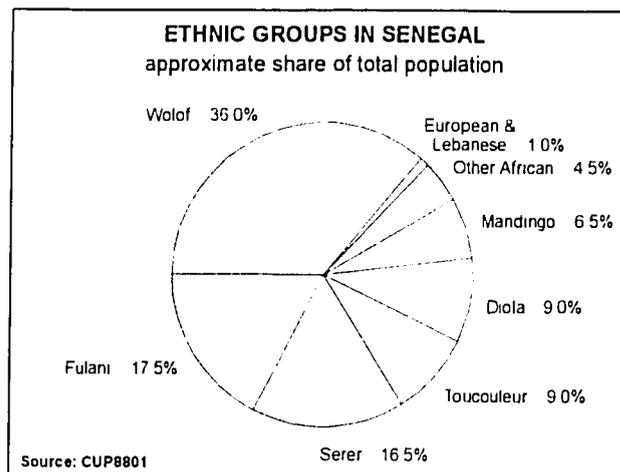


Figure 1.3

Senegal has no state religion, but it is one of the most Islamized nations in West Africa, with at least eighty percent of the population adhering to one of the two sects of Islam, Sunni and Shia. About five percent of the population follows Christianity, primarily Roman Catholicism. This group is comprised mainly of the Serer and the Diola groups, as well as the European and Lebanese minorities, but Christians are found in almost every ethnic group and are disproportionately well represented in the government, commerce and education. Most of the smaller ethnic groups and, among the larger groups, the Serer and the Diola, follow traditional animist religions, accounting for about ten percent of the population (FOF9201).

French is the official language, but Wolof serves as the national *lingua franca* and is spoken by over eighty percent of the population (FOF9201). Only a fraction of the population is literate, estimated at 19 percent of adult women and 37 percent of adult men (AID9110). Most native languages have no script, and it was only in 1971 that the government began a major program to transcribe the country's six main languages, Wolof, Serer, Pulaar, Diola, Manding, and Sarakole, into a modified Latin alphabet (FOF9201).

Economy

The Senegalese economy is one of the most developed in West Africa. As indicated in figure 1.4, Senegal's estimated level of GNP per capita in 1991 stood at nearly twice the median level among sub-Saharan nations, according to figures provided by the World Bank. More recently, after the devaluation of the CFA franc in 1994, USAID's mission in Senegal calculated per-capita income at just \$490 (AID9511). Although Senegal qualifies as a "middle-income" country, poverty persists both in struggling rural areas as well as in pockets within and around the nation's cities. A recent study of living conditions by the World Bank found that 13 percent of urban households and 37 percent of rural households live below the poverty line (determined regionally by observed local purchasing power).

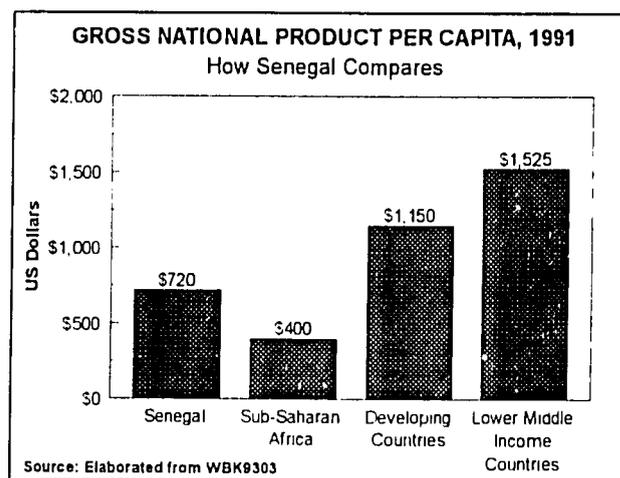


Figure 1.4



Economic conditions are worst in the South, where more than half of the populations of Ziguinchor and Kolda were found to live below the poverty line, but many northern and eastern regions, including Fatick, Kaolack, Tambacounda, and Louga, were found to suffer levels over forty percent as well. While Dakar is one of the more wealthy regions, the 12.5 percent of households living below the poverty line there comprise a concentration of nearly one-quarter of all poor households nationwide (WBK9507).

The national economy is dominated by agriculture, which employs an estimated 75 percent of the workforce (CUP8801). The major cash crops are peanuts, grown in 45 percent of the cultivated area, and cotton. Senegal ranks fifth in the world in peanut production and first in export of peanut oil. The chief food crops are millet and sorghum, followed by cassava, rice, maize, and sorghum. Livestock-raising is concentrated in the northern third of the country, along the Senegal River Valley and among the Fulani, who derive their livelihood almost entirely from herding; the prevalence of the tsetse fly limits cattle-raising in the South. Also of great economic significance is fishing, which generated about \$200 million, or roughly one-quarter of Senegal's foreign exchange earnings in 1987. Industry is heavily export-oriented. The largest subsector is food processing and beverages, followed by textiles and chemicals. Manufacturing is concentrated around Dakar, with other industrial centers located in Kaolack, Thies, Casamance, Diourbel, and St. Louis. Mining is dominated by extraction of phosphates, but production has faltered due to reduced worldwide demand for fertilizers (FOF9201).

The agricultural sector has yet to fully recover from the catastrophic drought period which began in 1966 and became particularly disastrous in 1972, when the rains nearly failed and the Senegal River reached a high-water mark of only 4.8 m (16 ft.) instead of its usual 9.1 m. (30 ft.). As the water table fell, wells and streams dried up, natural vegetation cover withered, and the national herd was virtually wiped out. The drought affected nearly 90 percent of the population, with some areas in Thies and Diourbel reporting agricultural losses up to 100 percent. An exodus from rural areas to towns and cities placed the country's scanty resources under further strain until short-term relief supplies arrived from international agencies. During such periods of drought, Senegal has been forced to rely on food imports. Although food production increased substantially during the late 1980s, boosted by development of irrigated farming following the completion of the Manantali and Djama dams (FOF9201), it has lagged in the 1990s. Senegal continues to import roughly \$300 million worth of food annually (WBK9506).

Population Dynamics

According to estimates by the United Nations Population Division, Senegal has a population of 8.3 million in 1995 (see figure 1.5). Although the majority of the population lives in rural areas, the urban population is expanding rapidly, currently estimated to account for 42 percent of the population and projected to surpass 50 percent by 2010 (UNP9400). While the national population is thought to be growing at an annual rate between 2.5 and 3.0 percent, the growth rate in Dakar is thought to be about 3.9 percent in 1995. With a population estimated at 2,000,000 in 1995, Dakar is among West Africa's largest cities and accounts for nearly one-quarter of Senegal's national population (UNP9401). According to one estimate, about sixty percent of the city's population lives in squatter settlements or slums (FOF9201).

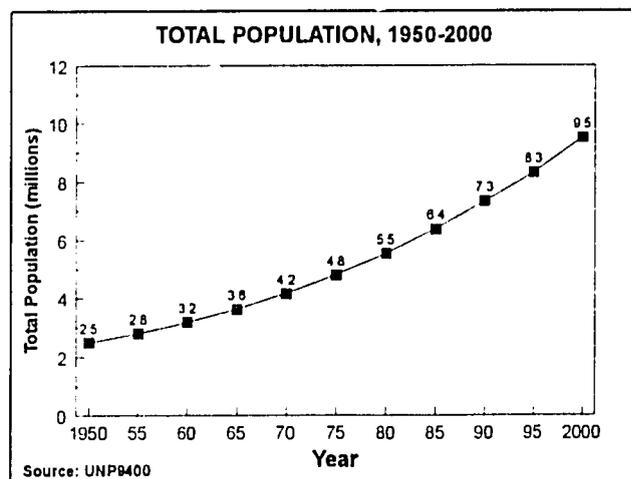


Figure 1.5

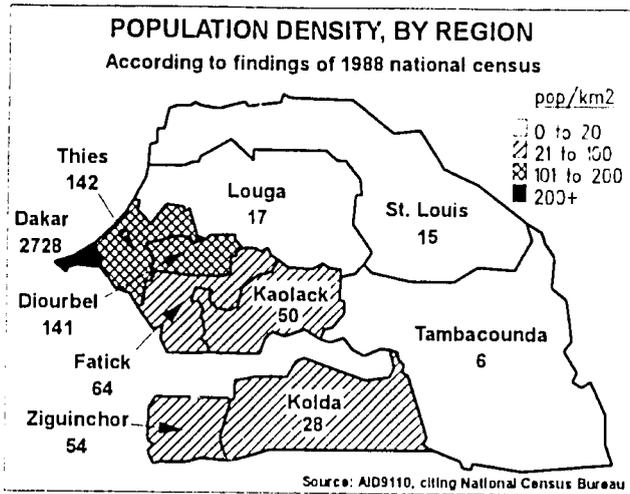


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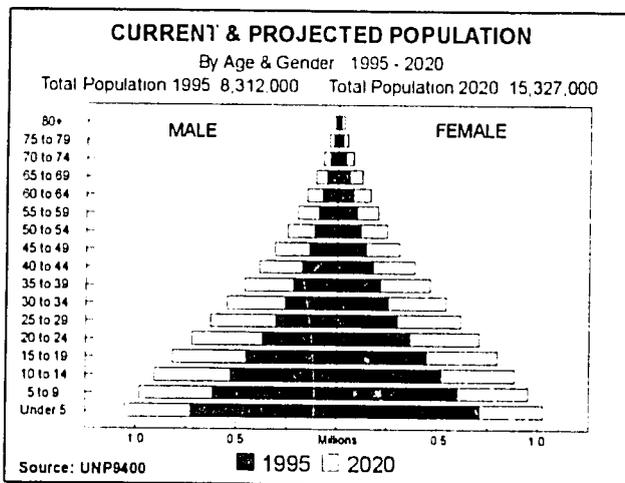


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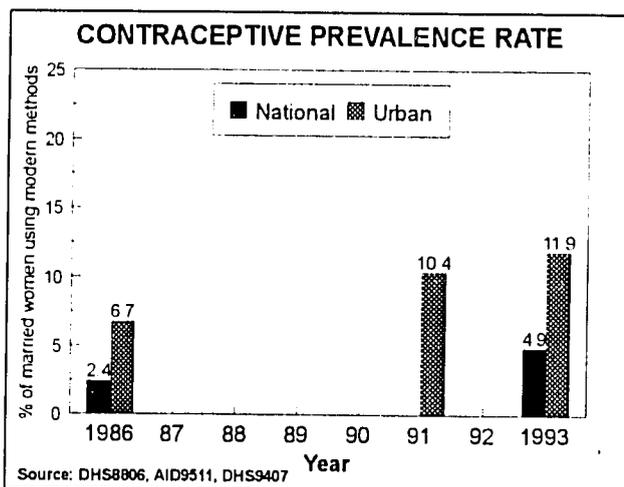


Figure 1.8

Overall population density is estimated at 41 persons per km² (UNP9400). The highest concentration is found in and around Dakar. Densities in other regions generally decrease with distance from Dakar and the Atlantic coast (see figure 1.6).

Figure 1.7 provides a representation of the breakdown of the population by age and sex. About 45 percent of the total population is thought to be under the age of 15 and 17 percent under the age of five. The population is thought to be currently growing at an average annual rate of about 2.6 percent, according to UN projections, a drop from rates closer to three percent in the 1970s and -80s (UNP9400). Population growth in Senegal is the combined product of natural increase (based on continuing high birth rates and decreased rates of mortality) as well as immigration. The 1992/93 DHS found Senegal's total fertility rate (TFR) to have dropped to six children per women, a substantial drop from the 6.6 found by the 1986 DHS and the level of 7.0 estimated for earlier years (see table A1 in appendix).

The use of contraception remains generally low nationwide, though family planning programs appear to be making inroads in urban areas. The 1992/93 DHS found that contraceptive prevalence among married women for modern methods stood at just 1.4 percent in rural areas but reached nearly 12 percent in urban areas (see figure 1.8).

Immigration is estimated to increase Senegal's population at a net annual rate of 0.65 percent (WBK9403). As one of the most industrialized countries in West Africa, Senegal attracts migrant workers from Mali, The Gambia, Burkina Faso, and Guinea-Bissau, some of whom stay on to become permanent residents. Immigrants from Mauritania are also a considerable minority (AID9018). The numbers involved in permanent or seasonal migrations have not been statistically determined, but in the early 1970s the government referred to the presence of 800,000 non-Senegalese in the country, accounting for nearly 20 percent of the population. Immigration appears to increase in times of famine and drought in the interior countries. Emigration is relatively insignificant. About 20,000 Senegalese are believed to live in France. Some 10-12,000 Senegalese go to Gambia for the harvest season, but few leave Senegal permanently (FOF9201).



II. HEALTH SITUATION ANALYSIS

Basic Health Indicators

Health conditions in Senegal have improved vastly in the past forty years. In spite of economic stagnation and declining public health expenditure in the 1980s, the trend of gradual improvement has continued into the 1990s. Projected levels of life expectancy at birth have increased from 40 years at the beginning of the 1980s (WBK9507) to nearly 50 years today (UND9402), just below the median level for sub-Saharan Africa (see figure 2.1).

This improvement in life expectancy is largely the product of declining mortality rates among children. Senegal has experienced significant reductions in its infant mortality rate (IMR) and under-five mortality rate (U5MR), particularly in the 1960s and -70s but continuing strongly into the present (see figure 2.2). Much of this progress is thought to be due to improvements in vaccination coverage (WBK9507).

A comprehensive study of mortality trends in Mlomp in southern Senegal found that the U5MR had remained stable at about 350-370 deaths per thousand live births from 1930 to 1960 before rapidly declining to just 81 for 1985-1989. The authors credited the introduction of maternal and child health (MCH) services starting in the 1960s with this success, citing the opening of a maternity clinic, improved supplementary feeding programs, and protection against major childhood diseases through immunization and the prophylactic use of chloroquine to prevent malaria infection (NAP9301).

Projections based on DHS and other data place the current IMR at 74 and the U5MR at 143 deaths per thousand live births for 1995, well below the medians for sub-Saharan Africa (see figures 2.3). These gains indicate excellent progress, particularly in the West African context, but when Senegal's rates are compared to those of other developing countries or countries of a similar income level, the advances still fall far short. The IMR projected for Senegal for 1995 is fifty percent higher and the U5MR more than double the median among all developing countries (see figure 2.3).

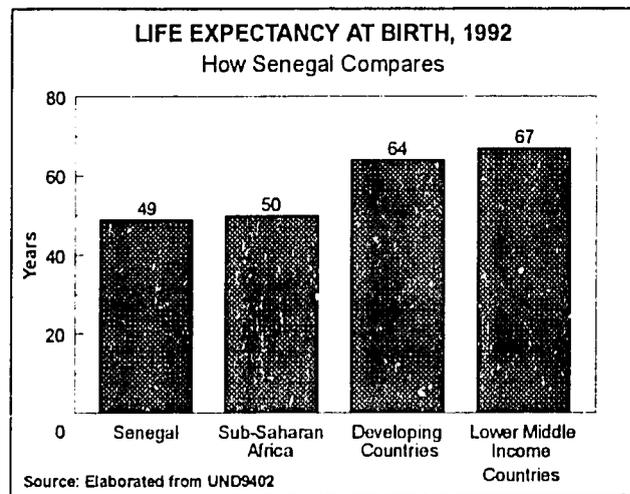


Figure 2.1

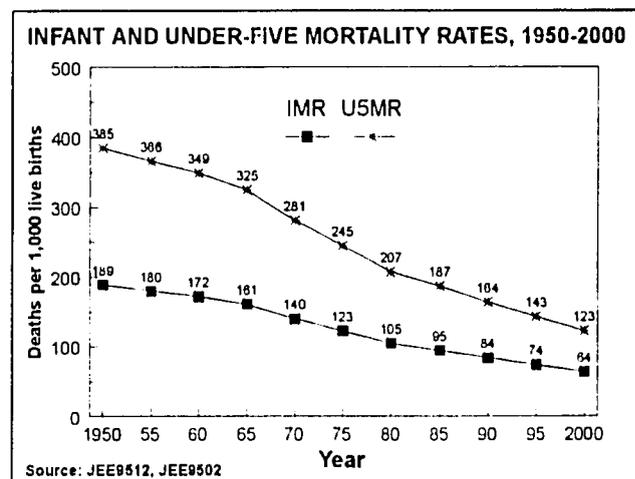


Figure 2.2

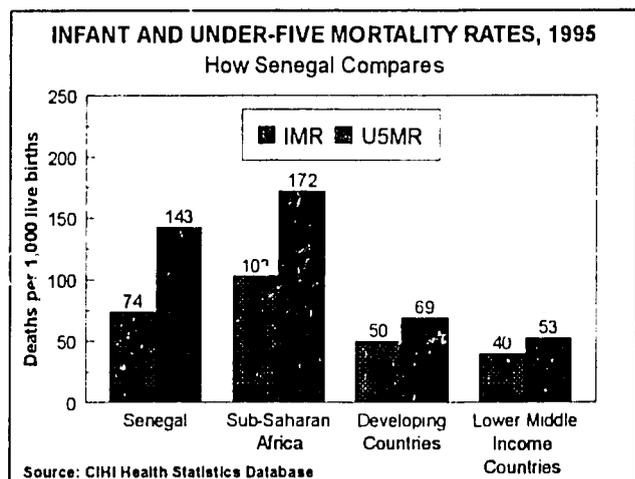


Figure 2.3



Within Senegal, health status varies widely according to geographic residence (see figure 2.4). The 1992/93 DHS, calculating mortality rates for the ten-year period preceding the survey, found the IMR to be more than fifty percent higher and the U5MR eighty percent higher in rural areas than in urban areas. Rates in the South and Northeast regions approach the high levels of mortality found in some of the nearby, less wealthy Sahelian nations. The IMR in the Northeast, the region with the highest infant mortality, was found to be double that of the West, where Dakar is located.

Causes of Mortality & Morbidity

The vast majority of deaths and illnesses among children in Senegal are due to preventable diseases. Because a death or illness can result from a variety of interrelated causes, it is difficult to attribute an exact share of mortality or morbidity to any individual cause. The lack of a comprehensive and reliable system for collecting morbidity and mortality data in Senegal further complicates any effort to quantify the relative significance of various causes of death or illness.

Periodic reports by the Statistics Division of the Ministry of Public Health and Social Action (MPHSA) are generally incomplete and do not represent the full extent of health problems but are biased toward more easily-diagnosed problems encountered in urban, hospital-based settings (AID9110). Figures 2.5 and 2.6 present summary information on overall morbidity and mortality due to communicable diseases, as reported by the MPHSA for 1985. The two graphs illustrate the overwhelming proportional significance of malaria among all reported cases of illness (41%) and as a reported cause of death in Senegal (40%). A summary of the MPHSA's tallies for 1988 attributed even higher shares to malaria among recorded deaths (44.8%) and illnesses (80.1%)(AID9110).

Although the data presented here reflect deaths and illnesses reported among all age groups, the most important afflictions identified – diarrheal diseases, respiratory infections, and measles – are all major childhood diseases. Other major health problems affecting the population as a whole include tuberculosis, schistosomiasis, gastroenteric infections, encephalomyelitis, sexually-transmitted diseases (STDs), and leprosy. Also of significance among adults are complications in childbearing, cardiovascular disease, and trauma (FOF9201). The following subsections present cause-of-death data from various surveys and studies focussing on infant and child mortality in Senegal.

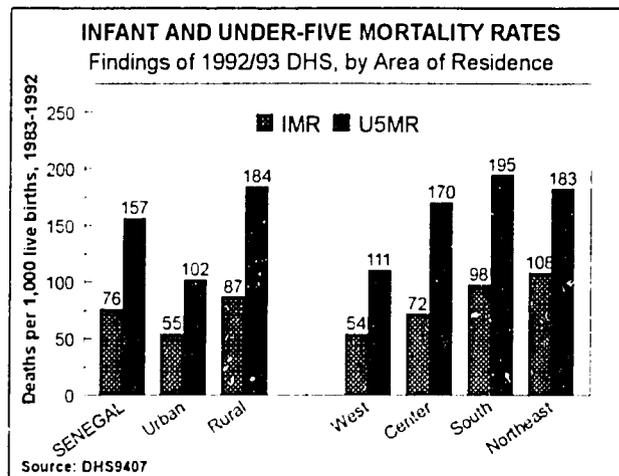


Figure 2.4

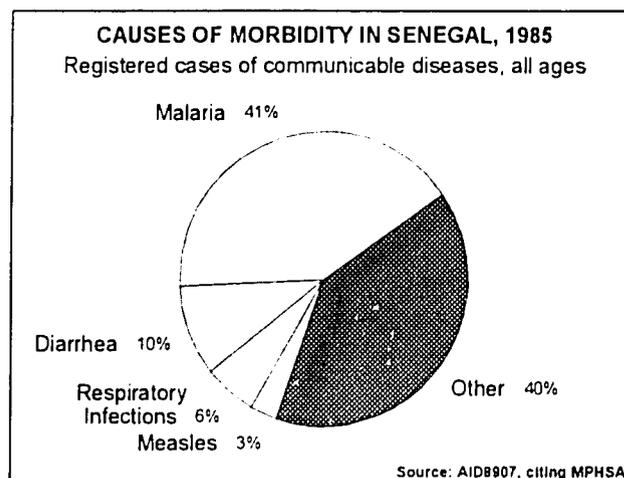


Figure 2.5

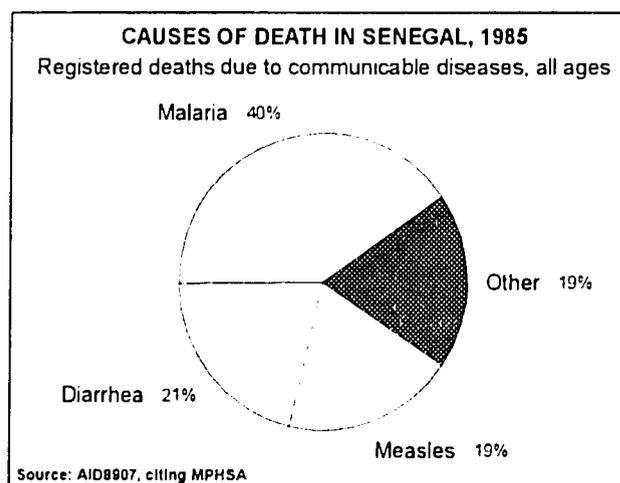


Figure 2.6

Causes of Neonatal Mortality

Figure 2.7 presents the findings of a long-term study in Niakhar, a rural area in Fatick region, on causes of death in the first month of life. Analyzing verbal autopsies to determine cause of death, the study found that nearly 40 percent of neonatal deaths were attributable to tetanus, which is preventable through the vaccination of mothers during or before pregnancy. Other methods of attributing causes of death, such as the use of facility records, typically underestimate the impact of tetanus. Also of great significance was low birthweight, a condition associated with poor maternal nutrition or illness during pregnancy, followed distantly by pneumonia and "birth trauma."

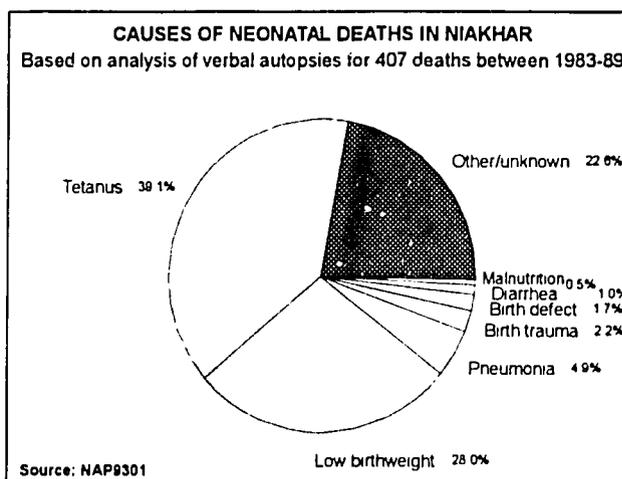


Figure 2.7

Causes of Infant Mortality

About half of infant deaths after the first month of life can be attributed to diarrhea and acute respiratory infections (ARIs). This point is illustrated in figure 2.8, which presents the Niakhar data for the post-neonatal period of infancy. Figures 2.9 and 2.10 present findings on causes of death during the entire first year of life from studies in Dakar, Saint-Louis, and Sine-Saloum, which comprises the present regions of Kaolack and Fatick. Since these figures include the neonatal period, tetanus and other perinatal diseases continue to be significant. Also of great significance are malnutrition and several vaccine-preventable diseases, including pertussis, measles, and somewhat surprisingly, polio. Two additional causes of infant deaths in figure 2.10 are malaria and meningitis.

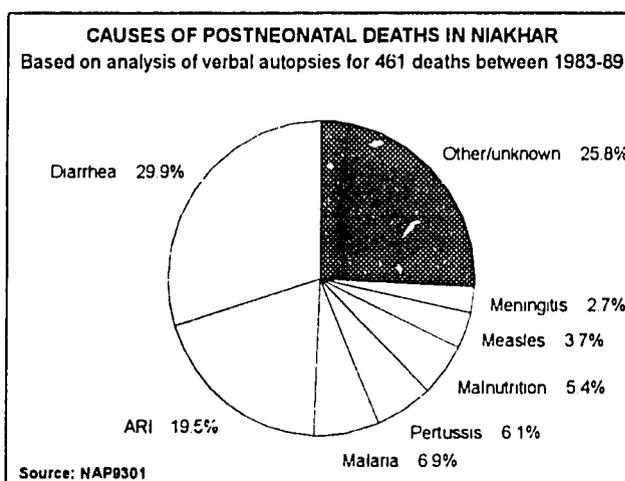


Figure 2.8

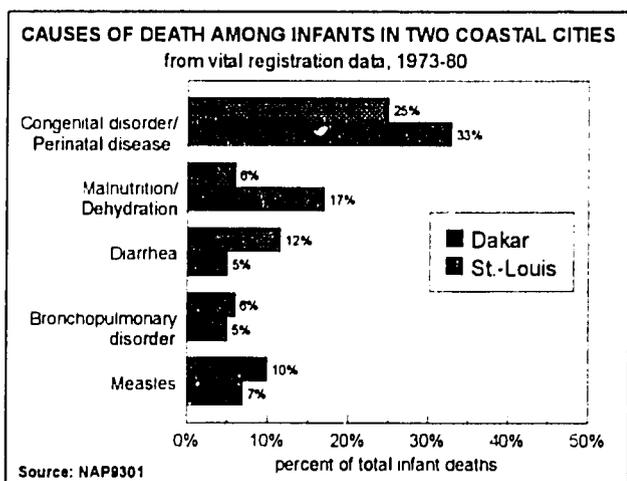


Figure 2.9

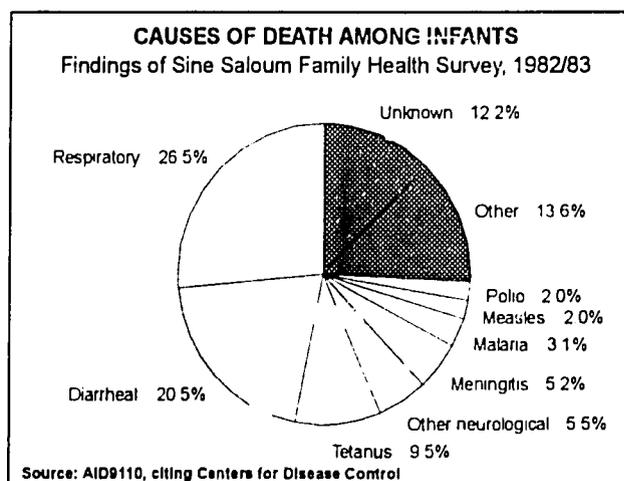


Figure 2.10



Causes of Child Mortality

After the first birthday, measles and malaria are more prominent, together accounting for an estimated 30 percent of deaths, and diarrheal diseases also are a major cause of death. Malnutrition among under-fives underlies many of these causes of severe morbidity and mortality and may be at least associated with as much as two-thirds of deaths at ages one through four. The studies in Dakar and Saint-Louis found the major cause of death to be measles, a disease which can fluctuate widely in significance from year to year (see figure 2.11). The authors noted that environmental events can have great impact on this kind of ranking, attributing the higher percentages of deaths due to malnutrition and malaria in Saint-Louis to drought conditions in 1972-3 and heavy rains in 1975, conditions which were not experienced with the same impact in Dakar (NAP9301).

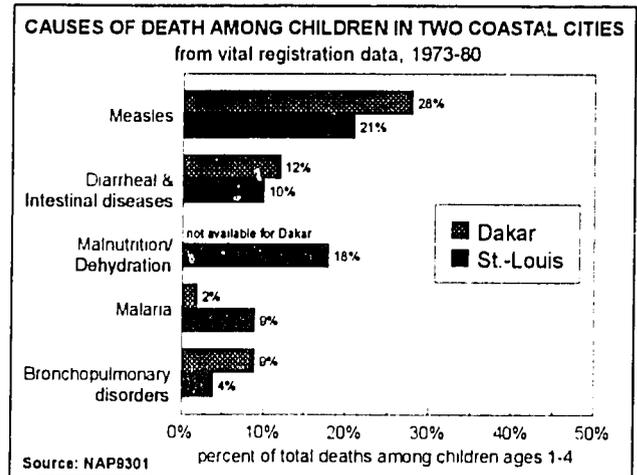


Figure 2.11

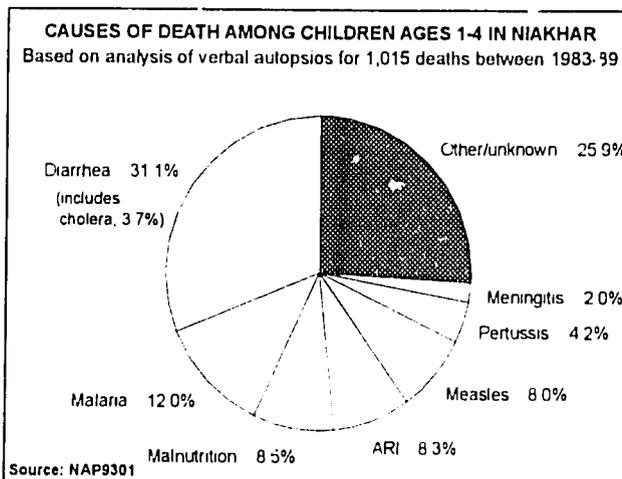


Figure 2.12

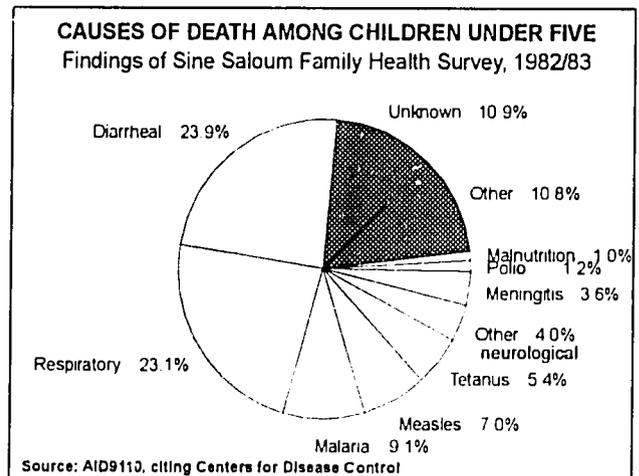


Figure 2.13

Other causes of death identified among children ages one through four in Sine-Saloum and in Niakhar included ARIs, pertussis, meningitis, hepatitis, and tuberculosis (see figures 2.12 and 2.13). The authors of the Niakhar study pointed out that congenital syphilis and typhoid were not specifically cited but were also known to be fatal among children (NAP9301). A more recent study in Niakhar examining the efficacy of various measles vaccines involved long-term monitoring of mortality rates and recorded causes of death among 67 of the children with standard vaccination and 134 members of two groups of children with early, high-titre vaccinations. Diarrhea was the most commonly observed cause of death in all three groups, followed respectively by malnutrition, malaria, and pneumonia (see figure 2.14).

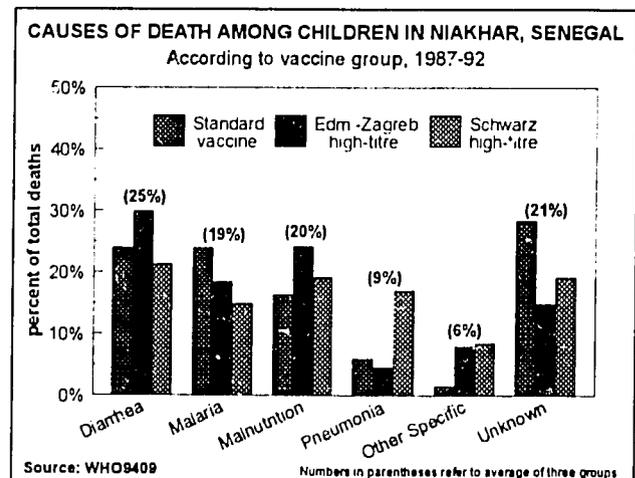


Figure 2.14

Maternal Mortality

Maternal mortality is a leading cause of death for women of reproductive age and is particularly devastating in rural areas. Measuring the maternal mortality rate (MMR) in a given country is a difficult process where variations in methodology and sampling commonly lead to widely disparate findings. Estimates of the MMR in Senegal range from 500 to 2,000 maternal deaths per 100,000 live births. A national study in 1988 sponsored by the World Health Organization (WHO), UNDP, and Columbia University chose 850 as the indicative MMR; a recent health sector assessment by the United States Agency for International Development (USAID) selected 600 as the figure of choice but noted the wide variation in estimates (AID9110). The 1992/93 DHS calculated the MMR at 510 for the period 1979-92 (DHS9407). A figure of 750 used by UNDP exceeds the median among rates reported for sub-Saharan Africa and is three times higher than the median among all developing nations (see figure 2.15).

Two factors contributing greatly to maternal and child health problems in Senegal are the high fertility rate and poor nutritional conditions. The 1988 maternal mortality study noted that 69 percent of women had had their first pregnancy at less than 17 years of age, 70 percent had had their workload maintained or increased during pregnancy, and one in five had had more than six children. Most women gave birth at home without any assistance and most did not know any signs of complications. One woman in five was judged to be at high obstetrical risk, according to the study (AID9110). An additional risk factor for maternal mortality in Senegal is the practice of female genital mutilation, prevalence of which is estimated at twenty percent of women, predominantly in the North and Southeast of the country (FGM9301).

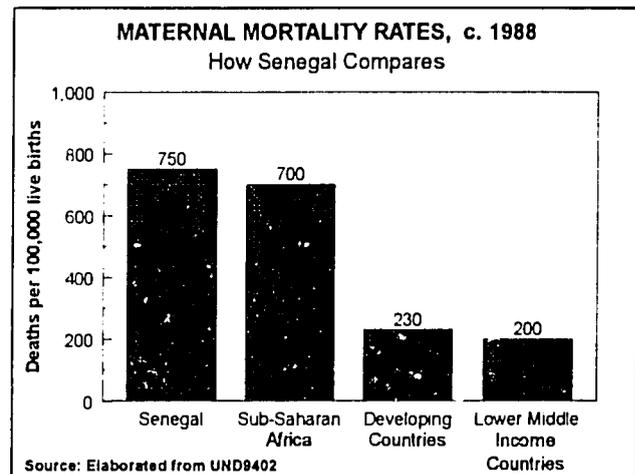


Figure 2.15

Maternal deaths are commonly the result of a lack of understanding among mothers and health workers of the major risk factors associated with pregnancy. According to a recent health sector assessment for USAID, the situation in Senegal could be improved through early and clear risk identification and better systems for counseling, referral, and treatment of maternal afflictions (AID9110).



Specific Health Problems

Vector-Borne Diseases

Among Senegal's greatest public health hazards are diseases carried by mosquitos, flies, and other vectors. As throughout sub-Saharan Africa, malaria is by far the most devastating. Also of significance are onchocerciasis (river blindness), trypanosomiasis (sleeping sickness), schistosomiasis, and Guinea worm disease (the latter two are discussed under diseases related to water and sanitation). Many vector-borne diseases are not reported in significant numbers on a national scale but have pronounced impact in high-risk pockets. Frequently, these focal points are associated with environmental impact of large-scale development activities. For example, areas near recently constructed dams have been found to exhibit not only increased transmission of malaria and schistosomiasis but also also higher incidence of tick-borne borreliosis as well as rat-borne leishmaniasis (WHO9307).

Malaria. Malaria is a major cause of death and illness among the entire population, accounting for 40 percent of recorded morbidity and mortality in 1985 (AID8907), but has the gravest impact among young children and pregnant women. Malaria may account for up to one-fifth of deaths among all children under five years of age. Deaths due to malaria before the age of one are less common, owing to the presence of maternal antibodies during infancy. By the age of three, most children have developed immune responses (AID9110).

Malaria transmission occurs throughout Senegal. Incidence is highest during the rainy season, but stagnant pools of water and liquid wastes nurture the mosquito vector year-round. In the Senegal River Valley, large swamps, lakes, and poorly drained impoundment areas near the river banks provide ideal breeding places for mosquitos. Rice irrigation projects, if not correctly managed, can also allow permanent, year-round mosquito breeding (WHO9307). The main vectors in Senegal are *A. gambiae* mosquitos. Although chloroquine-resistant strains of malaria did not arrive into most of West Africa until 1987, there is some indication that resistance may have been present in Senegal as early as 1985 (VBC8801). Chloroquine resistance is found in 25 to more than 60 percent of children in African countries, but treatment with chloroquine remains effective in most cases. The mortality study in Mlomp noted that an antimalarial program promoting regular doses of chloroquine during the rainy season contributed to declining prevalence of malaria parasitemia (from 60 percent of children in 1960 to just three percent in 1989) and a much reduced risk of death due to malaria (NAP9301).

Reliable quantitative data on incidence and prevalence of malaria are not available on a national scale. The 1992/93 DHS sought to illuminate prevalence patterns by asking mothers whether their children had suffered a fever in the previous four weeks. Overall four-week prevalence of fever was found to be over forty percent in rural areas and roughly one-third in urban areas. Children in the Northeast region were found to suffer the highest prevalence at 46 percent (see figure 2.16). The survey found that one-third of children with fever did not receive any kind of treatment, while 31 percent were taken to a medical facility, 22 percent were given antimalarial drugs, 21 percent received antibiotics, five percent received injections, and 22 percent received other drugs such as aspirin. Ten percent of the children with fever were reportedly given a traditional remedy (DHS9407).

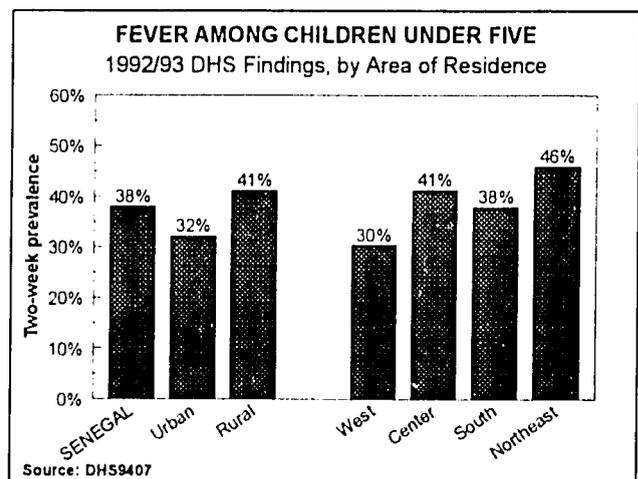


Figure 2.16



River Blindness (Onchocerciasis). "Oncho" is a non-fatal eye disease caused by a worm transmitted by the bite of the blackfly, which breeds in fast-flowing rivers. Moving through the body, the worms invade the eye, where the build-up of dead worms eventually causes lesions and blindness. Because of the tragic consequences of onchocerciasis, fertile land and villages throughout West Africa have been deserted in favor of higher, but usually much poorer, ground. The *Simulium* flies which transmit the disease are known to be present in large numbers in the upper valley of the Senegal River but little data exist regarding incidence of onchocerciasis in Senegal (AID9110). The Onchocerciasis Control Program (OCP), an international effort executed by WHO and sponsored by UNDP, the UN's Food and Agriculture Organization (FAO), the World Bank, and 19 donor governments, has identified the sparsely-populated, southeasternmost corner of Senegal as an area at medium risk of onchocercal blindness, including a high-risk focal area in the upper Gambia River valley (WHO9107). Under the OCP, the drug *Ivermectin*, which paralyzes and sterilizes the parasitic worm that causes "oncho," is distributed free to countries that request it (GPI9001).

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 South and Southeast of Senegal are considered endemic and the disease has reportedly affected agricultural activities in the western part of Fatick region (AID9110). Senegal has not reported any cases of trypanosomiasis to WHO since reporting five in 1976 (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 via the *Aedes aegypti* mosquito. Since 1976, mosquito vectors have been routinely monitored in the Kedougou area in southeast Senegal and a striking correlation has been found between increased yellow fever virus isolations from mosquitos captured in Kedougou and outbreaks of the disease in humans in West Africa. There is a clear indication that increased yellow fever activity is occurring in the sylvatic cycle around eastern Senegal, a fact which should serve as a warning to surrounding West African countries of an increased risk of yellow fever, especially among rural populations (WHO9412). All of southern Senegal is in the endemic zone for yellow fever and outbreaks of the disease have tended to occur at intervals of several years. Areas just north of endemic zones are at even higher risk because human immunity levels are negligible and epidemics can run rampant (WHO9106).

Exact prevalence and incidence of yellow fever 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. A massive outbreak in Diourbel, Senegal, in 1965 resulted in an estimated 2,000-20,000 cases, with a case-fatality rate (CFR) estimated at up to 44 percent. A more recent outbreak in 1982 resulted in just two reported cases and no fatalities (WHO8601); yellow fever appeared again in southeastern Senegal in 1987 (WHO9106). No recent human cases have been noted in Senegal, but elsewhere in the region, a yellow fever outbreak occurred in October 1993 in Ghana (WHO9412). 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 (WHO9503). In Senegal, both DHSs found yellow fever vaccination coverage among one-year-olds at around 55 percent (see figure 2.24). The 1992/93 DHS found that 68 percent of children in urban areas but just 48 percent in rural areas were vaccinated against yellow fever. These levels of coverage stand just below each of those found for the four traditionally recommended childhood vaccines discussed below under vaccine-preventable diseases (see figure 2.20)(DHS9407).



Acute Respiratory Infections (ARIs) and other Airborne Diseases

ARIs are among the top causes of infant and child mortality in Senegal, accounting for 23 percent of deaths among children under five years of age and 27 percent of infant deaths (including measles: 28.5% and 30.1%, respectively), according to the Sine-Saloum survey (see figures 2.10 and 2.13)(AID9508). 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). In Niakhar, pneumonia alone accounted for nearly five percent of neonatal deaths recorded in Niakhar in 1983-89 (see figure 2.7) and nearly ten percent of deaths among vaccinated under-fives in 1987-92 (see figure 2.14).

To obtain information on the prevalence of respiratory infections among children in Senegal, the 1992/93 DHS asked mothers whether each of their children had experienced a cough with rapid or difficult breathing in the two weeks preceding the survey. Overall prevalence was found to be 14.0 percent, with children in rural areas suffering slightly more than those in urban areas and children in the Center region suffering the highest prevalence of all (17.0%)(see figure 2.17). Among age groups, prevalence was highest among infants less than six months old (19.6%), ages 6-11 months (20.8%) and 12-23 months (18.4%), and then declined sharply with increasing age. The survey found that 27 percent of children with a cough and short or rapid breathing were taken to a medical facility. One-fifth were given cough syrup, 18 percent received antibiotics, 13 percent were treated with a traditional remedy, and four percent with an injection (DHS9407).

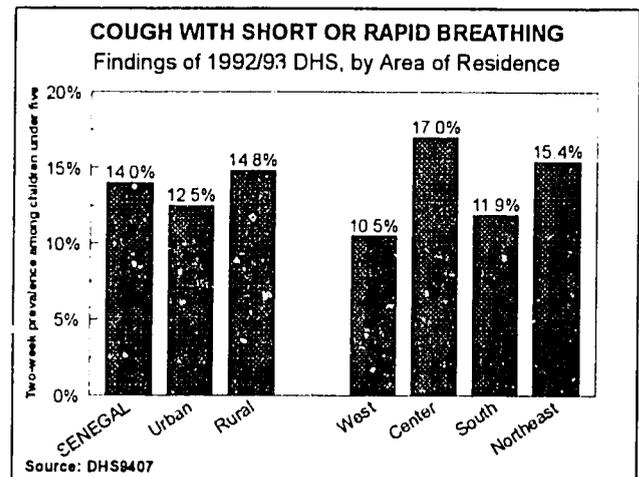


Figure 2.17

Other airborne diseases of significance include meningitis, for Senegal is located in what has been called the "meningitis belt" of Africa, an area which includes neighboring Guinea and Mali as well as Sahelian nations to the east (AID9110). Incidence varies greatly both seasonally and annually. The Sine-Saloum survey in 1982/83 found that 3.6 percent of all deaths reported among under-fives and 5.2 percent of infant deaths could be attributed to meningitis (see figures 2.10 and 2.13). Data from Niakhar suggests that meningitis was responsible for 2.7 percent of postneonatal (infant) deaths and 2.0 percent of deaths among children ages one through four (see figures 2.8 and 2.12).



Diseases Related to Water and Sanitation

Deficiencies in water supply and sanitation measures are responsible for a great deal of suffering and mortality in Senegal. 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 2.11-2.14 above, intestinal problems, including diarrheal diseases, are the specified cause of 20-30 percent of reported child deaths in Senegal.

About half of the population of Senegal is thought to have reasonable access to safe water and 56 percent to adequate sanitation measures, according to figures tracked by WHO (for definitions, see data notes in Appendix B). These figures are relatively good among sub-Saharan nations but stand below the median levels among lower middle-income nations and developing nations in general (see figure 2.18). Figures 2.19 and 2.20 indicate access levels reported over time for rural and urban areas since 1980. While more than three-quarters of the urban population have enjoyed reasonable access to safe water and adequate sanitation measures since 1980, access levels in rural areas have scarcely risen above 35 percent of households.

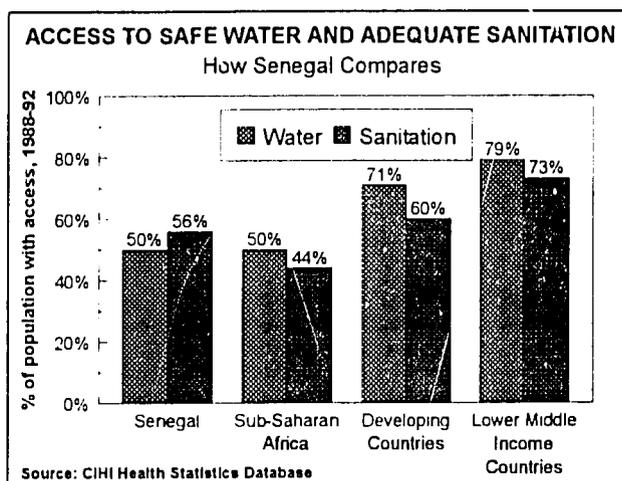


Figure 2.18

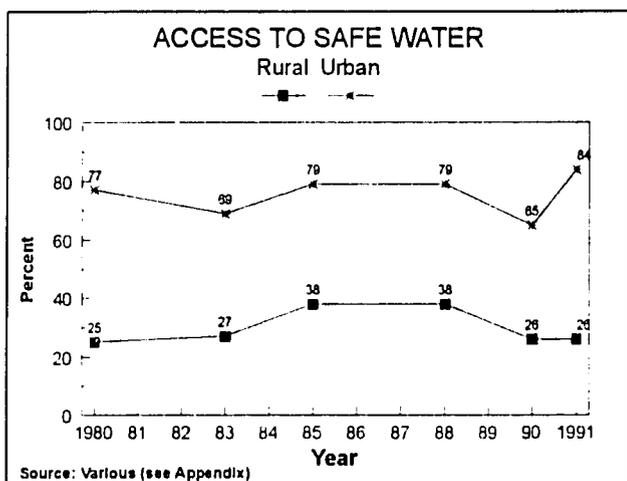


Figure 2.19

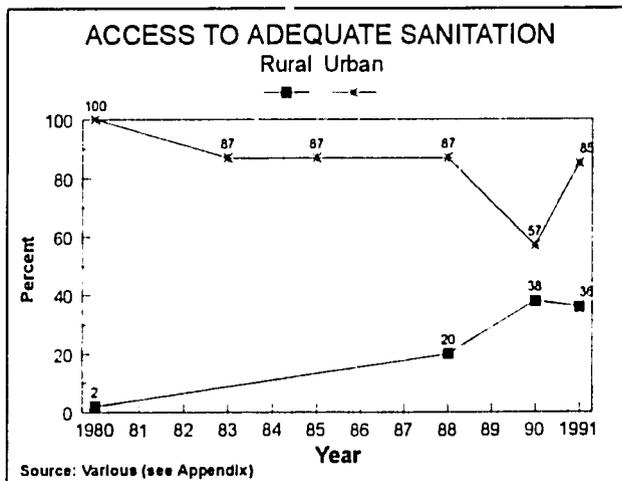


Figure 2.20

Diarrheal Diseases. Diarrheal diseases are most common among children at the time of weaning and as they start to become more mobile. In sub-Saharan Africa, diarrhea is generally the most common cause of death during the postneonatal period and the second most common among children aged 1-4 years. As indicated in figures 2.13 and 2.14, diarrhea was the specified cause of roughly one-quarter of children's deaths in both the Sine-Saloum survey and the more recent research in Niakhar. Diarrhea may also contribute indirectly to high mortality through malnutrition and micronutrient deficiency, which are important underlying factors for a high proportion of child mortality in sub-Saharan Africa. A study of diarrhea-associated deaths in children under five years of age in 30 villages in Senegal found that 46 percent of the deaths were cases with acute diarrhea, 47 percent with persistent diarrhea (an episode of at least two weeks duration, commonly associated with malnutrition), and eight percent with dysentery. In addition to contaminated water, a major source of infection with diarrheal disease is weaning foods, which are often stored and fed to the child throughout the day (NAP9301).



Estimates of diarrheal incidence in Senegal vary widely. A survey conducted by WHO in 1991 found that Malian children under five years of age suffer an average of 4.8 episodes of diarrhea each year (WHD9201). This rate, which is just above the median among sub-Saharan nations, is comparable to estimates of 4.7 in 1985 (WHD8700) and 4.4 in 1986 (WHD8800). All of these incidence rates are considerably lower than a 1988 estimate of 6.5 episodes per child by the MOH's diarrheal disease control program (WHD9000) and a rate of 9.6 episodes per child found by a household survey in 1987 (WHD8900).

Demographic and Health Surveys (DHSs) typically calculate diarrhea prevalence rates based on mothers' reports of children's diarrheal episodes during the two weeks preceding the survey. The surveys also seek data on twenty-four-hour prevalence and prevalence of bloody stools, which are indicative of dysentery. Figures 2.21 and 2.23 summarize some of the DHS findings for Senegal. The two-week prevalence rate of 37.9 percent found in 1986 is the second-highest ever found by a DHS in Africa. While the peak season for diarrhea is said to be the rainy season between June and October (AID9420), this survey was conducted between April and July. The rate found by the second DHS (field work conducted Nov. 1992 - Aug. 1993) is just over half the 1986 finding, a trend which holds true for most of the geographic divisions as well (see figure 2.21). The two surveys found prevalence in rural areas to be 35-44 percent higher than in urban areas; both also found the highest prevalence in the Center region (DHS9407).

Twenty-four-hour prevalence in 1992/93 was found to be 8.8 percent (5.9 percent in urban areas, 10.3 percent in rural). Prevalence rates for both intervals were highest among children ages six to 23 months. Two-week prevalence of dysentery was found to be highest among one-year-olds at five percent (see figure 2.22).

One reason for high mortality due to diarrhea in Senegal may be the failure to administer oral rehydration therapy (ORT) to children threatened with dehydration. As indicated in figure 2.23, use of ORT in Senegal lags far behind typical levels of nearly 50 percent in Africa and elsewhere. The 1992/93 DHS found that just 6.6 percent of children with diarrhea received packets of oral rehydration salts (ORS) and 11.4 percent received

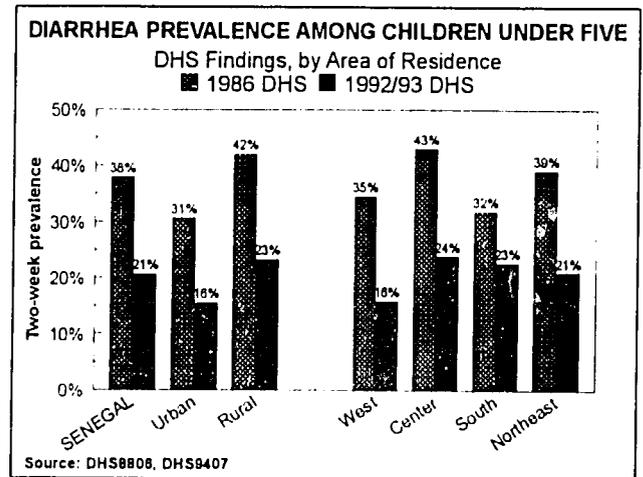


Figure 2.21

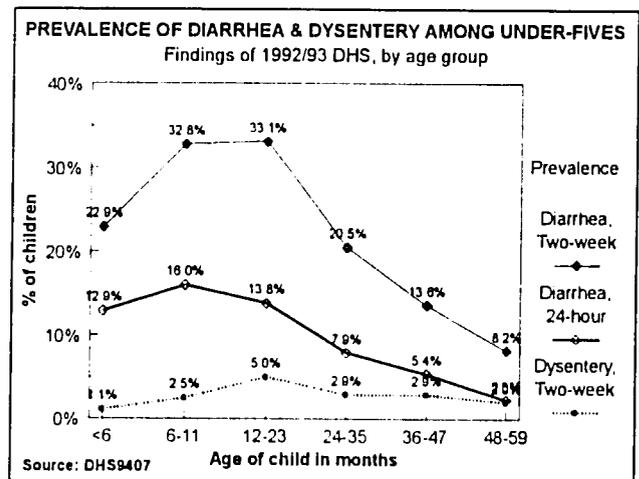


Figure 2.22

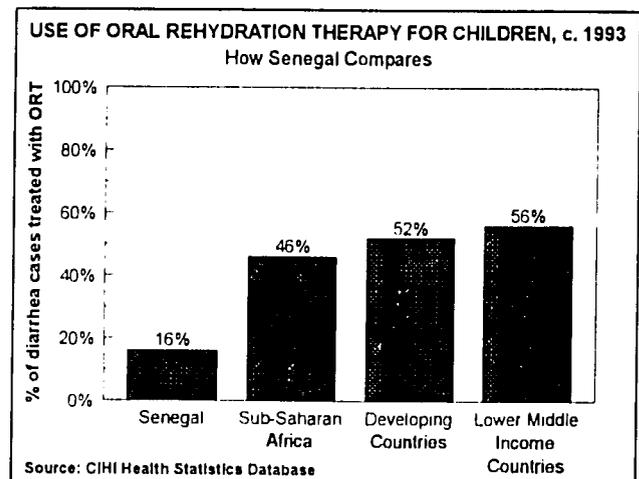


Figure 2.23



acceptable home solutions. The survey also found that 42 percent received increased fluids, 34 percent were given a traditional remedy and 23 percent were taken to a medical facility. More than half (52%) of the children with diarrhea received neither ORT, a home solution, nor increased fluids. Use of ORT, home solutions, and increased fluids was only slightly more frequent in urban areas over rural (DHS9407).

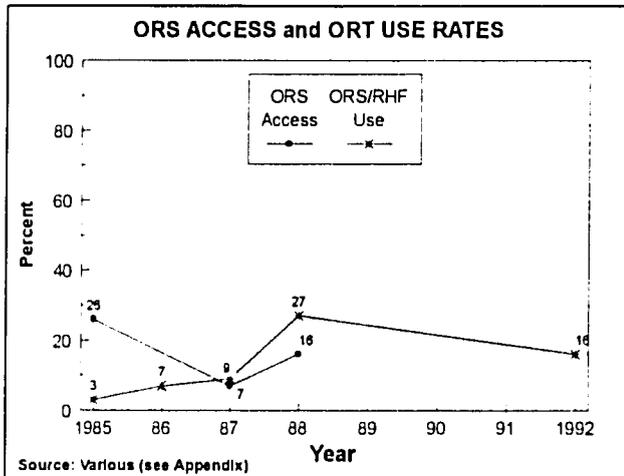


Figure 2.24

Figure 2.24 charts out progress in increasing ORT use rates in Senegal since the mid-1980s. A recent survey by USAID's BASICS project examined case management of diarrhea in facilities at various levels of the health care system in Fatick, Kaolack, Louga, and Ziguinchor. Although the survey found that health workers generally properly recognized the degree of dehydration and prescribed ORS or home solutions in over 80 percent of cases, the quality of diarrhea case management was found to be generally quite low. Following case management definitions jointly established by WHO and UNICEF, the BASICS project found that only five percent of cases were managed correctly: 36 percent were evaluated correctly, 21 percent were correctly rehydrated, and just 14 percent received appropriate advice. Among cases with dysentery, just 40 percent were found to have received appropriate antibiotics (AID9420).

Cholera. Cholera, an acute diarrheal disease, appears sporadically in Senegal. One of the most recent epidemics of cholera hit Senegal in 1986-87 (HPP9002). In the 1980s, Senegal 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). As indicated in figure 2.12, nearly four percent of deaths reported among children ages 1-4 in Niakhar between 1983 and 1989 were attributed to cholera, an unusually high figure considering the long period of time covered by the study. Senegal has not reported any cases of cholera to the WHO in the 1990s, but the disease appeared in neighboring parts of Mali in 1995 (WHO9503).

Trachoma. Trachoma is caused by repeated reinfection with the bacterium *Chlamydia trachomatis*. The disease 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). Along with vitamin A deficiency, and onchocerciasis, trachoma is one of the major causes of blindness in Senegal (AID9110).

Helminth Infections. Helminth infections include a wide variety of diseases caused by worms which contribute to malnutrition, anemia, and other health disorders. Typical examples are ascaris, hookworms, and trichuris. Filariasis and schistosomiasis are two helminth infections strongly associated with the ecological impact of water resource projects; lymphatic filariasis leads to elephantiasis (WHO9307). Very little hard data exists on prevalence or incidence of most types of helminth infections, but Guinea Worm in particular has been tracked closely as part of an international effort to eradicate the disease. While many helminth infections are treatable on a case-by-case basis, the most effective overall strategy is prevention through improved water supply, sanitation, and hygiene practices.



- **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. Senegal is one of 18 African countries which started the decade with endemic Guinea Worm. Since 1991, the first year in which a national case search was conducted, the number of cases reported has dwindled (see figure 2.25). Case incidence has generally been highest in July through September (WHO9408). In 1995, only 33 cases had been reported through September, indicating that eradication of indigenous Guinea Worm is close to complete in Senegal (CDC9504).

After interventions were energetically implemented in all known endemic villages in 1992, about 30 percent of those villages reported no cases in 1993. However, another 51 newly endemic communities were discovered in 1993. By the end of 1994, Senegal's Guinea Worm Eradication Program (GWEP) had implemented health education activities in all known endemic villages, had a trained village health worker in 87 percent, had provided cloth filters to protect water supply in 88 percent, and had assisted with improvements in water supply in 39 percent of endemic villages (CDC9403). As of April 1995, Senegal was reported to have a total of just 49 villages with endemic Guinea Worm, all of which were under case containment activities of the GWEP (CDC9502).

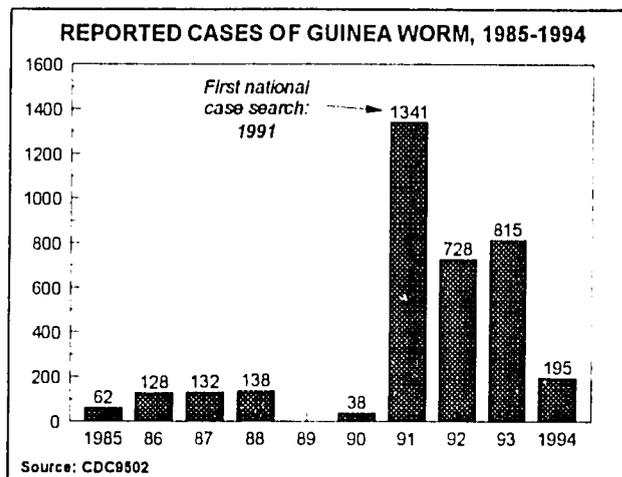


Figure 2.25

- **Schistosomiasis (Bilharziasis).** Schistosomiasis is a blood fluke infection acquired from water containing worm larvae which develop in snails. Senegal is considered to be an area of high endemicity. Of all the diseases associated with water development schemes, including malaria, onchocerciasis, and lymphatic filariasis, the most significant reported increases in disease prevalence and public health importance concern schistosomiasis. Although "schisto" does not kill, like malaria, or cause dramatic illness, as does lymphatic filariasis, in affected communities it is always recognized as a major health problem to which people attribute much misery. Immediate effects of the infection, including 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 (WHO9307).

Schistosomiasis is most prevalent in irrigated areas and near man-made bodies of water. Irrigated rice fields along the Senegal River, for example in Lampsar and Guede Chantier, are strongly associated with increased prevalence of urinary schistosomiasis and now require regular surveillance for new foci of *S. haematobium*, the more common variety of the disease. One and a half years after the 1986 opening of the Diama Dam on the Senegal River at St. Louis, Senegal's first cases of *S. mansoni* infection were reported. In the last quarter of 1989, 71.5 percent of over 2,000 routine stool examinations in the area tested positive for infection (WHO9307).



Vaccine-Preventable Diseases

Vaccine-preventable diseases, including measles, tetanus, tuberculosis, pertussis, diphtheria, and polio, account for at least 15-25 percent of child deaths reported in Senegal, according to the tallies illustrated in figures 2.11-2.14 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. Neonatal tetanus (NNT), which is preventable through vaccination of pregnant women, may account for forty percent of neonatal deaths, according to the verbal autopsy data from Niakhar (see figure 2.7). The expansion of vaccination services and their integration into the primary health care (PHC) system in the 1970s and 1980s are widely credited with playing a significant role in the reduction of under-five mortality in Senegal.

Measles, tetanus, and even polio all appear as significant causes of child deaths as reported by family members, the methodology used to obtain the Sine-Saloum survey data and about one-third of the data for Dakar and Saint-Louis (see figures 2.9-2.11, 2.13). However, because of the difficulty of diagnosing some vaccine-preventable diseases, this methodology tends to undercount their overall impact. One study in Senegal, for example, found that self-reports by families resulted in 20 of 26 NNT deaths being ascribed to other causes (fever [1], prematurity or low birth weight [3], other causes [5], and unknown causes[11])(OUP9301). In many cases, facility-based reporting and deeper analysis of verbal autopsies provide a more complete picture. This is reflected in the data for Niakhar, which, through analysis of verbal autopsies, properly identifies NNT as a major cause of infant deaths and pertussis as a significant cause of child deaths (see figures 2.7, 2.8, and 2.12)

Case totals for vaccine-preventable diseases reported to the WHO's Global Programme for Vaccines (GPV) between 1989 and 1994 are presented in table 2.1. Although reporting by Senegal is more comprehensive than that by most other sub-Saharan African nations, rises and falls in these figures are still often a better reflection of fluctuations in reporting than actual changes in incidence.

SENEGAL: REPORTED ANNUAL INCIDENCE OF VACCINE-PREVENTABLE DISEASES						
Disease	1989	1990	1991	1992	1993	1994
Measles	10,940	5,004	11,427	15,637	14,693	5,944
Tuberculosis	5,965	4,977	5,025	6,386	6,487	-
Pertussis	1,523	1,041	375	541	1,518	509
Tetanus	101	109	61	72	-	35
Neonatal tetanus	80	67	100	52	63	24
Polio	10	3	8	9	2	2
Diphtheria	-	-	-	-	-	-

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

Table 2.1

DHS findings on the vaccination status of one-year-olds indicate that coverage levels remained about the same between 1986 and 1992 for those vaccines requiring a single dose (BCG, measles, and yellow fever) but improved markedly for the diphtheria, pertussis and tetanus (DPT) vaccine and the polio vaccine, each of which require separate administration of three doses (see figure 2.26). This suggests that follow-up activities have improved. The latest data tracked by the WHO/GPV, which measures vaccination coverage by age one, indicates that coverage rates reached a peak in the late 1980s and early 1990s but have slacked slightly in the meantime (see figures 2.29 - 2.33 and table A5 in Appendix A).

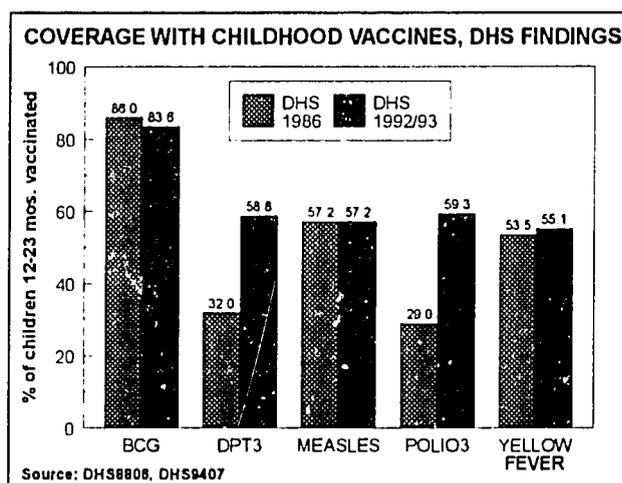


Figure 2.26

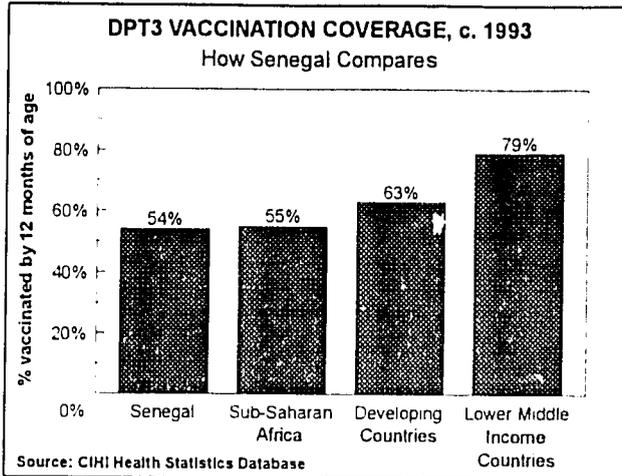


Figure 2.27

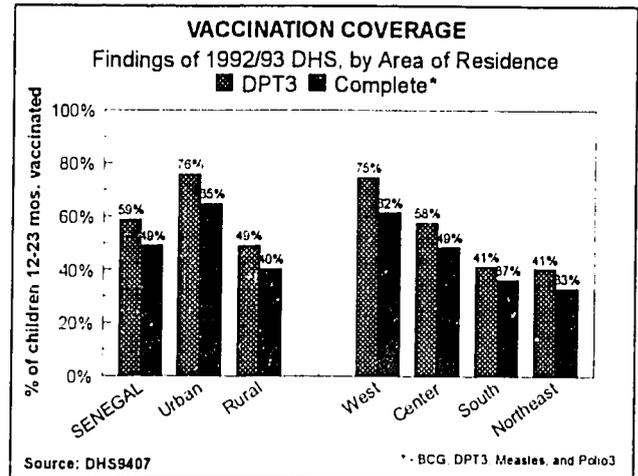


Figure 2.28

Senegal's vaccination coverage levels were higher than most African nations' rates in the 1980s. Today much of Africa has caught up to and even surpassed Senegal's level of coverage, as indicated for the case of DPT3 vaccination in figure 2.27, which reports the DHS finding for coverage by age one in 1992/93. The DHS found that 49 percent of one-year-olds had received all four recommended vaccines (not including yellow fever vaccine). As indicated in figure 2.28, coverage rates were found to be more than fifty percent higher in urban areas than rural. In the South and Northeast regions, only about one-third of children were found to be completely covered.

Measles. Measles is a highly communicable viral disease which has its most severe impact among infants and malnourished children. It is a more significant factor in child mortality in Africa than elsewhere because of higher fertility rates, which quickly replenish the population of children who have not had measles, and the common tendency of extended families living in enclosed areas. Higher case-fatality rates (CFR) in Africa are also related to the low level of health services available in many areas (NAP9301). Reported cases of measles in Senegal hit a high for recent years of over 15,000 in 1992 (see table 2.1). The WHO estimates that about six percent of measles cases in Senegal are fatal (WHO9103).

Because children are generally protected by maternal antibodies for much of their first year of life, deaths due to measles are much more common in the second year. The actual share of mortality or morbidity attributable to measles can vary widely from year to year. In the figures presented above, measles was found to account for 2-10 percent of infant deaths and 8-28 percent of deaths among children ages one through four (see figures 2.8-2.13). Another study in Senegal in 1963-1965 found that measles accounted for 26 percent of deaths among children ages one through four and 19 percent of all deaths under five years of age. During epidemic years, however, measles can reportedly be responsible for 50 percent of all deaths at ages one through four. Because measles often leads to severe diarrhea or respiratory infections, it is probably an underlying cause of many more child deaths than specifically acknowledged (NAP9301). 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).

Because of the increased risk of measles in Africa and because maternal antibodies are thought to wane earlier in African children, the recommended age of vaccination is 9-11 months for tropical Africa, compared to 12-15 months for Europe and the U.S. In some areas, programs have lowered the age for measles vaccination to just six months. The most common measles vaccine in Africa is the Schwarz vaccine, an attenuated live vaccine introduced in 1966. In a recent clinical trial conducted in Senegal, the efficacy of this vaccine given at 10 months of age was 98 percent (NAP9301). Unfortunately, Senegal's levels of vaccination coverage against measles by one year of age have remained below fifty percent since 1992 (see figure 2.29).



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. Senegal has not reported any diphtheria case totals to WHO. According to WHO, coverage rates for the recommended three doses of DPT vaccine have been fairly stable between 50 and 60 percent since the mid-1980s (see figure 2.30).

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 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 CFR for pertussis is typically about one percent in African nations, with the highest mortality observed among children under two (OUP9301). Data from Niakhar identified pertussis as the cause of 6.1 percent of infant (post-neonatal) deaths and 4.2 percent of deaths among children ages one through four in 1983-89 (NAP9301). According to case totals reported to WHO/GPV, pertussis is the third most frequently reported vaccine-preventable disease in Senegal (see table 2.1).

Tetanus. Tetanus is caused by contamination of wounds with an anaerobic bacillus. As a childhood disease, it is preventable through vaccination of women of reproductive age (TT2+) and children (DPT). 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. It kills more children worldwide than any other vaccine-preventable disease except measles, 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.

Research in Niakhar attributed nearly 40 percent of neonatal deaths to NNT (see figure 2.7). A community survey in Senegal in 1955 reported one of the highest NNT mortality rates ever found, 80 deaths per 1,000 live births. A more recent and better documented effort in 1983-86 found an NNT mortality rate of 16, still among the highest found in Africa, noting that NNT accounted for 31 percent of all neonatal deaths (OUP9101). Vaccination of pregnant women to prevent NNT began to reach significant levels in Senegal in the late 1980s. After reaching over fifty percent in 1993, the coverage rate reportedly dropped to about one-third of pregnant women in 1994 (see figure 2.31).

Polio. Senegal has been a relatively high-incidence country for polio in the recent past, but recorded case totals have declined to just two new cases per year since 1993 (see table 2.1). The finding in

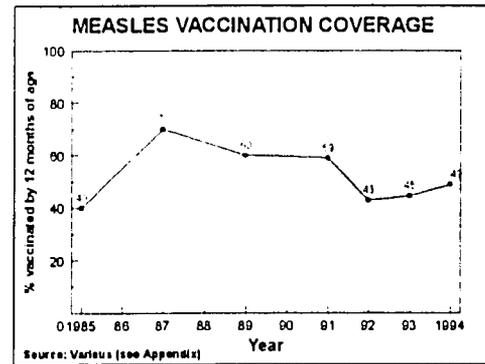


Figure 2.29

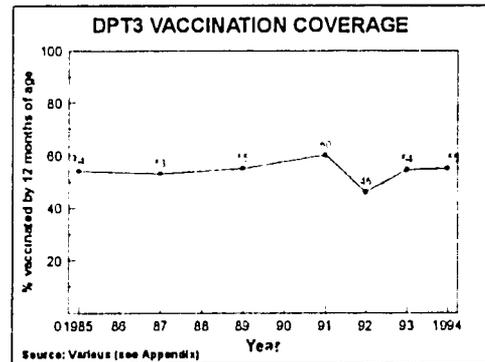


Figure 2.30

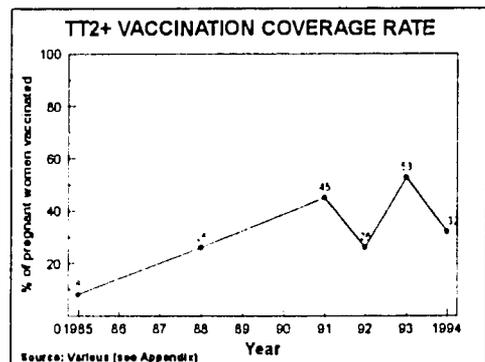


Figure 2.31

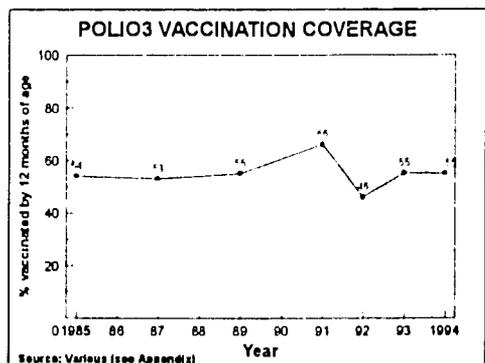


Figure 2.32



Sine-Saloum that polio accounted for 2.0 percent of infant deaths and 1.2 percent of all deaths among under-fives in 1982-83 is astounding, implying that five out of the nearly 400 deaths reported under the survey were attributed to polio (see figures 2.10 and 2.13). An outbreak of polio occurred in 1986 near the Gambian border in Kolda (HPP9002). According to reports by WHO/GPV, coverage against polio by age one with the recommended three doses has been stable at just over fifty percent since the mid-1980s (see figure 2.32).

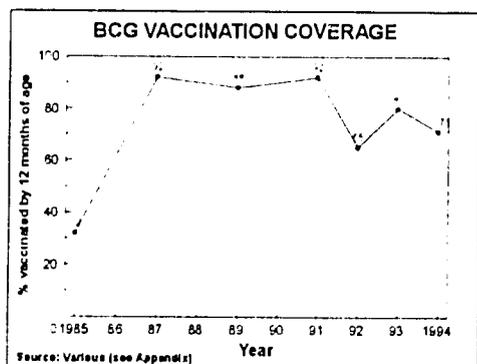


Figure 2.33

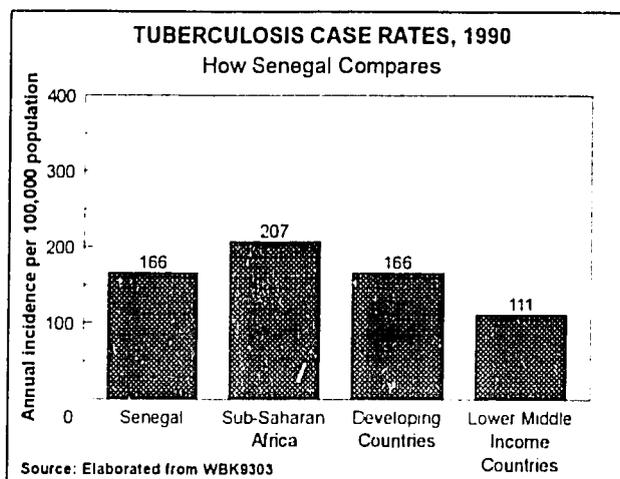


Figure 2.34

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 Senegal, 166 cases of TB per 100,000 population, is below the median level among sub-Saharan African nations and equal to the median for all developing nations. This figure implies an annual total of about 13,000 cases, more than twice as high as the number of cases reported to WHO each year (see table 2.1). Incidence of TB in Senegal is likely to rise with increased exposure of the population to HIV, and consequential higher incidence of AIDS. Immunization against TB only requires a single, easily-administered dose of BCG vaccine. Coverage by age one stood at about 90 percent in the late 1980s and early -90s, but has dropped in recent years to just 71 percent in 1994, 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 865 registered cases of leprosy. The corresponding prevalence rate of one case per 10,000 inhabitants, which is lower than that found in most African countries, represents a significant improvement since the end of the 1980s, when Senegal was considered a high-prevalence country at over 15 cases per 10,000 inhabitants. Coverage through multi-drug therapy (MDT) stood at just 12.6 percent in 1989, but has rapidly expanded to 100 percent of registered cases in 1995. Since the first pilot program opened in 1982, a total of 2,654 cases of leprosy have been cured through MDT, according to WHO (WHO9105,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, while poor nutritional status, in turn, increases susceptibility to disease. The traditional dietary staple in Senegal is millet, but it is being increasingly supplanted by rice. Supplementary foods include corn, sorghum, potatoes, cassava (manioc), and peanuts. Consumption of fish is high, but meat and dairy products are used in limited quantities. Recurring periods of near-famine, known as *soudure*, during the preharvest season contribute to short-term malnutrition (FOF9201). Senegal's serious nutritional problems are not problems of overall food supply but rather of seasonality, infectious disease, and maternal overwork. 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, disorders caused by deficiencies in both iodine and iron are significant public health problems in Senegal (WBK9405). Other evidence suggests that Vitamin A deficiency is also an important issue in Senegal (AID9218).

According to the Human Development Report 1994, ten percent of Senegalese 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). Pregnant women are estimated to consume only 85 percent of normal daily requirements, according to the USAID health sector assessment. Subsequent nutritional problems are directly related to inadequate infant feeding practices. More than half of infants up to four months of age are given water as well as being breastfed, a factor which also contributes to the early prevalence and frequency of episodes of diarrhea. Among infants 6-11 months old, nearly one-quarter (24%) do not regularly eat mushy or solid foods (AID9110). As a child grows older, bouts with malaria, measles, diarrhea, intestinal infections, and other diseases can further jeopardize the child's nutritional status.

The 1992/93 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 about 22 percent of Senegalese children suffered stunting, one of the lowest prevalences ever found for an African nation, and less than one-tenth suffered severe stunting. Higher rates of malnutrition were found among children two through four years old (see figure 2.35). Compared to the findings of the 1986 DHS, chronic malnutrition was found to have decreased in urban areas but increased slightly among the rural population and more significantly in the South and Northeast regions (see figure 2.36).

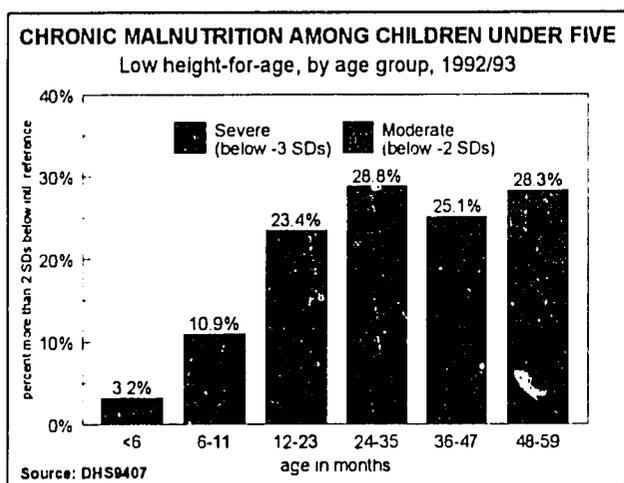


Figure 2.35

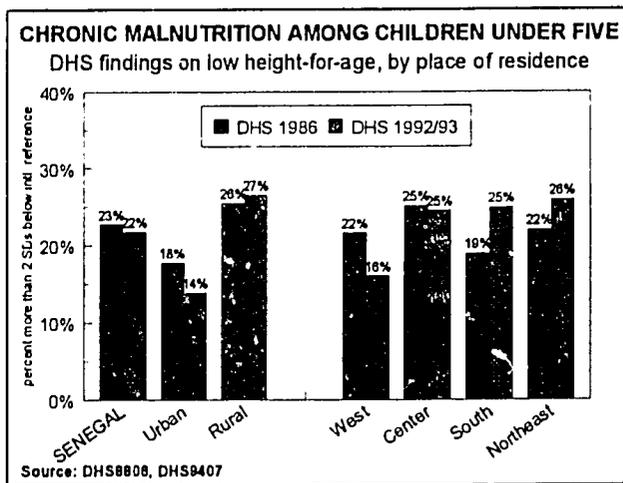


Figure 2.36



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. Major contributors to anemia in children and adults include malaria, hookworm, *kwashiorkor*, and congenital conditions such as sickle-cell anemia (ARN8501). 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, about 55 percent of pregnant women in Senegal suffer anemia, a level well above the median values for sub-Saharan Africa and developing countries in general (see figure 2.37).

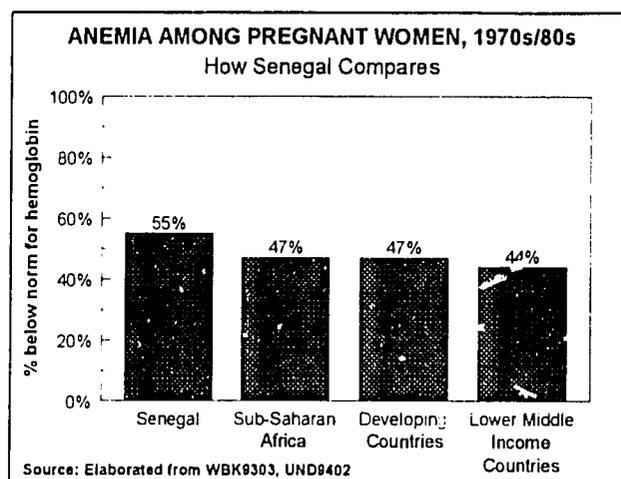


Figure 2.37

Vitamin A Deficiency (VAD). VAD is the most common cause of blindness in many tropical countries. It affects mainly children under six years old, especially those with protein-energy malnutrition, and can lead to *xerophthalmia*, or 'dry eye disease.' It is most common in tropical countries where the customary diet consists only of rice, white maize, cassava, or other vitamin-deficient staples. Often the first symptom of xerophthalmia is night blindness (ARN8501). Although a WHO classification did not note that VAD is a significant public health problem in Senegal, a 1988 survey conducted in a peanut-growing area in Senegal found prevalence of night blindness at 14.1 percent of a sample of 865 children ages 12 months to six years old (the study also found prevalence rates of 2.7 percent for conjunctival xerosis and 0.2 percent for Bitot's spots). As of 1992, the Senegalese government had no vitamin A prevention or control policy, but USAID was funding a project by Florida State University to develop community-based mango-drying as a means to ensure regular vitamin A consumption by vulnerable groups, particularly weaning-age children. The project, known as MANGOCOM, focuses on the development and promotion of *Mango Perental*, a dried mango product produced by women's cottage industries. The Organization de Recherche sur l'Alimentation et la Nutrition Africaine is providing information dissemination services (AID9218, AID9219).



Sexually-Transmitted Diseases (STDs)

Recent decades have seen an increase in the number of recognized major STDs from just 5 to 20. Diseases of public health importance in Senegal include gonorrhoea, treponemal diseases (including endemic and venereal syphilis), hepatitis B (endemic in some areas of Senegal), HIV/AIDS, papillomavirus, chlamydia (AID9110), and trichomoniasis (BUC9502). Proliferation of HIV/AIDS and other STDs remains a real threat, particularly in some trading towns, such as Kaolack and Ziguinchor, even though prevalence rates are lower than in countries such as Gambia, which juts into Senegal geographically, or Cote d'Ivoire (WBK9507).

The MPHSA estimates that 20 percent of all outpatient consultations are for STDs or their complications and that 60 percent of sterility is caused by STDs. Chlamydia in particular has been shown to be an important cause of chronic urethritis. Penicillin resistance among patients with gonorrhoea reportedly rose from 19 to over 50 percent between 1983 and 1985. Although reliable national-level statistics are lacking, small-scale studies and clinic records provide a general idea of the scope of the STD problem in Senegal. In 1990, the MPHSA estimated prevalence of gonorrhoea at 5-10 percent, syphilis at 1.2 percent, and chlamydia at 12 percent (AID9110). Drawing from a database assembled by the U.S. Bureau of the Census, figures 2.38-2.42 present findings on STD prevalence among various population groups in Senegal since 1987.

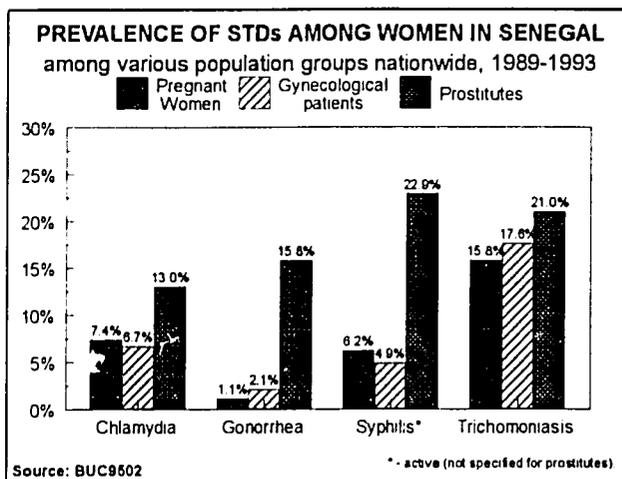


Figure 2.38

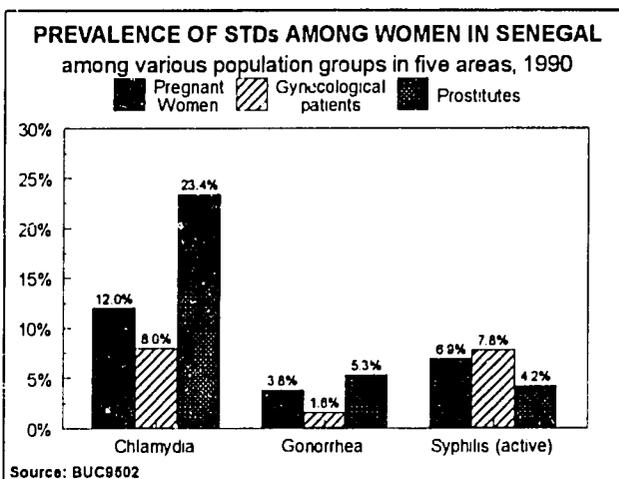


Figure 2.39

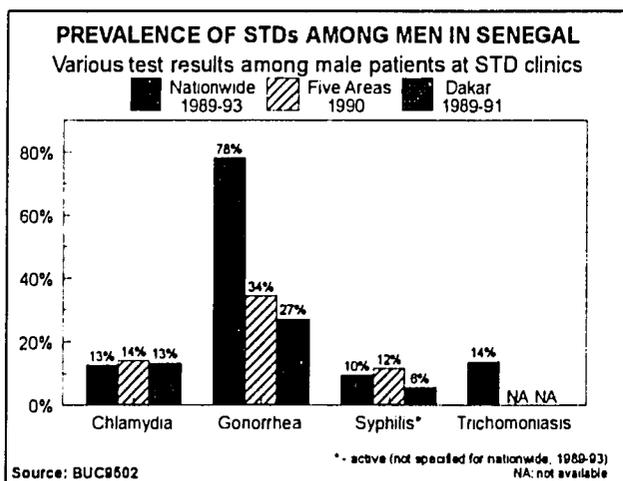


Figure 2.40

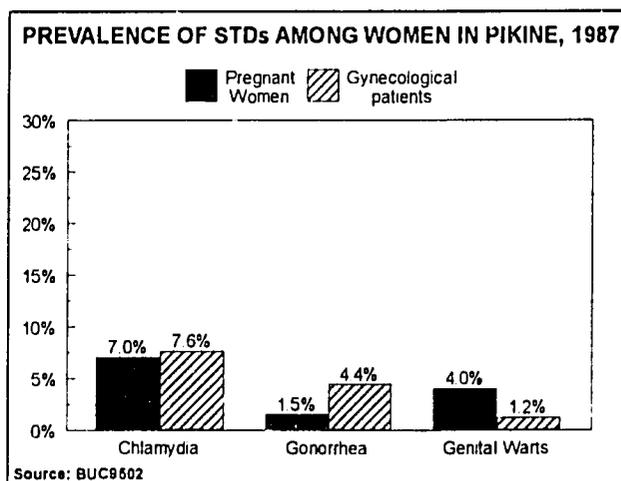


Figure 2.41

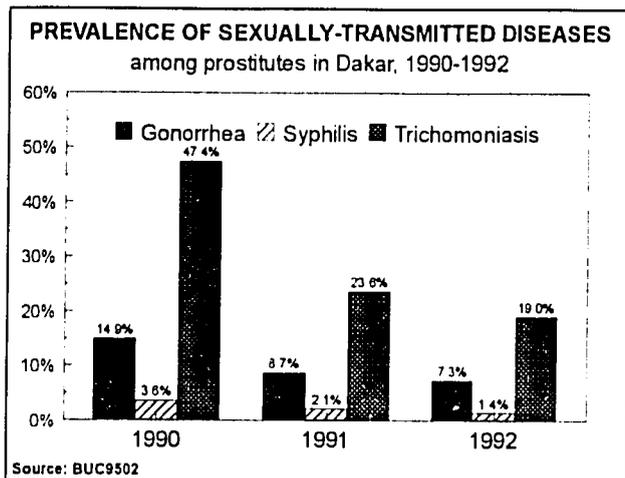


Figure 2.42

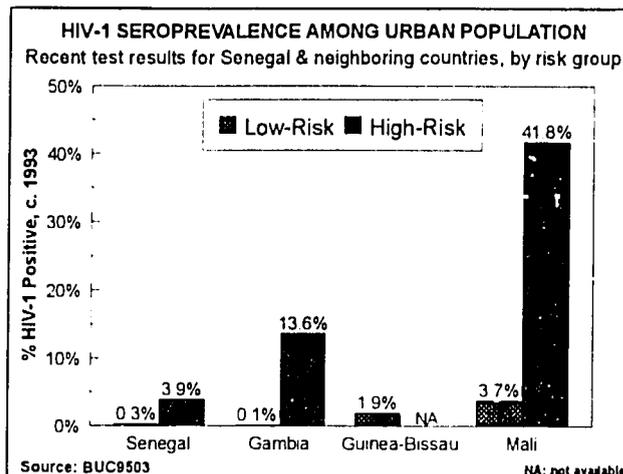


Figure 2.43

As indicated in figure 2.42, prevalence rates for three STDs were found to be declining among prostitutes in Dakar. Testing for HIV antibodies, however, found that HIV-1 was rising among the same population group in 1992 (see figure 4.5 in Section IV).

HIV/AIDS. As of January 1994, Senegal had reported nearly 1300 cases of AIDS to WHO. HIV infection levels for both major strains of the disease, HIV-1 and HIV-2, remain lower than those found in most neighboring countries (see figures 2.43 and 2.44), but levels of infection with HIV-1 are on the rise. More information on the HIV/AIDS pandemic in Senegal and efforts to combat it appears in Section IV below.

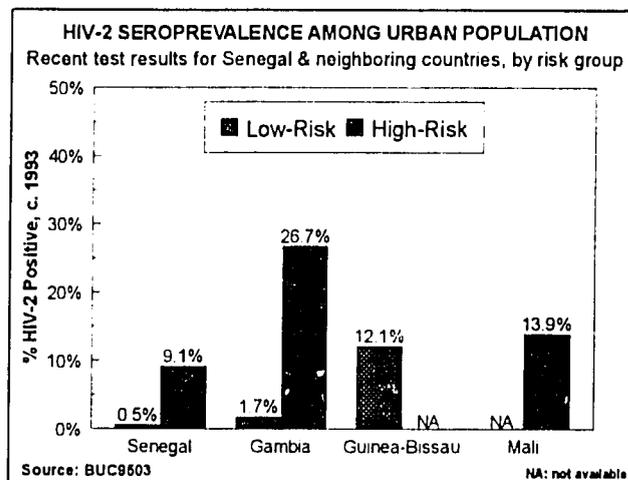


Figure 2.44



III. HEALTH SECTOR ASSESSMENT

Health Care Services

Access and Utilization of Services

According to UNICEF, just 40 percent of the population of Senegal lived within one hour's travelling time to modern health services in the late 1980s (UNI9501). This is a very low level of access by African standards and stands at less than half the median level among developing countries (see figure 3.1). The problem is acute in isolated rural areas. While the majority of formal services are located in the public sector, private voluntary organizations (PVOs), formal for-profit providers, and traditional practitioners also form important components of the health sector.

Statistics reported by the UN on utilization of maternal and child health care services are illustrated in figures 3.2 and 3.3. According to the Human Development Report 1994, only 21 percent of pregnant women receive prenatal care in Senegal, less than one-third the median level for sub-Saharan Africa and developing nations in general. The 1992/93 DHS, however, found that prenatal consultations with a doctor preceded 5.2 percent of births and consultations with a nurse or midwife (*sage-femme*) preceded 68 percent. Levels of prenatal care by trained personnel exceeded ninety percent in urban areas and in the West region but stood between 60 and 70 percent in rural areas and in the Center, South, and Northeast regions (DHS9407).

UNDP statistics on births delivered by trained medical personnel are slightly more encouraging, with Senegal's reported level of 41 percent serving as the median among sub-saharan nations. The implication, however, is that nearly 60 percent of births are not attended by trained personnel and thus occur at a higher risk for mother and child. The 1992/93 DHS found that nearly half (46.9%) of all births in the five years preceding the survey took place at a health establishment but only 30 percent of those in rural areas. The DHS also found that two percent of births were attended by a doctor, 45 percent by a nurse or midwife, and 28 percent by a traditional birth attendant (TBA)(DHS9407).

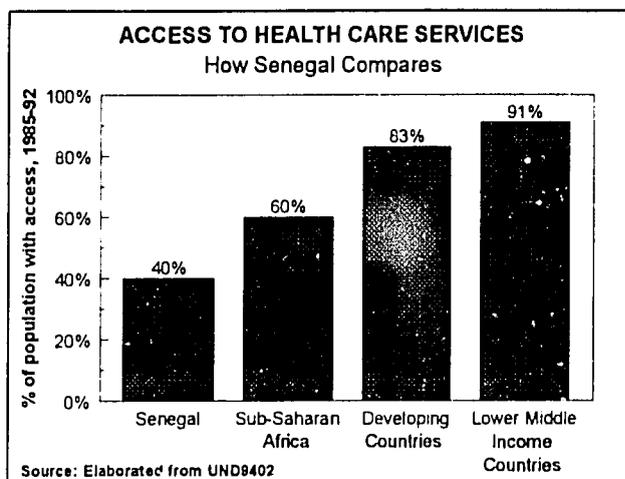


Figure 3.1

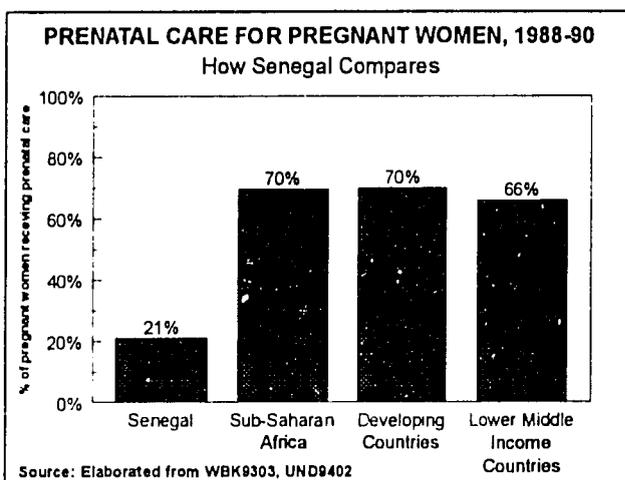


Figure 3.2

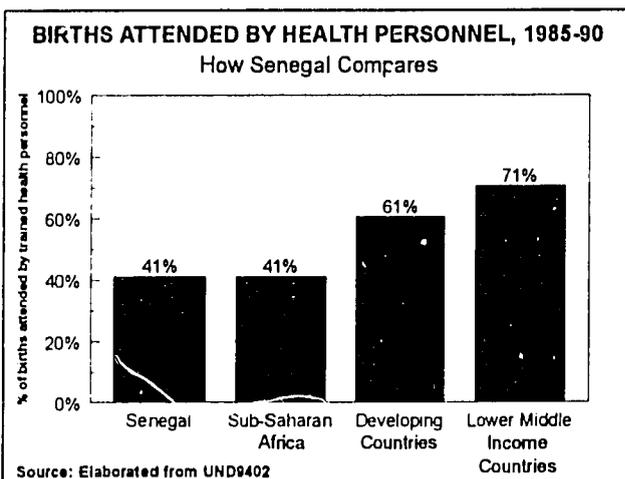


Figure 3.3



According to the MPHSA, overall utilization of public health services declined significantly between 1978 and 1985. Despite an increase in population by over twenty percent in this period, the number of patients seeking consultations dropped by 36 percent, the number of days of hospitalization by 67 percent, and the hospital utilization rate by 22 percent (BRK9301).

Health Care Personnel & Facilities

According to the Human Development Report 1994, there are roughly 20,000 inhabitants per physician in Senegal, a ratio far higher than the medians among sub-Saharan African and developing nations (see figure 3.4). A more alarming indication of the serious dearth of trained medical personnel in Senegal is the ratio given for nurses, which at 7,690:1 is more than triple the median ratio among sub-Saharan nations. These ratios vary widely with the use of different data sources and definitions of health care personnel. A 1993 assessment by the World Bank reported ratios of 13,000 inhabitants per doctor and just 2,000 per nurse. The same source reported 1,900 inhabitants per hospital bed, painting a bleaker picture than that reported in two other recent World Bank studies (e.g., 1,385:1 for 1990 in WBK9306, 1,500:1 for 1989 in WBK9205). The assessment, which excluded maternity beds in health centers, counted a total of 2,353 beds in MPHSA facilities, 1,880 in non-profit hospitals, and 700 in for-profit clinics (WBK9308).

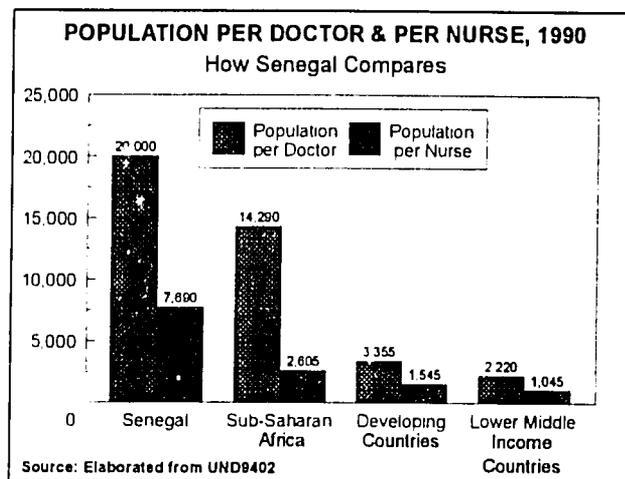


Figure 3.4

Figure 3.5 illustrates the growth in the number of health care facilities in Senegal since 1960. The most dynamic growth has occurred with peripheral facilities, including health huts and health posts, though the number of functioning health posts may be smaller than the figures reported here. Personnel and facilities are overwhelmingly concentrated in the Dakar region, which has 22 percent of the national population, 45 percent of public sector health personnel, and 80 percent of private sector health personnel, according to the study by the World Bank (WBK9308).

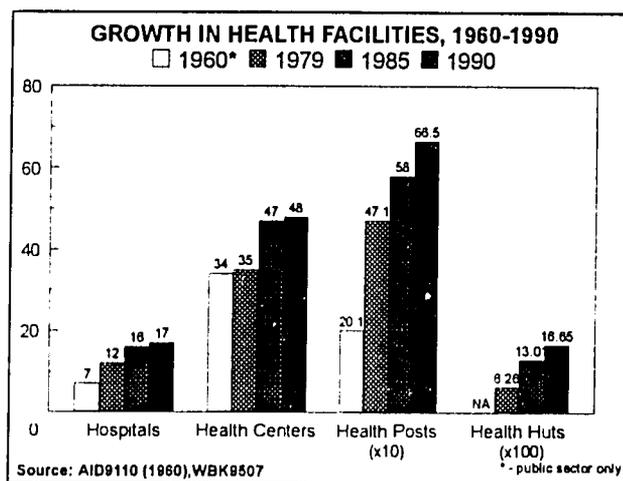


Figure 3.5

Public Sector Services

Senegal's public health system is organized under the Ministry of Public Health and Social Action (MPHSA). Public health services suffer chronic shortages of drugs, contributing to the development of parallel markets, and demoralization of personnel due to inadequate working facilities. Both of these factors encourage growth of legal and clandestine private health care services. Rising costs of public services are suspected to impede utilization by the poorest citizens (WHF9301). USAID's mission in Senegal reports continued deficiencies in peripheral health services, a general under-appreciation of the importance of family planning within health care, and an over-reliance on curative, clinic-based care (AID9327).

Responsibility for providing preventive and curative services is decentralized to regional public health services based in seven regional hospitals, which oversee departmental and community-level activities. Also located at the regional level are offices of special programs including maternal and child care, immunization, and the *Services de Grandes Endemies*, which deploys mobile teams to control endemic diseases such as malaria, schistosomiasis, and leprosy (AID8705). In the regions of Kaolack, Fatick, Louga, and Ziguinchor, USAID's Rural Health Delivery Services/Child Survival project has helped decentralize the planning and prioritizing of maternal/child care and family planning services to the district level (AID9511).

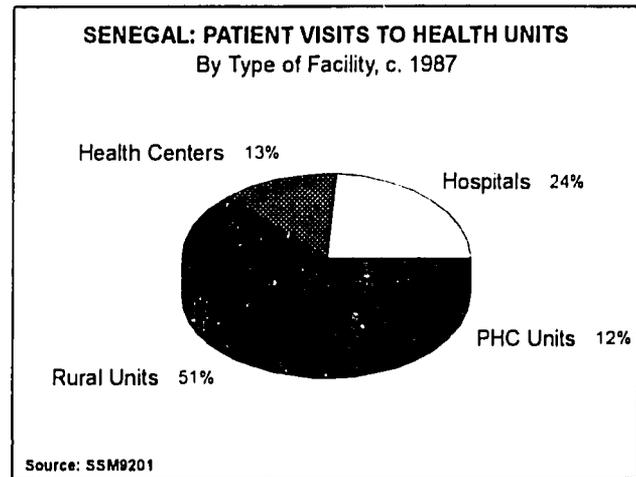


Figure 3.6

As indicated in figure 3.6, rural health units were by far the most commonly visited facilities in the late 1980s (SSM9201). Peripheral health care facilities in the public sector include over 1,400 health huts (*cases de santé*) run by community health workers (CHWs) at the village level, 495 rural maternities usually staffed by a traditional midwife, and 520 health posts run by a nurse in the chief locality of each rural area. The main referral centers for the peripheral level are 49 health centers, which are typically located in a department capital. These units are run by health teams headed by a physician and provide outpatient consultation as well as hospitalization. Two sub-regional hospitals operate in the region of Saint-Louis; seven regional hospitals provide more complicated inpatient care in regional headquarters and supervise the first three types of facilities. Finally, four national hospitals located in a national teaching hospital complex (*Centre Hospitalier Universitaire / CHU*) in Dakar are the system's ultimate referral institutions (WBK9205).

Also in the public sector are health centers or dispensaries operated by other ministries (Education, Interior, and Armed Forces), 75 health posts operated by municipalities, two health centers and a hospital (Center of Traumatology and Orthopedics) belonging to the National Social Security Fund (CSS), and a hospital (A. Ndao) run by the municipality of Dakar (WBK9205). The National Supply Pharmacy manages the distribution of essential drugs in the public health system through regional supply pharmacies serving regional hospitals, district depots serving health centers, and community depots managed by local populations to supply health posts (WHF9301).

According to a recent report to the WHO, decentralization of the national health system since 1978 has fostered closer cooperation and integration between the public and private sectors and empowered local communities to participate in the management of health care facilities through elected health committees, which play a particularly important role in coordinating community inputs and cost recovery. Depending on the level within the health care system, these local committees are known as Associations for the Promotion of Health (APS) or Associations for the Promotion of the Hospital (APH) (WBK8801). Committees for health centers in department capitals are represented in a national APS recognized by the Ministry of the Interior (WHO9001).

Since the Declaration of Alma Ata in 1978, the health ministry has worked with local communities to develop primary health care (PHC) throughout the country, constructing 1333 health huts and over half of the country's 673 health posts and training thousands of CHWs in this period (WHF9301). Despite this commitment, the overall flow of resources has continued to favor the urban-based hospital network, according to a 1990 evaluation by USAID (AID9018); expansion of PHC services has been mostly financed from abroad (WHF9301). Other sources indicate that the MPHSA has been gradually decreasing its emphasis on curative care within its overall budget (AID8905, WBK9308).



Private Sector Services

In the late 1980s, the private sector was estimated to account for about 30 percent of formal health care in Senegal (SSM9201). Private health care includes a variety of ambulatory, hospital, and retail services in the modern, formal sector as well as traditional and informal sectors.

Modern For-Profit Care. For-profit hospitals, practitioners, and pharmacies operate primarily in urban areas. Until the late 1980s, private practice was tightly controlled and all graduating medical students were required to work for the health ministry. Since the loosening of these restrictions, the private health sector has rapidly expanded (AID9018). A 1995 assessment of the private sector by the BASICS project reported that there were 350 private physicians in Senegal, including 278 in Dakar and most of the remainder in Thies, and 600 para-medical personnel and assistants. Private practice serving the urban wealthy can be particularly lucrative; public sector personnel are also known to engage in part-time private practice. The private sector also includes a total of 230 pharmacists, half of whom practice in Dakar; pharmacists are organized into two associations, the Pharmacy Owners' Union and the Pharmacists' Association (AID9512).

Private sector facilities include two hospitals, 42 polyclinics (18 in Dakar), and about 75 health posts (AID9512). The exclusive *Hopital Principal* in Dakar is run by the military but, like other military facilities, serves the local civilian population willing to pay for its services. Senegal's other major private hospital is *Hopital St. Jean de Dieu*, a missionary facility in Thies (WBK8801). A few large private enterprises operate their own dispensaries (SSM9201). In addition to 230 pharmacies, the BASICS project reported that Senegal has 200 *depots de medicaments* serving rural areas as well as countless ambulatory drug sellers in public markets. Drugs are manufactured locally by two major concerns, both of which export to neighboring countries (AID9512).

Private Voluntary Organizations (PVOs). PVOs have made significant contributions to the development of PHC in Senegal, particularly Catholic Relief Services (CRS) and other church-based groups (AID9018). The *Association Française des Volontaires du Progres* (AFVP) has also provided considerable technical assistance to improve health care. PVOs and local non-governmental organizations contribute significantly to the provision of health services in areas which may otherwise be underserved by the formal sector. The World Bank estimates that Senegal has about 85 non-profit health posts, including 75 grouped into a Christian Association. Another PVO, the Islamic African Relief Agency, manages a health post in Dakar (WBK9205, WBK9308).

Traditional Medicine. For much of the population, especially those in rural areas lacking access to modern health services, traditional medicine plays an important role. In the 1970s, WHO recognized for the first time the importance of traditional medicine and at Alma Ata proposed that it should be included in PHC strategies in developing countries. This move reflected the realization of the shortcomings of modern health care systems, particularly in rural areas, and of the need to rehabilitate native practices which had so far been neglected. In Senegal, traditional medicine holds an important position within the health sector. Practitioners include TBAs, *marabouts* (healers following Muslim traditions), and healers following animist traditions (see reference WHF9401). According to an estimate reported by the BASICS project, Senegal has a total of 5,000 traditional healers (AID9512). One of the first formal associations of traditional therapists to be set up in Senegal was the Pikine Tradi-practitioners Circle, which was founded in the early 1980s. With the support of the Minister of Health, the Circle aims to identify and give official status to healers in the Dakar suburbs (COU9401).

Health Care Financing

Data on health care financing in Senegal is available from several recent sources. The World Bank's World Development Report 1993 (WBK9303) provides global estimates of health care spending by country and sector, facilitating a comparative analysis between countries and regions. A comprehensive country-level focus is available in another recent document by the World Bank, "Republic of Senegal: Issues in Health Care Financing" (WBK9205), which provides a detailed overview of sources and uses of funding for health care in Senegal since 1980. A more detailed look at the current use of resources at the facility level is a study by USAID's Health Financing and Sustainability (HFS) Project, "Costs, Financing, and Efficiency of Government Health Facilities in Senegal" (AID9419). This section presents some of the basic findings of these three sources and other studies: for a more detailed analysis of health care financing in Senegal, the reader is directed to the latter two sources cited above.

According to estimates published in the World Development Report 1993, overall spending on health in Senegal amounted to \$214 million in 1990, or \$29 per inhabitant, the third highest level of per-capita health spending in sub-Saharan Africa. However, at 3.7 percent of Senegal's gross domestic product (GDP), total spending was well below the regional average of 4.7 percent (see figure 3.6)(WBK9303).

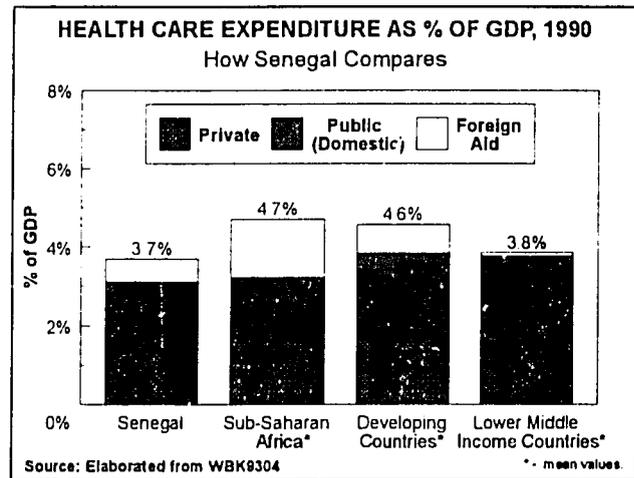


Figure 3.7

Sources of Funding for Health

While domestic government support waned as a source of health care financing in the course of the 1980s, community financing and various public and private health insurance schemes have grown sharply in significance. In 1990, public sector health spending comprised over 60 percent of total spending at 2.3 percent of GDP, according to the World Bank's estimates. However, this includes \$36 million in foreign aid flows accounting for nearly 17 percent of total expenditure on health (see figure 3.8). An earlier assessment of recurrent funding for health found that the public sector accounted for 58 percent of the total, including 17.2 percent of the total from external sources and just over 40 percent from various domestic government sources (see figure 3.9). Both studies found the private sector to account for about 40 percent of spending. The World Bank recently reported that private and public health insurance in Senegal covers 12 percent of the population, the highest level reported in sub-Saharan Africa (WBK9307), through 22 percent of total expenditures (WBK9308).

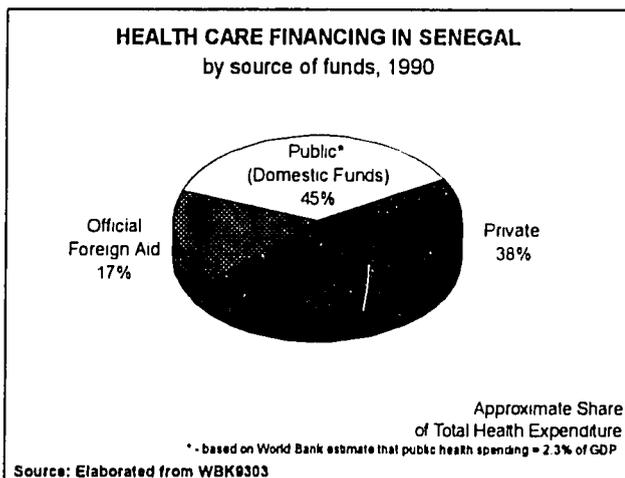


Figure 3.8

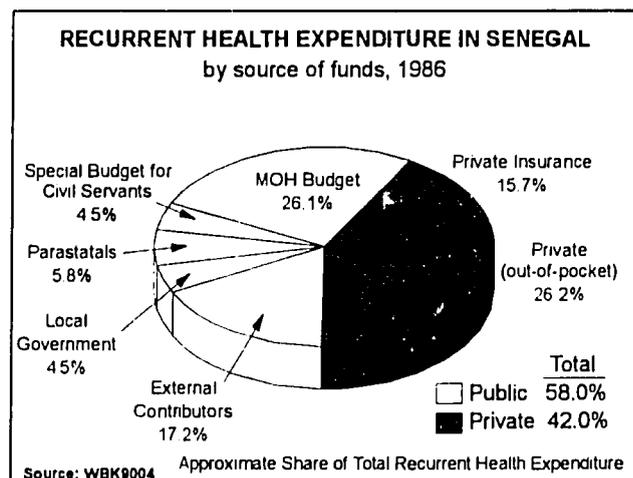


Figure 3.9



The recent health sector assessment for USAID included a focus on recurrent funding of health care in Senegal. The authors' findings diverged considerably from those of the World Bank, finding the private sector to account for two-thirds of spending, more than half of which consisted of payments to private pharmacies (see figure 3.10). Drawing estimates on domestic spending from various sources, the authors of this study calculated that total health expenditures amounted to about \$20 per-capita, totalling roughly three percent of the national GDP. Part of the difference between these findings and those of the World Bank may result from the omission of foreign aid flows in the authors' calculations (AID9110).

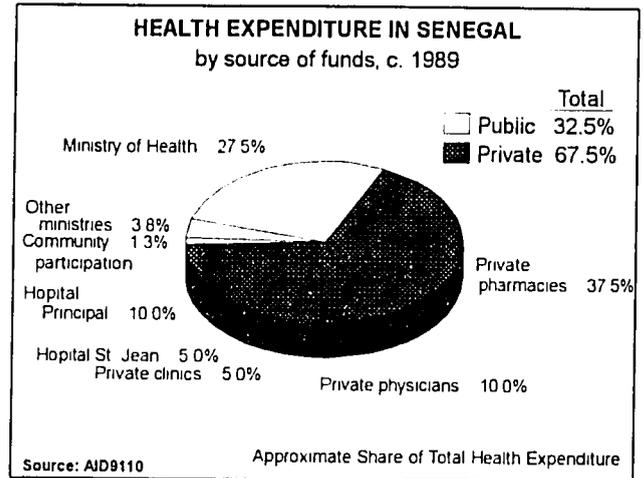


Figure 3.10

Foreign Aid. Figures 3.11 and 3.12 provide comparisons of Senegal's estimated level of foreign aid for health in 1990 with those found for sub-Saharan African nations and developing countries in general. While the share of foreign aid within total health spending is typical for developing countries at around 17 percent, the level of nearly

\$5.00 per person greatly exceeds median values for the various country groupings (WBK9303). Figure 3.13 provides a breakdown prepared by the World Bank of the various sources of foreign aid for health in the late 1980s. The majority of funding from the largest individual donor, France, went toward technical assistance concerning hospital-based care (WBK9205). USAID focusses on bolstering child survival interventions at the local level in selected rural areas as well as health sector reform at the central level. The third-largest donor, Italy, has focussed on supplies of equipment to the MOH and support of immunization activities under UNICEF. The World Bank's International Development Agency has been most active in the promotion of nutrition through local health huts and decentralized distribution of essential medicines (AID9110).

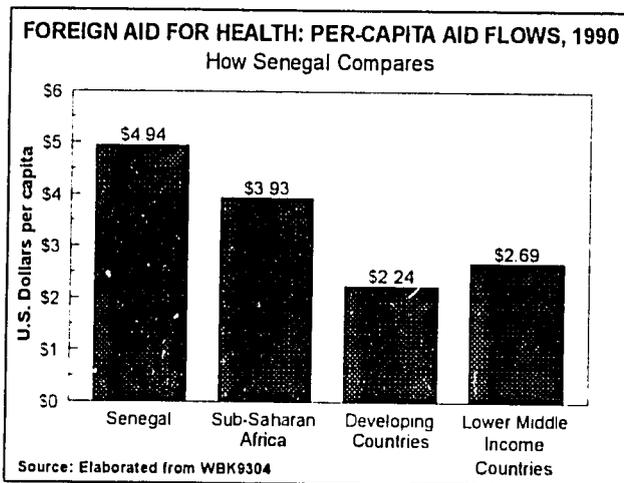


Figure 3.11

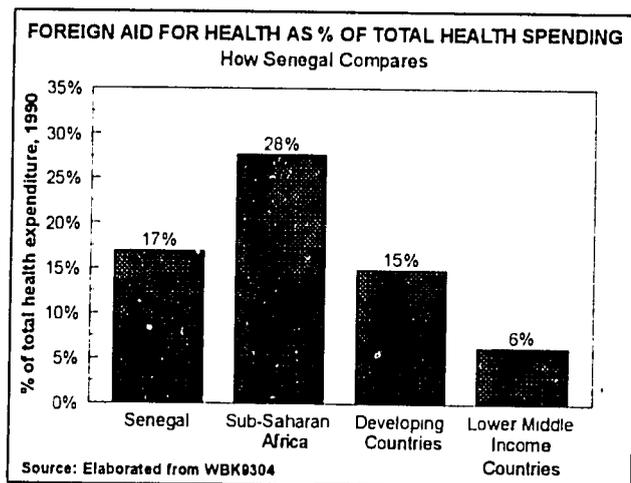


Figure 3.12

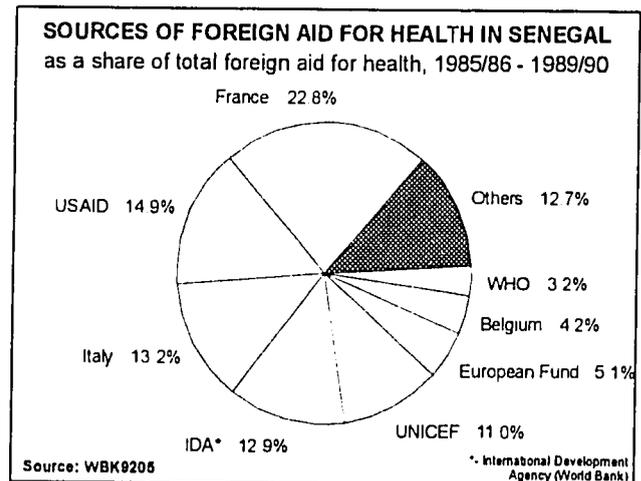


Figure 3.13



Domestic Government Funding. According to the estimates in figures 3.9 and 3.10 above, the budget of the MPHSA accounts for only about one-quarter of total spending on health in Senegal. Other sources of public health spending include parastatal organizations, other ministries, special allotments for the health care of civil servants, and local governments. According to a recent report by the World Bank, the share of total health spending derived from the central government budget declined slightly in the 1980s, from 35.6 percent in 1981 to 33.4 percent in 1989 (WBK9503). Underlying this slight decline, a drastic reduction in public spending has been only minimally offset by increased private spending on health.

The share of the national budget dedicated to the health sector dwindled from over nine percent in 1970 to less than five percent in 1989 (see figure 3.14). According to the USAID health sector assessment, this translates to a 60 percent drop in per-capita allocations since 1970 (AID9110). Estimated levels of actual expenditure on health are even lower, declining from an average of nearly six percent of total government spending in the late 1970s to well under four percent by the mid-1980s (SSM9201). Figure 3.15 and 3.16 chart total and recurrent expenditure levels in the 1980s as reported by the World Bank (also see tables A5 and A6 in Appendix A).

Cost Recovery & Community Financing. Since the early 1980s, the government of Senegal has been attempting to bolster its dwindling contribution to public health care through the encouragement of community participation in local health care systems and the establishment of user fees in all public health facilities. In 1989/90, it was estimated that the MPHSA recovered four percent of recurrent expenditures through user fees (WBK9503). Geographic and facility-based variations in the level of funds collected are considerable. Health centers and posts collect significant revenue, which is retained within the local health care system to cover the costs of drugs and other recurring expenses. Cost recovery at these levels, however, has not increased in real terms since the inception of the program in 1980. Indigent patients are technically exempted from fees, though actual exemption practice varies (AID9110). Cost recovery within public hospitals, which charge higher consultation fees but must remit a large share of revenues to the central treasury, has been negligible (WBK9205).

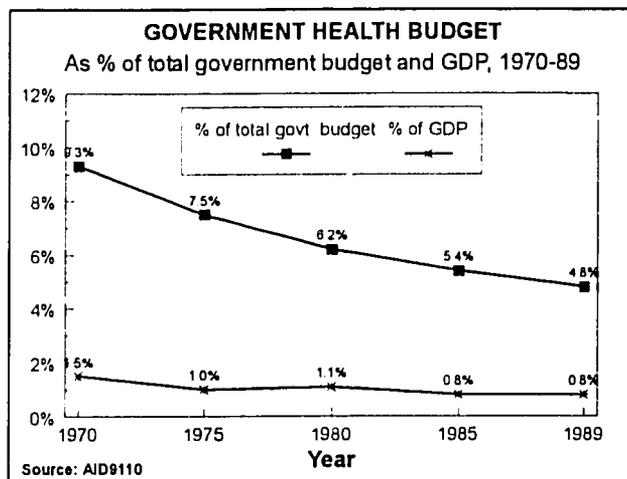


Figure 3.14

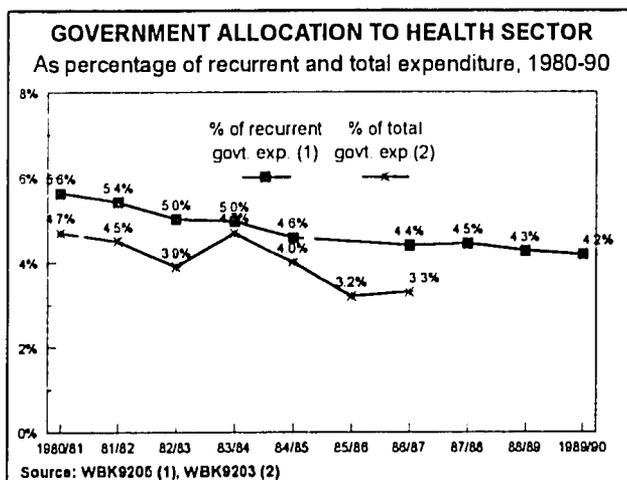


Figure 3.15

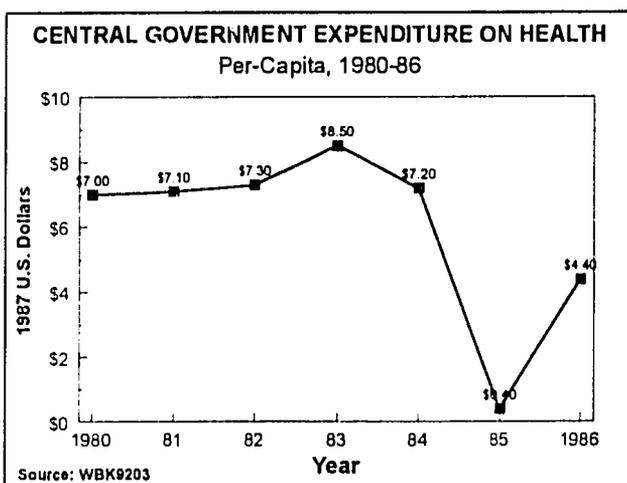


Figure 3.16



Several pilot initiatives following the Bamako Initiative to improve quality of PHC and drug availability through user fee revenue have had mixed results (see, e.g., references HPP9002, WHF9301). Efforts under a Belgian-funded project in a periurban area, Pikine, have been fairly successful while USAID-supported initiatives in rural Kaolack and Fatick have been less effective (AID9110). A recent effort in Kolda appeared to improve quality of care but was unable to show any long-term increase in service utilization. Bamako Initiative-style activities are now operating under the MPHSA in three districts, according to the World Bank (WBK9503).

Since 1978, community resources have played an important role in the construction and operation of local health posts. Decentralized communities and communes contribute to PHC efforts primarily by funding the construction or renovation of community health facilities; some allocate up to ten percent of their budgets to health care in this manner. According to a recent account of Senegal's PHC efforts, various user fees collected by local health committees yield \$2-2.4 million annually, which is said to represent over fifty percent of the funds allocated to decentralized health care structures. At least 80 percent of this user fee revenue is applied to meet operating costs (WHF9301). Committees are permitted to spend up to 50 percent of receipts on drugs alone; the remainder is typically applied to finance salaries of supporting staff of health services. Rural health committees are encouraged to devote eight percent of their budgets to the initial procurement of drugs for community health facilities (WHO9001). For an interesting account of the dynamics of community participation at the local level and an innovative effort to fund local outreach for maternal and child health services, see reference WHF9501.

Social Insurance. In addition to tax revenues, community participation, and user fees, public health care is financed through programs of the National Social Security Fund (*Caisse Nationale de Securite Sociale* (CSS)), a compulsory social security program known as *Prevoyance Sociale*, and a civil service insurance plan offered to government employees. Together with private health insurance, these modern insurance plans are estimated to cover 13 percent of the national population (WBK9205).

Prevoyance Sociale offers pension, work injury, maternity and medical benefits for the formal labor force and is administered within the Ministry of Labor and Jobs Training. Firms with at least 150 employees are required to form a health insurance institute (*Institution de Prevoyance Maladie* (IPM)) while firms with less than 150 employees may join together to form cooperative institutions. An estimated 58,000 employees contribute up to three percent of their earnings and employers up to three percent of payrolls. Medical benefits for the insured and dependents cover most outpatient and pharmaceutical charges and all inpatient costs; levels of reimbursement average 66 percent but are determined by each institute's administrative council on a funds-available basis (WBK9503, HHS9201). About 60,000 retirees are also covered under the *Institut de Prevoyance et Retraites du Senegal* (IPRES). Together, these two insurance schemes are estimated to cover the health care needs of about 445,000 people, largely concentrated in Dakar. Health insurance schemes under the CCS provide direct maternal and child health care in two health centers in Dakar and cover the costs for work-related accidents, serving about 7,000 people annually (WBK9205).

The civil service insurance plan involves 65,000 employees of the government and 25,000 retirees and their families. Estimating the total population covered at 400,000 in 1992, the World Bank noted that government spending on this scheme equals 15 percent of total public expenditure in the health sector. The treasury reimburses patients for an average of 80 percent of costs of public hospitalization and consultations with agreed-upon private doctors and clinics. Patients must assume the costs of drugs. Civil servants also benefit from free access to public health centers, budgetary subsidies to parastatals with health facilities, and medical evacuation costs which are covered in full by the government. The World Bank calculated that insured Senegalese receive a per-capita subsidy from the state more than four times higher than the per-capita spending level for the vast majority of uninsured Senegalese (WBK9205).

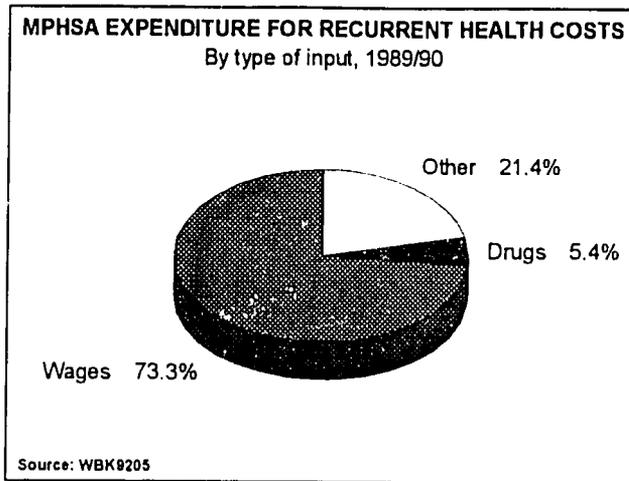


Figure 3.17

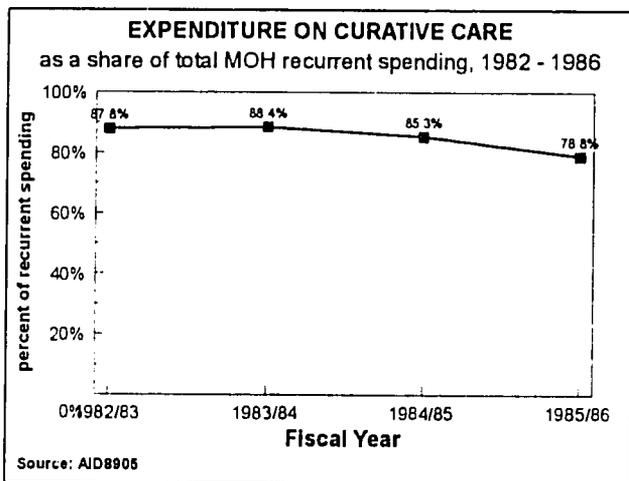


Figure 3.18

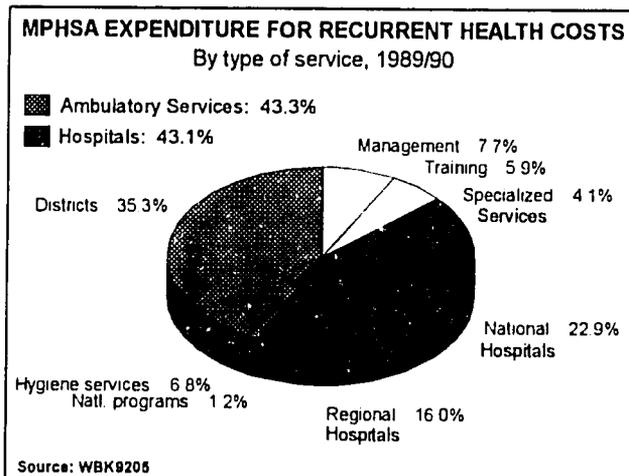


Figure 3.19

Allocation of Public Health Funds

The loss of budgetary support sharply limited the health ministry's ability to fund recurrent costs, which absorbed 97-100 percent of total MPHSA expenditure in four out of five years from 1981 to 1985 (AID8905). In the long term, the MPHSA's predicament has been exacerbated by the fact that other sources of funding for the public health system – foreign aid and local communities – have made investments in facilities and vehicles which add to total operational costs (WHO9001). An analysis by USAID's REACH project of public health care financing in seven sub-Saharan nations found that personnel costs comprised the greatest burden in Senegal at over two-thirds of the ministry's total recurrent expenditures for 1985 (AID8905). Subsequent data indicate that the burden of wages and salaries rose to nearly three-quarters of recurrent expenditures by the end of the decade (see figure 3.17).

As indicated in figure 3.18, the vast majority of recurrent funding is destined to cover the curative care. Hospitals were estimated to account for 50 percent of total public health spending in the mid-1980s (WBK9310). However, at the end of the decade, a detailed assessment by the World Bank found that just 43 percent of recurrent expenditures were committed to the hospital system, a share equivalent to that of ambulatory services (see figure 3.19). Public expenditures on drugs, which are most frequently purchased with private funds, amounted to only roughly seven to eight percent of MPHSA recurrent expenditure in the 1980s (SSM9201) a share which the Bank found to have dropped to just over five percent by the end of the decade (see figure 3.17).

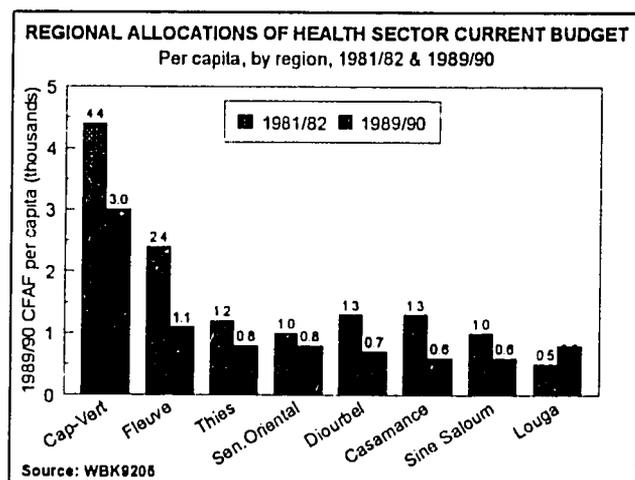


Figure 3.20

The World Bank study also reported per-capita levels of government health spending by region at the beginning and end of the 1980s (see figure 3.20). Using a fixed value of currency to account for inflation, the Bank showed that recurrent spending levels had declined in all but one region, Louga, which had started the decade with the lowest per-capita spending level. In four regions, Fleuve (Saint-Louis), Casamance, Diourbel, and Sine Saloum (now Fatick and Kaolack), levels were halved or nearly halved. As may be expected, the highest level of expenditure by far took place in Cap-Vert (Dakar), the location of Senegal's national hospitals and services (WBK9205).

Private Financing

At an estimated 1.4 percent of GDP in 1990, private spending accounted for nearly 40 percent of total health expenditure, according to the World Bank (WBK9303). Health care in the private sector is mostly funded on a fee-for-service basis, but private insurance has grown rapidly since the late 1980s. In 1990, about 15,000 people, including much of the European community in Dakar, were enrolled in plans offered by eight private health insurance companies. Many less wealthy Senegalese are organized into informal risk-sharing associations often referred to as *tontines* (WBK9205).

Figure 3.21 provides some additional detail on private sector funding from the World Bank study on recurrent funding referenced in figure 3.9 above (also see figure 3.10, detailing the USAID report which calculated private funding to account for two-thirds of total recurrent expenditure on health). The vast majority of out-of-pocket payments are for pharmaceuticals purchased in the private sector, which is estimated to have controlled about ninety percent of the total cost of drugs available in Senegal in 1991 (WHF9301). Most insurance payments serve to finance care at the *Hopital Principal*, whose annual budget is roughly one-third the size of the health ministry's (WBK9004). In the mid-1980s, the World Bank noted that the budget of the *Hopital Principal* was equal to 78 percent of the total budgets of all public hospitals in Senegal and that the budget of the provincial mission hospital at Thies, *Sr. Jean de Dieu*, nearly equalled the entire budget for all regional hospitals in Senegal (WBK8801). Mission hospitals as a whole were receiving increasing levels of public subsidies in the late 1980s (SSM9201).

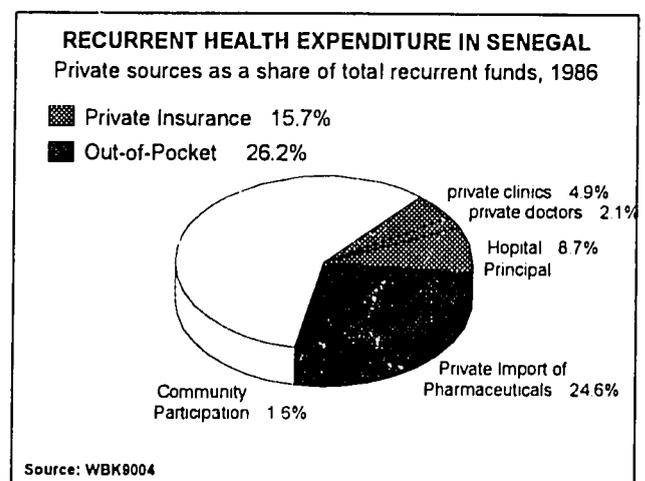


Figure 3.21



IV. HIV INFECTION AND AIDS

Senegal's first case of AIDS was reported in 1986. By January 1994 cases reported to WHO totalled 1,297 (see figure 4.1), with the majority reported from Dakar and Kaolack (AID9325). Senegal's incidence rate of 4.2 reported cases per 100,000 population is roughly on par with neighboring Guinea (4.4), but well below Guinea-Bissau (8.7) and Mali (6.6). Even higher rates in nearby Cote d'Ivoire (28.3) and Burkina Faso (30.3 for 1992) suggest that West Africa, which has not yet experienced the impact of the HIV/AIDS pandemic on the scale of eastern, central, and southern Africa, may have very troubled times ahead (WHO9501). The actual total number of AIDS cases occurring in Senegal is certain to be considerably higher than indicated by reports to WHO. As illustrated in figure 4.2, the World Bank estimates that cumulative cases reached as high as 5,000 by 1994 and projects the total to approach 20,000 by 1997.

Results of HIV seroprevalence studies provide a somewhat better indication of local trends. As indicated in figures 2.43 and 2.44 above, both major strains of the HIV virus, HIV-1 and HIV-2, are found in Senegal. Among pregnant women, the population group most commonly studied to determine the level of HIV infection among lower-risk groups, seropositivity levels remain well below one percent. Recent test results among lower- and higher-risk women in Dakar and Ziguinchor Region are displayed in figures 4.3 and 4.4. Studies indicate that rates for both HIV-1 and HIV-2 are rising (see figure 4.8 and 4.9).

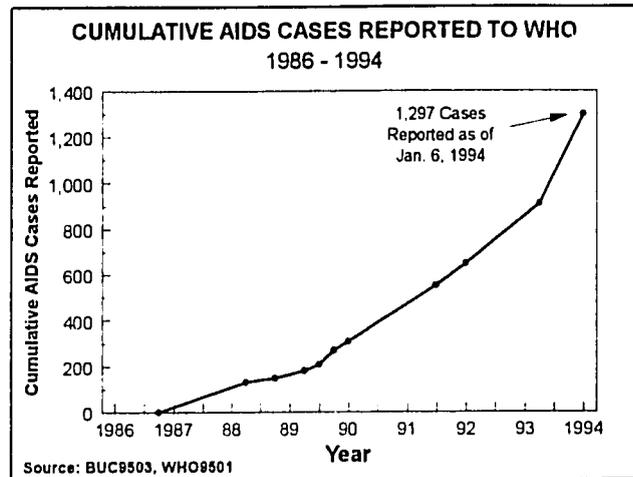


Figure 4.1

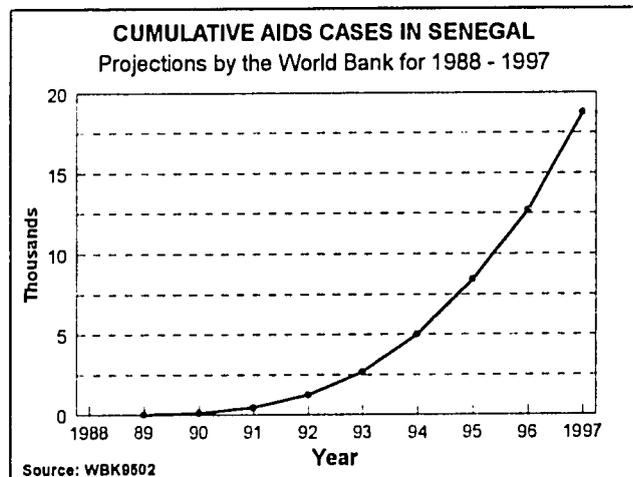


Figure 4.2

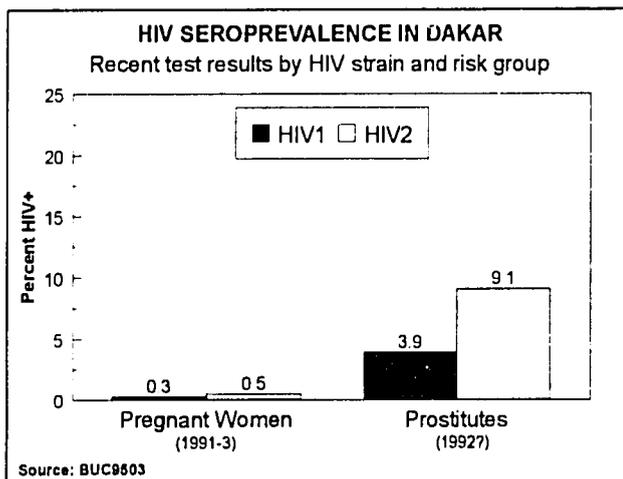


Figure 4.3

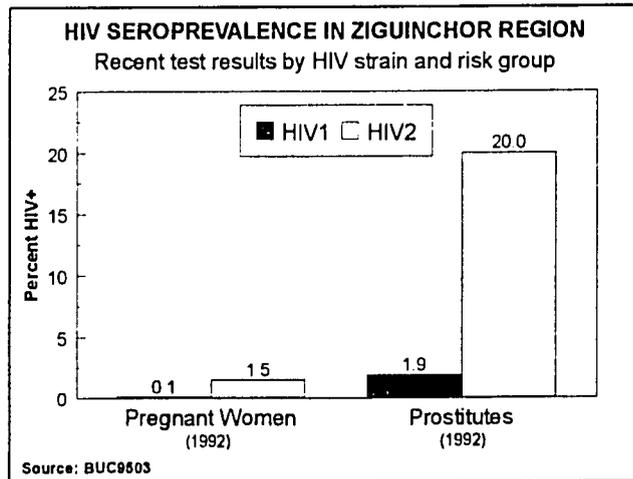


Figure 4.4

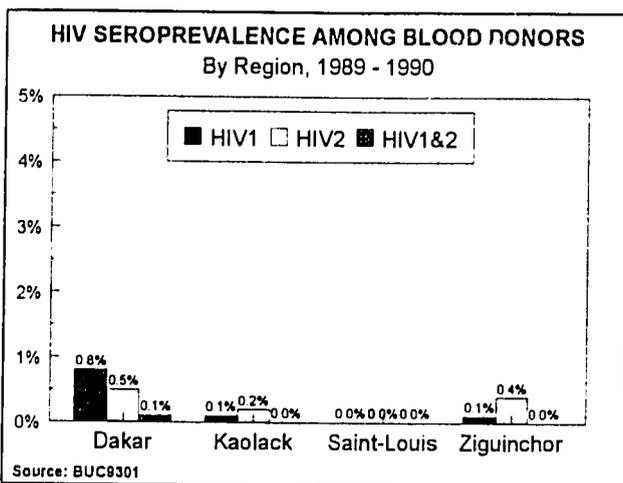


Figure 4.5

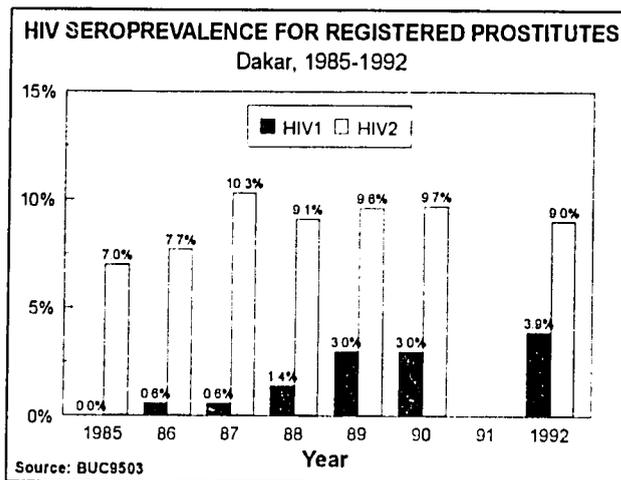


Figure 4.6

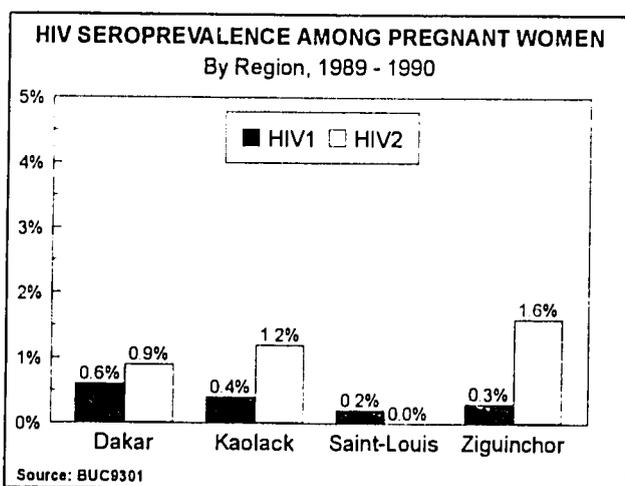


Figure 4.7

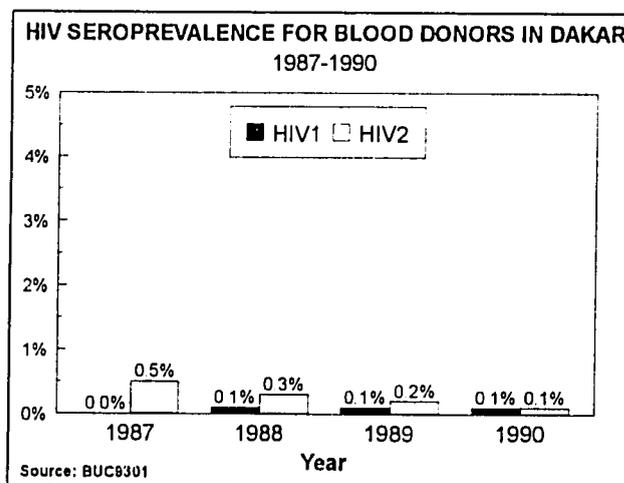


Figure 4.8

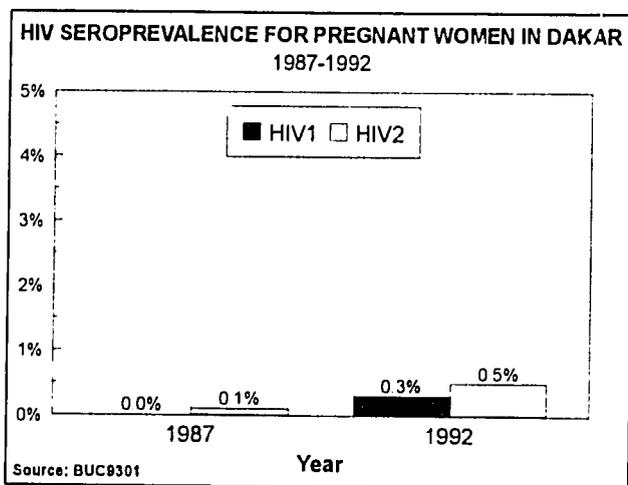


Figure 4.9

Senegal's National AIDS Control Program (NACP) estimated the national HIV seroprevalence level at 0.9 percent in 1995 (AID9510). Seroprevalence levels found among various population groups are illustrated in figures 4.3-4.9. The highest levels of HIV infection are found among commercial sex workers (CSWs) and other groups engaged in high-risk sexual activity. Test results among CSWs indicate that the more prevalent strain, HIV-2, may be now waning while HIV-1 infection levels gradually rise (see figure 4.6). Recent reports cite much higher infection levels among CSWs in Ziguinchor (21.9%) and Kaolack (33.9%). The NACP projects that by 1998 over 90,000 Senegalese will be HIV-positive and 10,000 will have developed AIDS (AID9510).

Concern over the possibility of an exacerbated AIDS epidemic in Senegal has risen due to the increase in HIV infection elsewhere in West Africa and particularly the deployment of Senegalese troops in regional peacekeeping efforts (CAB9211). Poverty and increasing levels of internal migration and prostitution contribute greatly to the spread of HIV in Senegal (AID9510).



National AIDS Control Program

Programme National de Lutte contre le SIDA (PNLS), Ministry of Public Health and Social Action (MHPSA), Dakar. In 1986, Senegal was one of the first African countries to work with WHO to prepare a five-year Medium Term Plan for the prevention and control of AIDS. Following completion of a modified two-year plan for 1992-93, a Second Medium-Term Plan has been finalized for 1994-98 (AID9407). The PNLS benefits from strong and capable leadership which exemplifies the level of commitment demonstrated by the Senegalese government. The president of Senegal opened the Sixth Annual African AIDS Conference in Dakar in 1991. The MHPSA has allocated an annual minimum of \$100,000 to the PNLS in addition to other recurrent budget support (CAB9212). Specific efforts by the PNLS to control AIDS include public education through events such as National AIDS Day and distribution of condoms to CSWs, STD patients, and youth (AID9310). Currently, the PNLS is receiving assistance from USAID's AIDSCAP project to plan and manage decentralized HIV/AIDS prevention activities throughout the country. Specific help is planned with the PNLS's sentinel surveillance system (AID9325).

Local Non-Governmental Organizations with AIDS Activities

ACI (Africa Consultants International) conducts HIV/AIDS education training with support from USAID's AIDSCAP project (AID9510).

ARLS (L'Association Rurale de Lutte Contre le SIDA) is a community-based association in northern Senegal working to inform rural residents about HIV/AIDS and to help them develop the capacity to defend their communities from the disease. Support from AIDSCAP helped ARLS expand interventions from six to 23 villages in 1994 (AID9510).

SANFAM is providing AIDS training in four workplaces with assistance from the AIDSCAP Project (AID9407).

SWAA (Society for Women Against AIDS in Africa) has promoted awareness about reproductive health and sexuality among young women through youth groups in Dakar (WHO9301).

Specialization Workshops on Information and Communication Occupation (SWICO), Dakar, collaborating with the University of Amsterdam and the School of Journalism, Tilburg, has worked with African journalists to define the role of the mass media in reporting on HIV/AIDS (WHO9102).

Troupe theatrale feminine Saint Yalle, working with the AIDS control program, employs popular theater and other mass media to spread awareness about HIV/AIDS among urban poor women in Dakar (WHO9301).

International NGOs with AIDS activities in Senegal

(NC19201,WHO9102,AID9313,WHO9301,CAB9403,AID9510)

AIDS and Reproductive Health Network
Appropriate Health Resources and Technologies Action
Group (AHRTAG), London

Arid Lands Information Network
Association Française des Volontaires du Progres (AFVP)
Caritas Internationalis
Centre de Cooperation en Sante et Developpement (CCISD),
Quebec

Christian Reformed World Relief Committee

Environment and Development Action in the Third World
(ENDA-TM)

Family Health International (FHI)
Institute of Tropical Medicine, Antwerp, Belgium
International Center for Research on Women (ICRW)
International HIV/AIDS Alliance, London
Medicus Mundi Belgium, Brussels
Unitarian Universalist Service Committee

International Donors supporting AIDS activities in Senegal (GAP9200,AID9510,WBK9502)

French Cooperation

Norwegian International Development Agency (NORAD)

United Nations Development Program (UNDP)

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
Infant Mortality	180	172	161	140	123	105	95	84	74	64	JEE9512
Under Five Mortality	366	349	325	281	245	207	187	164	143	123	JEE9502
Crude Birth Rate	49	50	49	49	49	48	46	44	42	40	UNP9400
Crude Death Rate	28	27	26	25	23	21	19	17	15	14	UNP9400
Avg. Annual Growth Rate	2.5	2.6	2.7	2.8	2.9	2.8	2.8	2.7	2.6	2.6	UNP9400
Total Fertility Rate	6.8	7.0	7.0	7.0	7.0	6.9	6.6	6.3	5.8	5.4	UNP9400

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

YEAR	ACCESS TO SAFE WATER		ADEQUATE SANITATION		SOURCE
	Rural	Urban	Rural	Urban	
1980	25	77	2	100	AID9012,WHO9101
1981	NA	NA	NA	NA	
1982	NA	NA	NA	NA	
1983	27	69	NA	87	WHO9101
1984	NA	NA	NA	NA	
1985	38	79	NA	87	WHO9101
1986	NA	NA	NA	NA	
1987	NA	NA	NA	NA	
1988	38	79	20	87	AID9012
1989	NA	NA	NA	NA	
1990	26	65	38	57	WHO9200
1991	26	84	36	85	JMP9301
1992	NA	NA	NA	NA	

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

YEAR	ORS Access	ORS/RHF Use	SOURCE
1984	NA	NA	
1985	26	3	WHD8700
1986	NA	7	DHS8806
1987	7	9	WHD8900
1988	16	27	WHD9001
1989	NA	NA	
1990	NA	NA	
1991	NA	NA	
1992	NA	16	DHS9309
1993	NA	NA	

Table A3. ORS Access and ORS/RHF Use, 1985-1989



YEAR	VACCINATION COVERAGE					SOURCE
	BCG	DPT3	Measles	Polio 3	TT2+	
1984	NA	NA	NA	NA	NA	WHE8700,WHE8701
1985	32	54	40	54	8	
1986	NA	NA	NA	NA	NA	WHE8801
1987	92	53	70	53	NA	
1988	NA	NA	NA	NA	26	UNI8901
1989	88	55	60	55	NA	UNI8901
1990	NA	NA	NA	NA	NA	WHE9100
1991	92	60	59	66	45	
1992	65	46	43	46	26	WHE9301
1993	79.9	54.3	44.6	55.1	52.7	DHS9407
1994	71	55	49	55	32	WHE9501

Table A4. Vaccination Coverage by 12 months of age (for TT2+, percent of pregnant women), 1985-1994

PUBLIC EXPENDITURE ON HEALTH CARE IN SENEGAL			
Year	as % of total govt. expenditure	as % of GDP	\$US (1987) per-capita
1980	4.7%	NA	\$7.00
1981	4.5%	1.21%	\$7.10
1982	3.9%	1.20%	\$7.30
1983	4.7%	1.33%	\$8.50
1984	4.0%	1.22%	\$7.20
1985	3.2%	NA	[\$0.40]
1986	3.3%	NA	\$4.40
Source	WBK9203	IMF9300	WBK9203

Table A5. Public Expenditure on Health Care in Senegal, 1980-1988

RECURRENT EXPENDITURE ON HEALTH CARE	
Fiscal Year	recurrent exp. as % of total govt. rec. exp.
1980/81	5.63%
81/82	5.42%
82/83	5.02%
83/84	4.97%
84/85	4.58%
85/86	NA
86/87	4.40%
87/88	4.45%
88/89	4.27%
1989/90	4.19%
Source	WBK9205

Table A6. Recurrent Public Expenditure on Health Care in Senegal, 1980-1990



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 definition 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 stan-

dard 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.

Prenatal Care for Pregnant Women: The proportion of pregnant women who attended prenatal (antenatal) care clinics in a given year.



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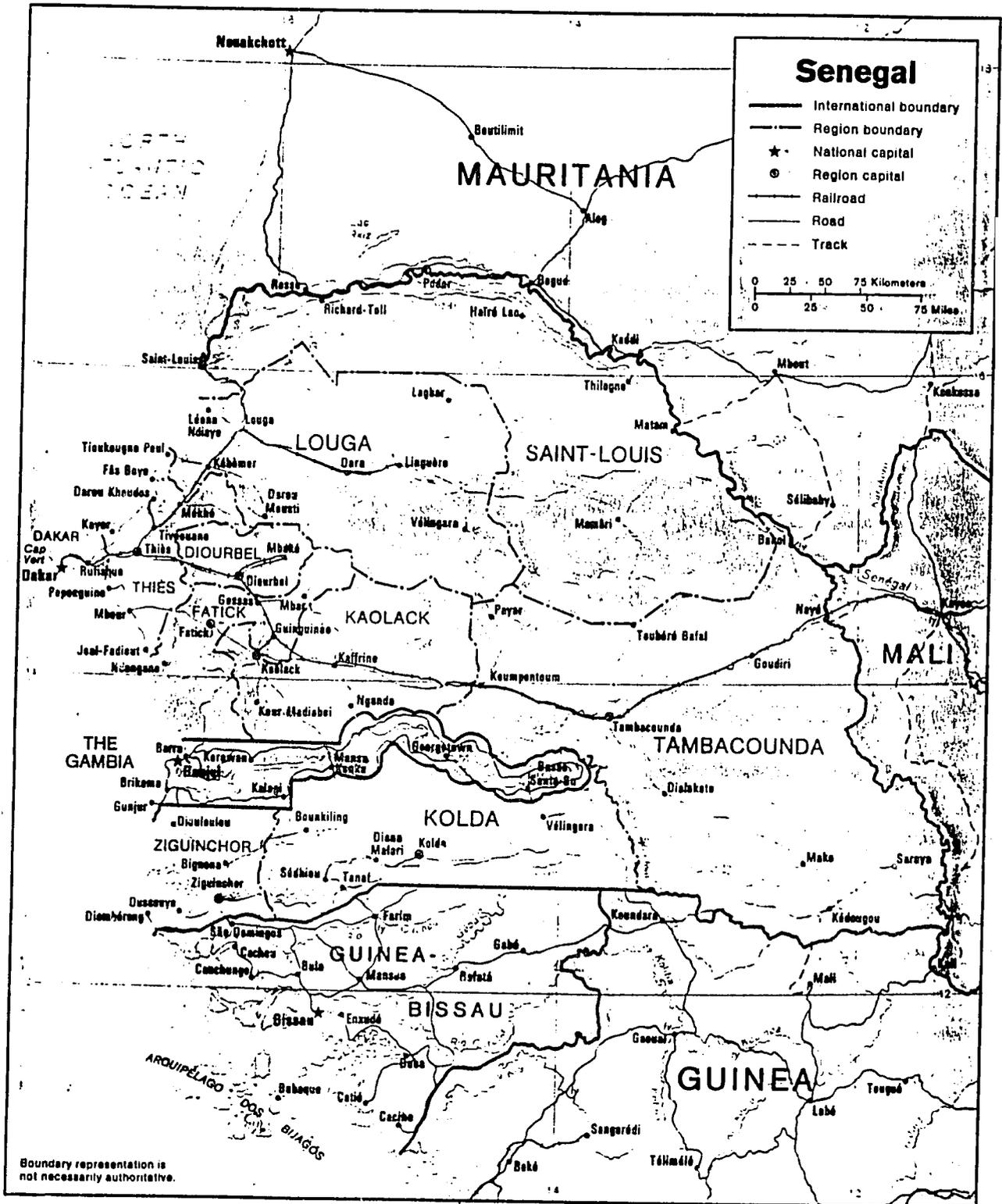
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