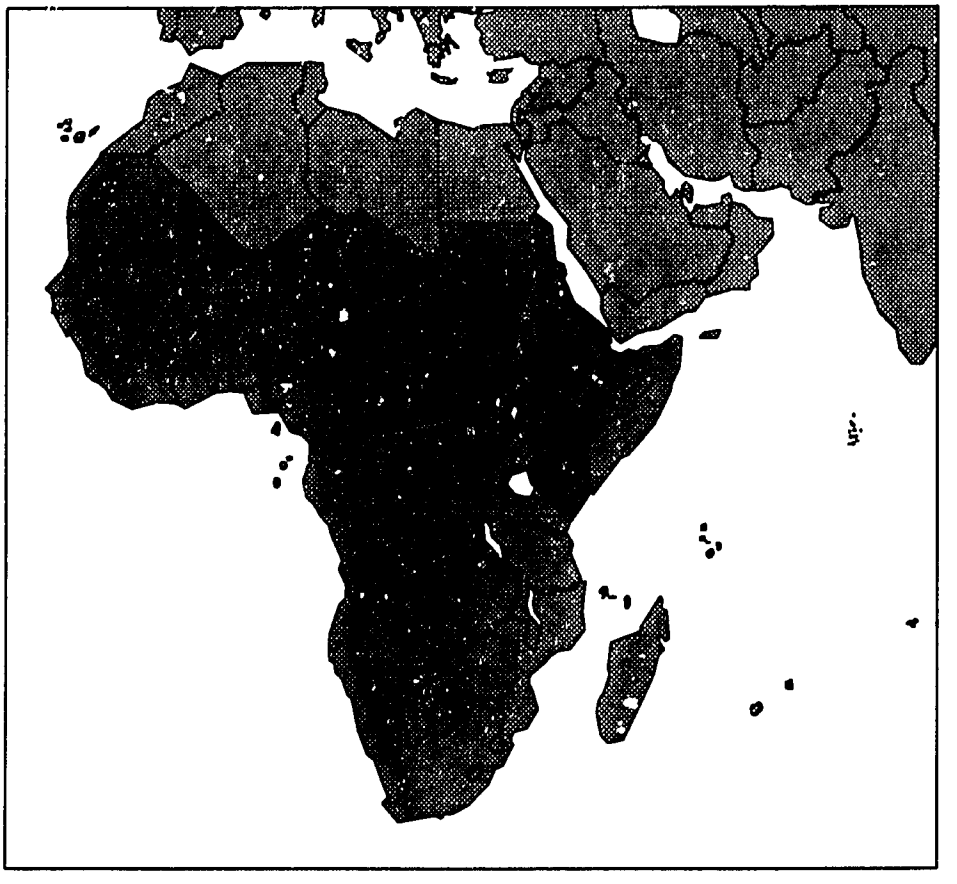
*CIHI Country Health Profile Series*

# KENYA

## Country Health Profile
## 1995



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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).

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# KENYA

## 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 | 27,331,400 | 1994 | UNP9400 |
| Urban Population | 7,352,147 | 1994 | UNP9400 |
| Women Ages 15-49 | 6,001,600 | 1994 | UNP9400 |
| Infant Mortality | 68.0 | 1994 | UNP9400 |
| Under 5 Mortality | 113.2 | 1994 | JEE9504 |
| Maternal Mortality | 657 | 1987 | WHM9110 |
| Life Expectancy At Birth | 55 | 1994 | UNP9400 |
| Number of Births | 1,202,500 | 1994 | UNP9400 |
| Annual Infant Deaths | 81,770 | 1994 | CALXX01 |
| Total Fertility Rate | 6.1 | 1994 | UNP9400 |

| Child Survival Indicators | | | |
|---|---|---|---|
| **INDICATOR** | **PERCENT** | **YEAR** | **SOURCE** |
| **Vaccination Coverage** | | | |
| BCG | 95 | 1994 | WHE9501 |
| DPT 3 | 86 | 1994 | WHE9501 |
| Measles | 81 | 1994 | WHE9501 |
| Polio 3 | 86 | 1994 | WHE9501 |
| Tetanus 2 | 72 | 1994 | WHE9501 |
| DPT Drop Out | 9.3 | 1993 | DHS9406 |
| **Oral Rehydration Therapy** | | | |
| ORS Access Rate | 65 | 1991 | WHD9201 |
| ORS and/or RHF Use | 69 | 1991 | WHD9201 |
| **Contraceptive Prevalence** | | | |
| Modern Methods (15-44) | 27.5 | 1993 | DHS9406 |
| All Methods (15-44) | 32.9 | 1993 | DHS9406 |
| **Nutrition** | | | |
| Adequate Nutritional Status | 83.9 | 1993 | DHS9406 |
| Exclusive Breastfeeding | 17.4 | 1993 | DHS9406 |
| Complementary Feeding | 90.1 | 1993 | DHS9406 |
| Continued Breastfeeding | 90.8 | 1993 | DHS9406 |

| Other Health Indicators | | | |
|---|---|---|---|
| **INDICATOR** | **PERCENT** | **YEAR** | **SOURCE** |
| **HIV-1 Seroprevalence** | | | |
| Urban | 15.0 | 1993 | BUC9503 |
| Rural | 3.2 | 1992 | BUC9503 |
| **Access to Improved Water** | | | |
| Urban | 73.7 | 1991 | JMP9301 |
| Rural | 42.5 | 1991 | JMP9301 |
| **Access to Sanitation** | | | |
| Urban | 69.2 | 1991 | JMP9301 |
| Rural | 34.8 | 1991 | JMP9301 |
| **Deliveries by Trained Attendants** | 54.1 | 1993 | DHS9406 |

*NA = Data not available.*
*For definitions of indicators, see data notes in Appendix B. For full citations of sources, see Appendix C.*

# Table of Contents

# List of Figures

# List of Tables

# Acronyms/Abbreviations

| | |
|---|---|
| AIDS | acquired immune deficiency syndrome |
| AMREF | African Medical and Research Foundation |
| ARI | acute respiratory infection |
| BCG | Bacillus of Calmette and Guérin vaccine (to prevent tuberculosis) |
| BUCEN | United States Bureau of the Census |
| DPT3 | diphtheria, pertussis, tetanus vaccine (three shots) |
| CFR | case fatality rate |
| CIHI | Center for International Health Information |
| DHS | Demographic and Health Survey |
| GDP | gross domestic product |
| GNP | gross national product |
| GPV | Global Program for Vaccines (WHO) |
| HFS | Health Financing and Sustainability (USAID) |
| HIV | human immunodeficiency virus |
| IMR | infant mortality rate |
| MCH | maternal and child health |
| MMR | maternal mortality rate |
| MOH | Ministry of Health |
| NGO | non-government organization |
| NHIF | National Hospital Insurance Fund |
| NNT | neonatal tetanus |
| ORS | oral rehydration salts |
| ORT | oral rehydration therapy |
| PHC | primary health care |
| P/PHC | preventive and 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+) |
| UN | United Nations |
| UNDP | United Nations Development Program |
| UNICEF | United Nations Children's Fund |
| USAID | United States Agency for International Development |
| U5MR | under-five mortality rate |
| WHO | World Health Organization |

# EDITOR'S NOTES

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

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

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

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

# I. COUNTRY OVERVIEW

Kenya, an eastern African nation of approximately 28 million inhabitants, lies astride the equator between the Indian Ocean and Lake Victoria. One of the nation's most serious underlying problems since independence in 1962 has been its annual population growth rate, one of the highest in the world. However, of Kenya's two Demographic and Health Surveys (DHSs) in 1988 and 1993, the latter indicated that total fertility has declined significantly. According to the Government of Kenya, the population growth rate has now been reduced to under three percent, and in 1994 the economy was thought to be growing at a faster rate than the population for the first time since 1990. Major challenges faced by Kenya in the health sector include the need to resume the declining trend in infant and child mortality rates, which appear to have stagnated in the 1980s, and to reduce the skyrocketing impact of HIV/AIDS among adults and children alike (AID9514).

PROVINCES OF KENYA

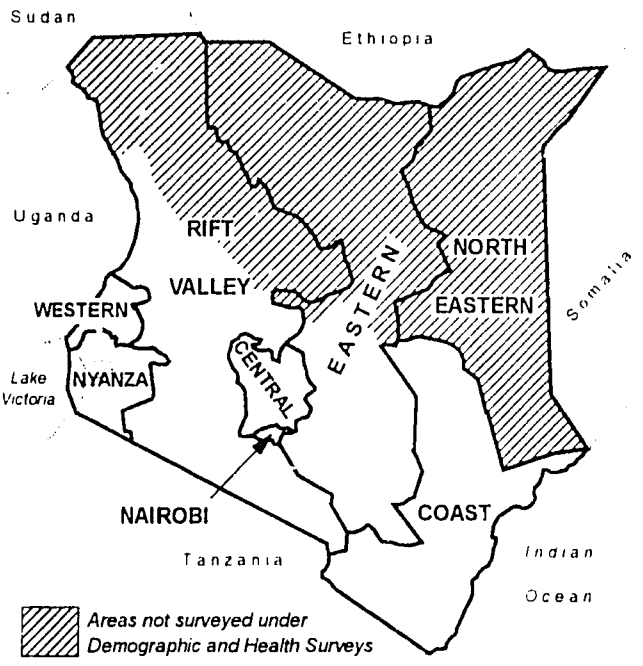



*Figure 1.1*

## Geography

Kenya has a total land area of 582,646 sq. km. (224,940 sq. mi.) and shares borders with five neighbors: Sudan and Ethiopia to the North, Somalia to the East, Uganda to the West, and Tanzania to the South (see figure 1.1 and map inside back cover). The nation is divided into eight administrative provinces, each of which is governed by a provincial commissioner directly responsible to the president. The next level is the district, headed by the district commissioner. Each district contains a varying number of divisions, each headed by a district officer. The smallest units are locations or sublocations, in which the government is represented by chiefs or subchiefs (FOF9201).

MAIN AGRO-CLIMATIC ZONES
By District

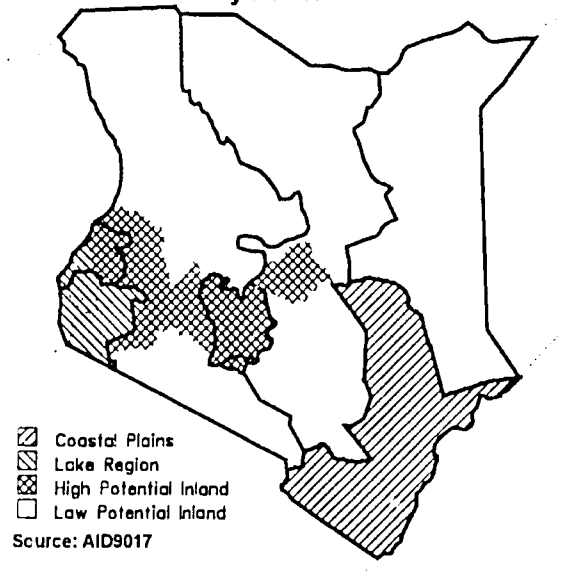



*Figure 1.2*

Topographically the country may be divided into seven regions: the coastal strip, the inland plains, the Eastern Plateau, the Northern Plains, the Kenya Highlands, the Rift Valley, and the Western Plateau. Figure 1.2 illustrates a simplified division of the country's districts into four agro-climatic zones. Over 70 percent of the country is arid or semi-arid, receiving less than 51cm. (20 in.) of annual precipitation. The highlands and the coast receive an annual average of 101 cm. (40 in.) and the Western Plateau over 178 cm. (70 in.). The highlands generally have a cool climate, with temperatures ranging from a mean annual minimum of 10 degrees Celsius (50 degrees Fahrenheit) to a mean annual maximum of 26 degrees C. (79 degrees F.). The highest temperatures prevail in the Northern Plains, where the mean maximum is 34 degrees C. (93 degrees F.) and the absolute maximum 43 degrees C. (110 degrees F.). The hottest months are January through March; June and July are the coolest months (FOF9201).

## History

Although the coastal area was under the influence of Portuguese forces in the 16th and 17th centuries, until their ousting by Omani Arabs, the modern colonial history of Kenya dates from the Anglo-German Agreement of 1886, under which the territories of Uganda and Kenya were assigned to the British sphere of influence. Except for a revolt in 1895, the British were never seriously challenged for the next 60 years. British rule was intense and led to far-reaching social and economic changes. After several decades as a protectorate, Kenya was officially made a British colony in 1920. The colony had a substantial British community and the Kenya or "White" Highlands were largely owned by British farmers. Continuing resentment among the Kikuyu to the appropriation of land led to the "Mau Mau" rebellion, which resulted in the declaration of a state of emergency in 1952. By the time the emergency was lifted in 1959, nearly 3,000 civilians had been killed and over 79,000 Africans, including Jomo Kenyatta, detained. Meanwhile, significant constitutional progress had been made in introducing black majority rule in the country. The final step toward independence was a constitutional conference in London in 1962, under which a national government was formed. In 1963, Kenyatta was appointed prime minister; in December 1964, Kenya became a republic within the British Commonwealth with Kenyatta as its first president (FOF9201).

President Kenyatta died in 1978 and was replaced by Vice President Daniel arap Moi, who has since governed Kenya in a fairly heavy-handed fashion. In 1979 and 1983, Moi was re-elected president without any opposition on the ballot. In 1982 the National Assembly declared KANU (Kenya African National Union) to be the only legal party; subsequent increases in press censorship and political detentions brought about an attempted coup by members of the Kenya Air Force in August 1982. In 1988, Moi dissolved the National Assembly, dismissed the formality of a public election, and was summarily re-elected president. Constitutional amendments in July 1988 made it possible for the president to dismiss senior judges and to increase permissible detention without trial from 24 hours to 14 days. Opposition to Moi's one-party rule grew during 1990 (FOF9201). In December 1991, parliament repealed the one-party section of the constitution, allowing other parties to register. By early 1992, several new parties had been formed, and multi-party elections were held in December 1992, resulting in the re-election of President Moi for another five-year term (DOS9401). Today the political opposition is recognized and serves to some extent as a counterbalance within the government. Ethnic clashes in Western and Rift Valley Provinces continue to be a destabilizing factor in the 1990s (AID9514).

## People

Kenya has one of the world's fastest rates of population growth. The total population is thought to have doubled in the twenty years since 1975 (see figure 1.3). The estimated annual growth rate was estimated at 3.5 percent for 1990, one of Africa's highest (UNP9400). Due to progress in family planning, however, the rate is thought to have dropped below three percent, according to the Government of Kenya (AID9514). This trend is supported by DHS findings that total fertility for 1990-93 had decreased to just 5.4 children per woman aged 15-49 years (DHS9406), considerably lower than the UN projection of 6.5 for 1990 (see table A1 in Appendix A).

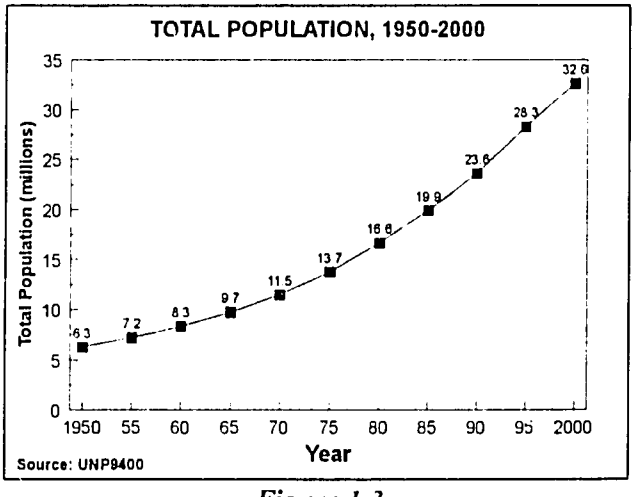



*Figure 1.3*

Kenya's National Family Program, announced in 1967, was a pioneer in family planning in sub-Saharan Africa. Since then, the government and the private Family Planning Association have pursued vigorous policies designed to reduce population growth through voluntary means. Family planning services are provided on a daily basis at 400 rural centers and 17 mobile clinics under the auspices of the National Family Welfare Center (FOF9201). The 1993 DHS found Kenya's contraceptive prevalence rate (CPR) for modern methods has risen to nearly 30

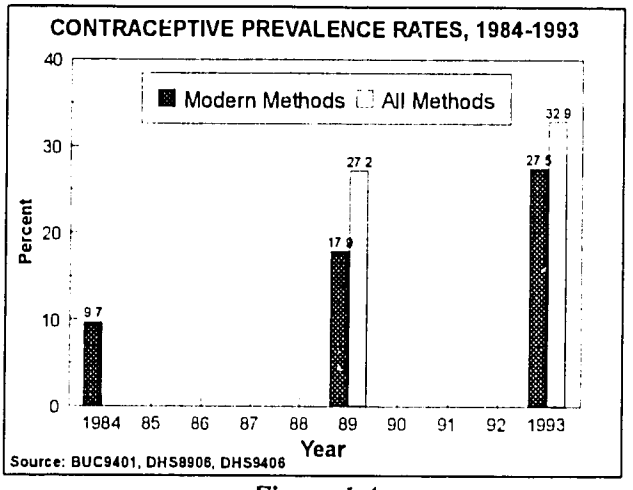



*Figure 1.4*

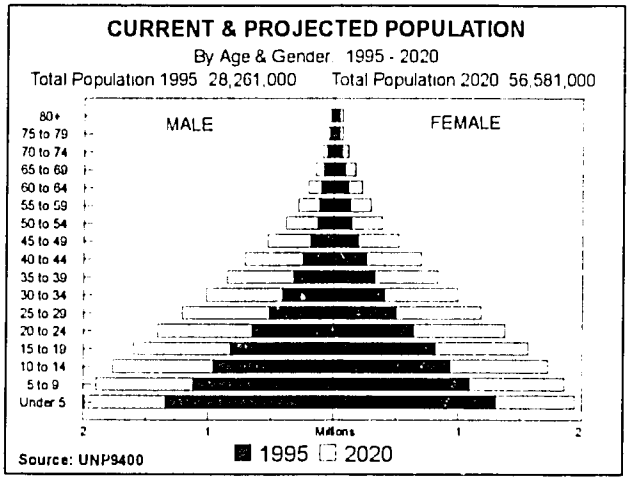



*Figure 1.5*

percent (see figure 1.4), one of the higher levels in sub-Saharan Africa. Figure 1.5 presents a pyramidal representation of Kenya's population by age and sex for two years, 1995 and 2020, according to projections by the UN. The total population was projected to double again over the 25-year span. In 1995, 18 percent of the population is thought to be under five years of age and nearly half (47.7 percent), under the age of 15 (UNP9400).

As a whole, the nation is relatively scarcely populated, with a nationwide population density estimated at 35 persons per $km^2$ (91 per $mi^2$). However, the southwestern quadrant, with just 10 percent of the land area, contains over 75 percent of the population. Density in arable areas is estimated to be 276 per $km^2$ (714 per $mi^2$). The main areas of concentration are Central Province in the eastern Kenya Highlands, the Lake Victoria area in Western and Nyanza Provinces, and the coastal zone around Mombasa. In the northern half of the country the density is less than four persons per $km^2$ (10 per $mi^2$)(FOF9201).

Though a relatively recent phenomenon, urbanization has resulted in significant shifts in population since independence. Over one-quarter (26.9%) of the population was thought to be living in urban areas in 1994 (UNP9400). The annual rate of urban growth is estimated at 6.8 percent, more than double the national growth rate (UNP9501). At the start of the 1990s, there were about 50 urban centers with a population of over 2,000 but only two with populations of over 100,000, Nairobi (1.5 million) and Mombasa (400,000). Together, these two primary cities absorb most of the rural migrants seeking employment. A vast majority of urban residents live in slums and squatter settlements: Nairobi's slum population is estimated to have grown from just 19 percent in 1965 to 70 percent today. A current estimate for Mombasa is comparable at 67 percent (FOF9201).

Of Kenya's 32 major indigenous ethnicities, no single group is numerically dominant. The largest, the Kikuyu, constitutes only 21 percent of the population. Together, the five largest ethnic groups – Kikuyu, Luhya (14%), Luo (13%), Kamba (11%), and Kalenjin (11%) – make up 70 percent of the population. The principle non-African minorities are Asians (descendants of Indian and Pakistani settlers) and Arabs. The vast majority of the population, some 70 percent, follows Christianity, while about one quarter follow indigenous beliefs and six percent are Muslims. English and Kiswahili are Kenya's two official languages (FOF9201, DOS9401).

## Economy

Kenya is considered a lower-income country, with a level of GNP per-capita estimated at just $340 in 1991, well below the median among sub-Saharan nations (see figure 1.6). After independence, Kenya promoted rapid economic growth through public investment, encouragement of smallholder agricultural production, and incentives for private (often foreign) industrial investment. This growth declined starting in the early 1980s through to the 1990s (GRI9301). In 1994, the economy rebounded somewhat, with GDP growth estimated at 3.3 percent and

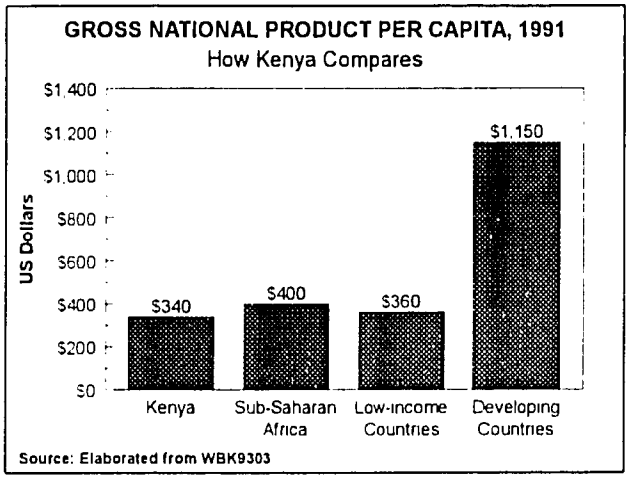



*Figure 1.6*

inflation down from over 50 percent at the end of 1993 to just nine percent in 1994. Much of the success is credited to improved confidence in economic management as the government has removed controls over foreign exchange and prices (AID9514). Kenya is one of the few African countries to espouse an economic philosophy based on private enterprise. Agriculture is the mainstay of the economy, employing four-fifths of the population and accounting for about one-third of GDP. The main export commodities are coffee, tea, fruit, vegetables, sisal, pyrethrum, and cotton (FOF9201). The tourist industry, Kenya's biggest source of foreign exchange, has been badly hit by insecurity in the Western part of the country (WIA9301).

Ten percent of Kenya's total land area is considered to be agricultural. A total of 60 percent of the cultivated area is planted with corn, sorghum, or millet. Population growth has brought mounting pressure on the land, as evidenced by excessive subdivision, landlessness, and settlement in semi-arid areas not well-suited to farming. Kenyan farmers tend to place a high value on cattle as a status symbol and as a source of wealth. Commercial fishing is another significant activity, employing over 31,000 fishermen in Lakes Victoria, Naivasha, Baringo, and Turkana and in deepwater offshore fishing in the Indian Ocean (FOF9201). The adequacy of internal food supply as well as success in the export sector are both highly subject to variations in weather patterns. Droughts caused widespread crop failures in 1979, 1984, and most recently in 1992-93. These droughts have led to large-scale food imports, including emergency relief supplies after the latest drought, which was Kenya's worst in living memory. The problem was exacerbated by the presence of 500,000 Somali refugees in some of the worst-hit areas. Although the drought subsided in arid and semi-arid areas in 1994, it struck anew in southern districts of Rift Valley Province and in Eastern Province (AID9514).

By the early 1990s, growth in the agricultural sector had slumped to one percent, an all-time low. Production of coffee fell as farmers destroyed bushes and replanted their land with more lucrative food crops. Tea production slumped by as much as 20 percent due to low rainfall and ethnic clashes which have centered on many of the prime tea growing areas. Horticultural produce, the export success story of recent years, suffered from high local costs of jet fuel and poor quality packaging (GRI9301,WIA9301).

The most important industries are agro-based products, textiles and clothing, machinery and vehicle assembly, and chemicals. More than 50 percent of manufacturing plants are in Nairobi, but the government is encouraging location of new industries away from the capital. Known mineral resources include lead, silver, fluospar, and ruby deposits, which are all believed to be extensive, as well as some zinc, copper, nickel, and gold (FOF9201).

Unemployment is unofficially thought to have approached a level of 30 percent of the work force. The level is higher in urban areas, where the formal, wage-earning sector is increasingly hard-pressed to absorb the annual increases in the work force. To attain real growth in per-capita income, the government has undertaken a major structural adjustment program and committed itself to related policy changes (GRI9301). Efforts are under way to reduce the budget deficit by reforming and divesting from parastatals and streamlining the civil service. The slow progress of these reforms has been one of the donor community's main reasons for delaying the resumption of aid (WIA9301).

# II. HEALTH SITUATION ANALYSIS

## Basic Health Indicators

### Life Expectancy and Mortality

Although Kenya faces enormous obstacles to the improvement of health conditions, the country remains relatively well-off among sub-Saharan African nations. Life expectancy at birth was estimated by the United Nations (UN) at 59 years in 1992, far above the median of 50 among sub-Saharan nations (see figure 2.1). The long-term progress reflected in this estimate is now gravely threatened by the possibility of increasing infant and child mortality and the broader impact of HIV/AIDS among the adult population. In the absence of AIDS, the United States Bureau of the Census (BUCEN) had projected Kenya's life expectancy to rise to about 67 years of age by the year 2010. However, calculating for continuing impact of the AIDS pandemic, the Bureau now projects life expectancy to drop to just 40 years of age by 2010 (BUC9403).

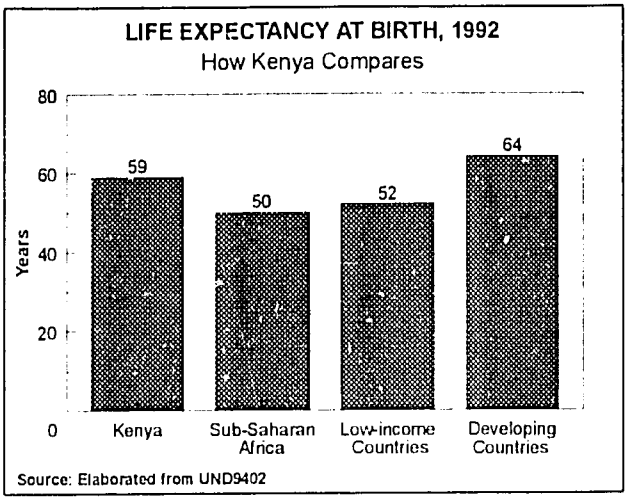



*Figure 2.1*

As indicated in figure 2.2, the crude death rate for the population as a whole is thought to have been halved since the 1950s. Meanwhile the crude birth rate remained very high until finally beginning to descend in the late 1970s, according to UN projections. Studies of mortality patterns in a rural Kenyan community in the 1980s found mortality among infants to account for 63 percent of all deaths. As is typical, mortality rates decreased with increasing age (EAM90001).

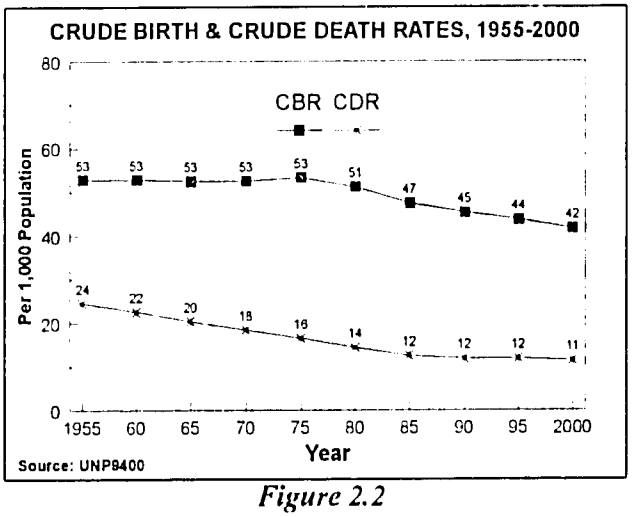



*Figure 2.2*

### Infant and Child Mortality

Past improvements in life expectancy in Kenya have largely been the product of declining mortality rates among children. Reductions in Kenya's infant mortality rate (IMR) and under-five mortality rate (U5MR) have been substantial since 1950, when they stood at a level two-and-one-half times higher than the current respective estimates of 68 and 113 deaths per 1,000 live births. These estimates are part of a projected time series based on analysis of Kenya's two DHSs along with other available data on mortality trends (see figure 2.3). As indicated in figure 2.4 on the following page, these current rates stand at just about 60 percent of median levels for the region and among low-income countries as a group.

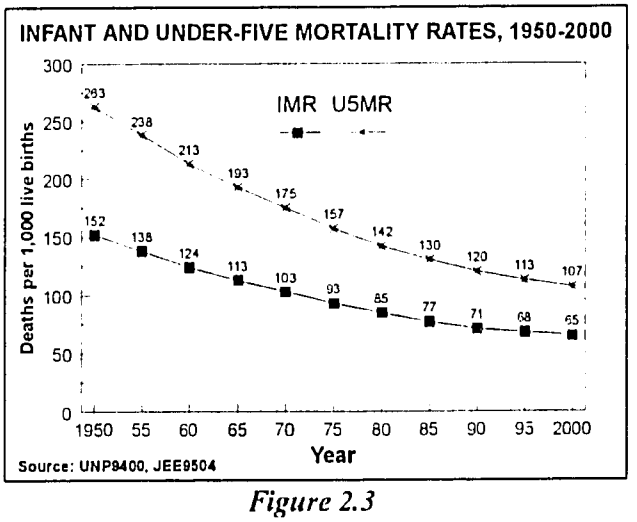
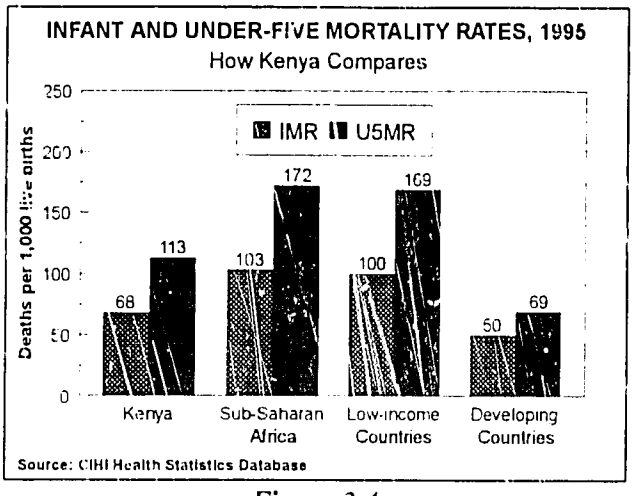



*Figure 2.3*

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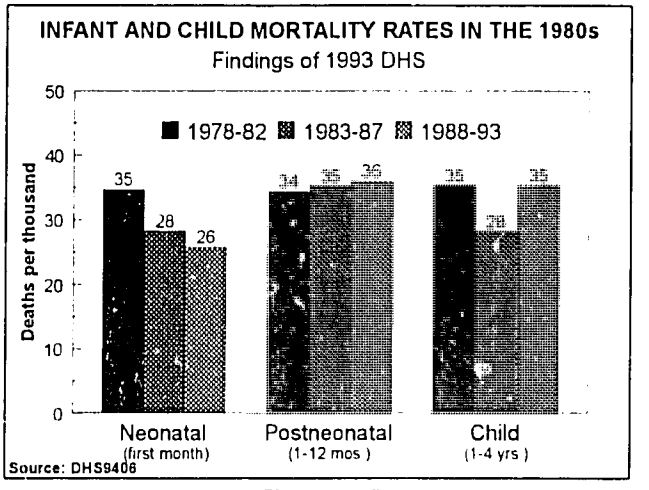



*Figure 2.5*

Although the long-term trends are encouraging, close analysis of DHS findings suggests that the trend of declining infant and child mortality may have stagnated and even reversed in the 1980s. The 1993 DHS found that both infant and under-five mortality declined slightly over the three five-year periods preceding the survey. Most of this decline, however, occurred among neonatals (see figure 2.5), while mortality increased steadily in the postneonatal period (one through twelve months), according to the DHS. No improvement was found in the child mortality rate (one through four years of age).

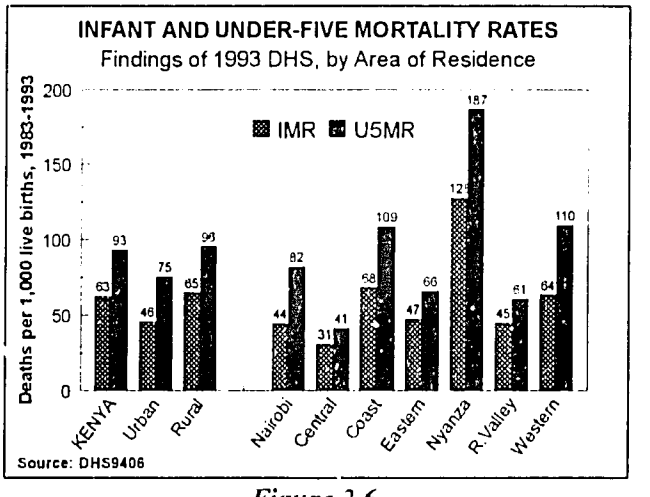



*Figure 2.6*

Increased deaths reported among infants in rural areas were the overwhelming cause behind the DHS finding that postneonatal mortality had increased, a phenomenon which is suspected to reflect increased impact of childhood diseases, particularly malaria (AID9424). Calculating mortality rates for the ten-year period preceding the survey, the 1993 DHS found that the IMR in rural areas was over 40 percent higher and the U5MR 28 percent higher in rural areas than in urban areas. Among Kenya's regions, by far the highest rates of infant and under-five mortality were found in Nyanza, standing four times higher than the lowest regional rates, which were found in the Central Region. Other areas displaying above-average rates of infant and under-five mortality were the Coast and Western Region (see figure 2.6).

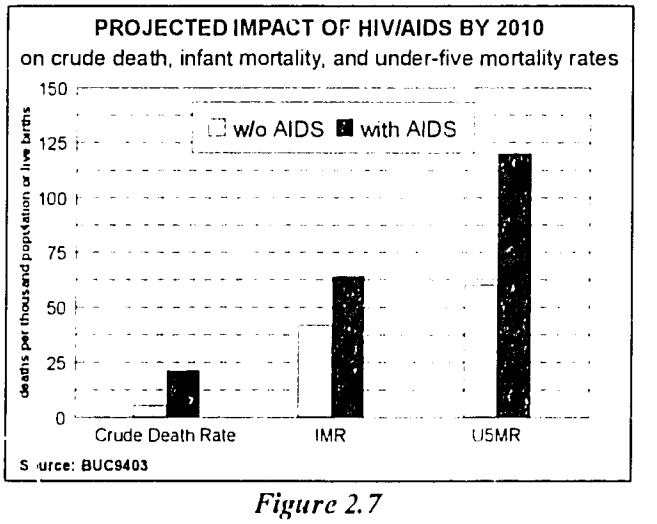



*Figure 2.7*

Unfortunately, whatever progress has been made in decreasing mortality rates since the 1970s stands to be lost as a result of the HIV/AIDS pandemic. The analysis by BUCEN found that in the year 2010, the crude death rate would be nearly four times higher, the IMR 50 percent higher, and the U5MR twice as high as rates projected in the absence of HIV/AIDS (see figure 2.7).

## Causes of Mortality & Morbidity

Most of the prevalent causes of ill health in Kenya can be effectively addressed through improved nutrition coupled with preventive actions such as better sanitation, clean water, immunization, and relatively simple curative health interventions. Kenya's disease pattern can be grouped into five broad categories: Vector-borne diseases, especially malaria, comprise the group with the most severe impact in the lowlands. Respiratory infections, including pneumonia, tuberculosis, and bronchitis, are prevalent throughout the country but are more predominant in higher-altitude areas. Diarrheal diseases and other parasitic afflictions related to poor sanitation have enormous impact throughout the country, especially among children. Vaccine-preventable diseases, particularly measles and pertussis, also have their greatest impact among children. Of great significance among adults in particular are complications related to maternity as well as sexually-transmitted diseases (STDs), particularly HIV/AIDS, gonorrhea, and syphilis (WBK9101). Underlying many of these afflictions are nutritional deficiencies, which can result in increased susceptibility to disease and long-term disability, particularly among children and mothers. Each of these categories is treated in greater detail under specific health problems examined below.

As throughout sub-Saharan Africa, the exact disease pattern in Kenya is difficult to ascertain. Health information systems are limited by incomplete and inconsistent reporting of diagnoses from formal health establishments. Furthermore, treatment of illnesses commonly occurs outside of the formal health system and thus goes unrecorded in official tallies. Reports based on official tallies of causes of death or illness are thus only a partial reflection of the relative impact of various diseases. According to data gathered by the Ministry of Health (MOH), the first three disease groups mentioned above – vector-borne, respiratory, and sanitation-related diseases – accounted for at least 70 percent of reported deaths in 1992 and 60 percent of reported illnesses in 1987 among all age groups (see figures 2.8 and 2.11). In the time since this information was collected, HIV/AIDS has emerged as another major cause of illness and death.

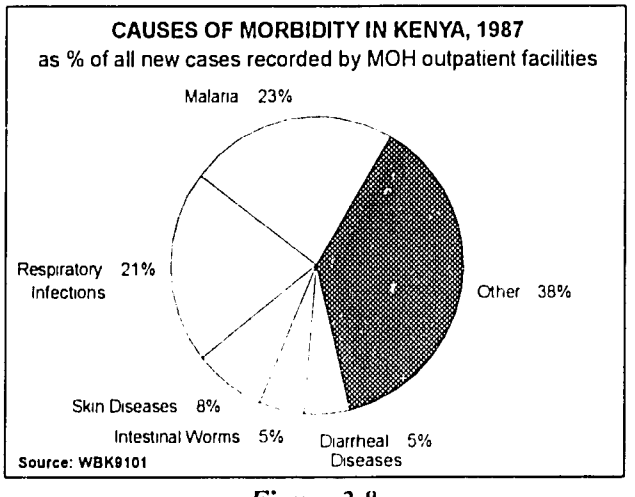



*Figure 2.8*

## Causes of Illness

As indicated in figure 2.8, national morbidity data collected by the MOH in 1987 suggest that the top five reported conditions among all new cases treated were malaria, respiratory infections, skin diseases, intestinal worms, and diarrheal diseases. These data were based on the number of cases reported of 36 diseases by all health institutions in the country with outpatient services. Reports were submitted by only 63 percent of facilities nationwide (WBK9101).

Estimates of adult morbidity can be derived from a study of illnesses reported among factory workers in Eldoret in 1990. Of 303 episodes of illness, malaria was cited as the cause of more than half, followed distantly by ARIs (see figure 2.9). The two causes resulting in the most lost workdays per episode were abortions and worm infections, each of which caused seven lost days per episode (EAM9201).

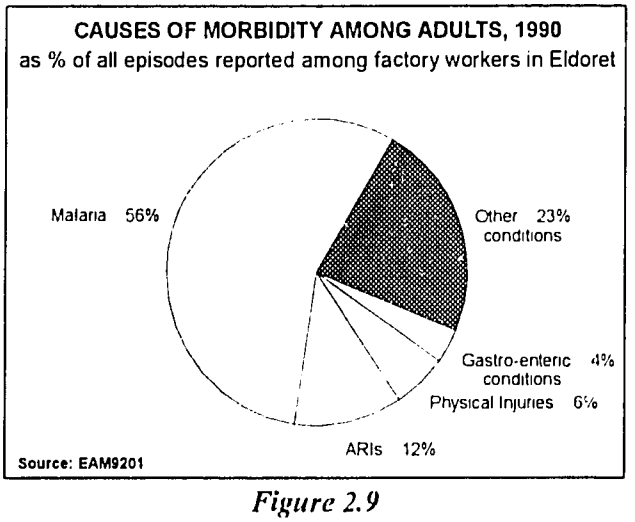



*Figure 2.9*

Recently published data summarizing over 400,000 consultations at four mission hospitals in rural areas of Kenya provide an opportunity not only to observe the relative significance of various major diseases as a cause of hospital admissions but also to see how the incidence of each disease has changed over time (see figure 2.10). Between 1975 and 1990, the catchment area population of the four hospitals increased from 500,000 to 850,000. Not only has malaria consistently been the most commonly reported disease over the entire time period, but its incidence, as measured by admissions per inhabitant, has nearly tripled since the late 1970s. Meanwhile, the next four disease groups, gastroenteritis, pneumonia, "immunizable diseases," and measles, showed substantial declines in incidence over the same period; their combined incidence in the final four-year period was still less than half of malaria's most recent rate of over 15 admissions per 1,000 inhabitants. The next three conditions, malnutrition, meningitis, and tuberculosis, displayed slight if any increase in incidence since the late 1970s (JTM9501).

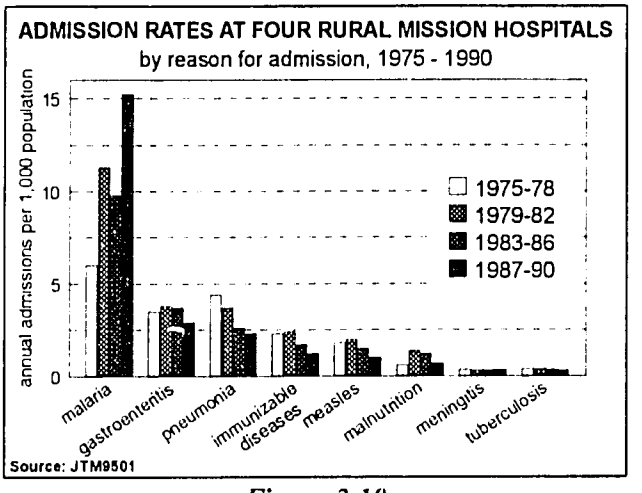



*Figure 2.10*

## Causes of Death

Figure 2.11 presents a recent summary of nationwide cause-of-death data as reported by facilities to the MOH. The most frequently reported cause of death, malaria, accounted for over one-quarter of the total, followed closely by respiratory diseases. Due to biases inherent to facility-based reporting, these data are not the most reliable source on the actual disease pattern in Kenya. The proportion of deaths attributable to AIDS was not provided but is certain to comprise a major share of adult mortality.

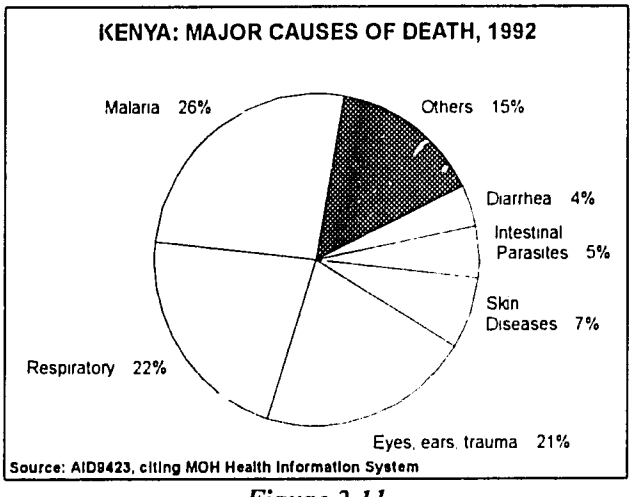



*Figure 2.11*

In the absence of a systematic registration of births and deaths, population-based surveys are the most reliable approach available for quantifying causes of death. One of the earliest comprehensive studies of mortality in sub-Saharan Africa took place in Kenya's Machakos District between 1973 and 1978. Data on cause of death from verbal autopsies were complemented by separate follow-up studies focussing on causes of death among newborns, children, and adults. A detailed illustration of the proportion of total deaths attributed to various causes for all age groups is provided in figure 2.12; data disaggregated for younger age groups are presented in figures 2.14-2.16 below. It has been suggested that these patterns are not typical for the country because Machakos was found to have lower mortality rates than other parts of Kenya. Malaria in particular is underrepresented here because Machakos is located in the highlands, where the disease has minimal impact (OUP9101).

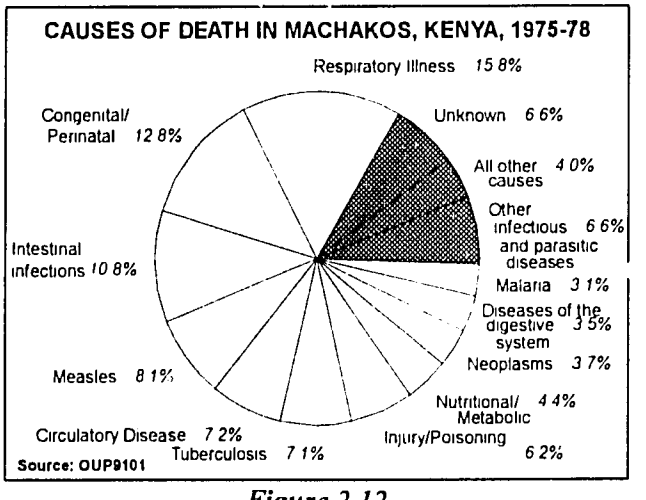



*Figure 2.12*

Data reported by the four mission hospitals between 1975 and 1990 detail the relative significance over time of various causes of death among hospital patients (see figure 2.13). Pneumonia was the most commonly reported cause of death for the first three time periods but was surpassed in the 1987-90 period by malaria, whose death rate had increased about six-fold since the late 1970s. The next most frequent causes of death, gastroentiritis and immunizable diseases, declined in incidence, as did measles and malnutrition. Meningitis was reported as a cause of death with increasing frequency over the sixteen-year period (JTM9501). Although this information resulted from years of careful and relatively consistent observation at mission hospitals, it is subject to various reporting biases inherent to hospital-based care.

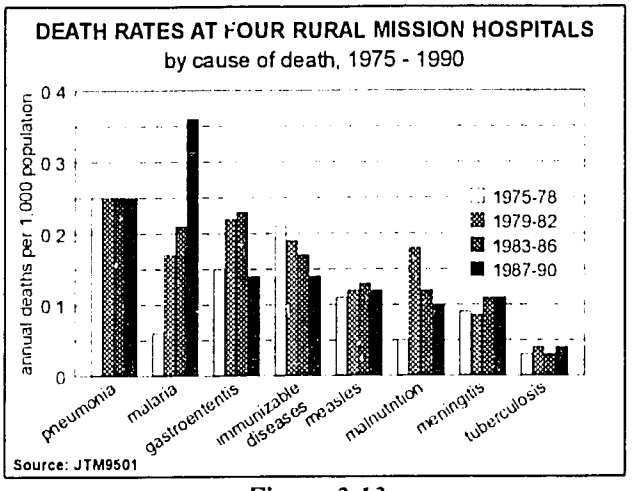



*Figure 2.13*

## Causes of Child Mortality

Major causes of death among children in Kenya include malaria, respiratory infections, and diarrheal diseases. Also of great importance are malnutrition, the role of which is typically underplayed in cause-of-death data, and neonatal complications. The Machakos surveys produced one of the earliest in-depth studies of causes of death among neonatals (up to one month of age), infants (up to 12 months of age), and young children in sub-Saharan Africa. Figures 2.14-2.16 provide a summary of the study's findings for each of the three periods. Although the data are the result of a carefully conducted investigation, they are not fully representative of the current situation in Kenya, where malaria and HIV/AIDS are now known to play enormous roles in child mortality (ages 1-4) in particular.

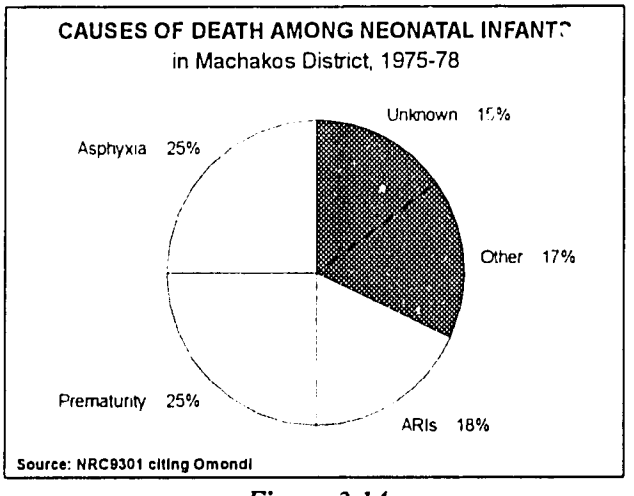



*Figure 2.14*

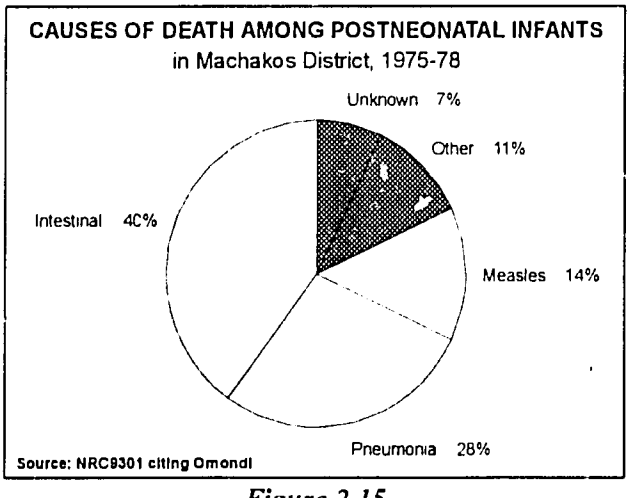



*Figure 2.15*

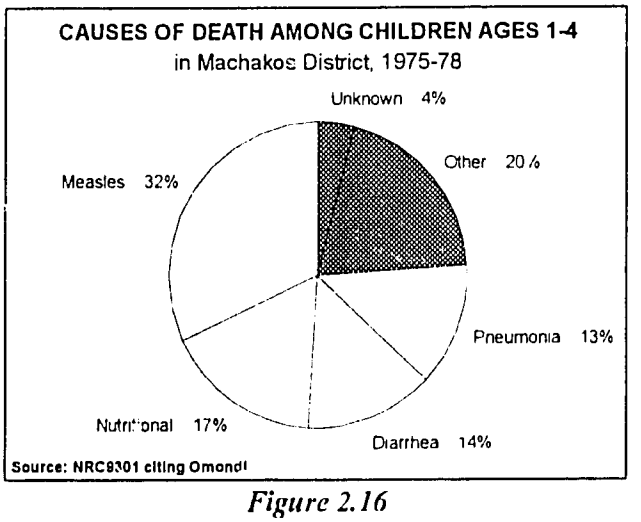



*Figure 2.16*

A rigorous examination of various data sources covering the period 1976-87 led to nationwide estimates of annual child deaths attributable to individual diseases. As illustrated in figure 2.8, respiratory infections topped the list, distantly followed by measles, diarrheal diseases, malaria, and neonatal tetanus (NRC9301). HIV/AIDS is currently projected to become the leading cause of deaths among children by the year 2000. By 2005, AIDS may account for as many as 50,000 child deaths each year, as opposed to 10,000 due to measles and malaria (AID9422).

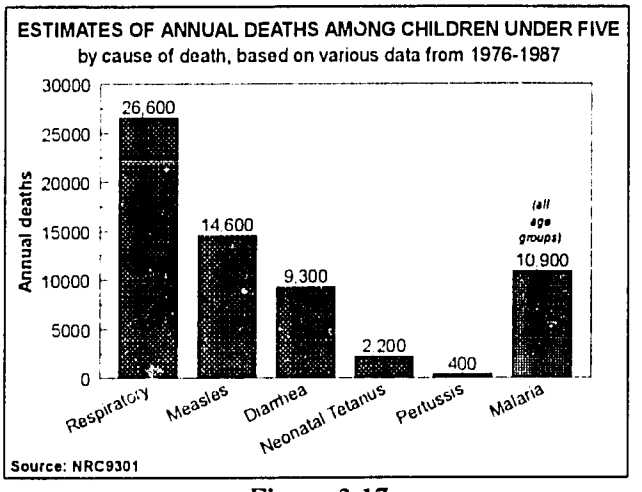



*Figure 2.17*

## Maternal Mortality

Deaths in childbirth reportedly account for 40 percent of all deaths among 15-35 year old women in Kenya, mainly resulting from hemorrhages, tetanus, hypertension, and uterine rupture (WBK9101). As indicated in figure 2.18, Kenya's maternal mortality rate (MMR) is thought to be 400 maternal deaths per 100,000 live births, quite high by international standards but just over half of the median level among sub-Saharan African nations. Safe pregnancy has long been an emphasis of the health care system; in 1984 it was believed that rural health programs had already helped reduce maternal mortality by 30 percent (FOF9201).

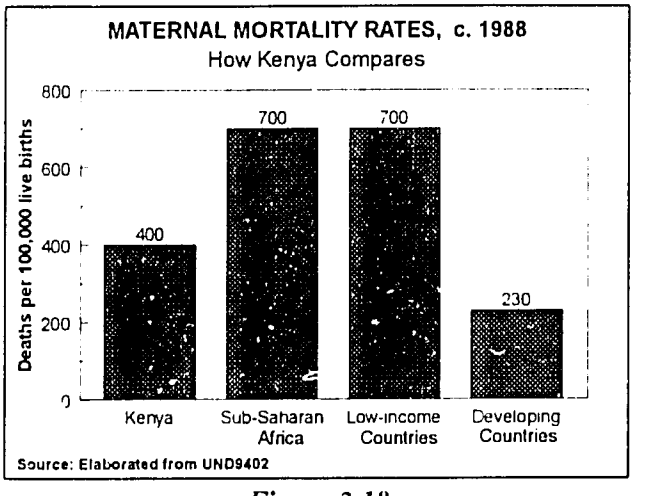



*Figure 2.18*

Women in Kenya face many grave obstacles to safe pregnancy and childbirth. Of particular significance are the lack of information on the prevention and treatment of reproductive-related illnesses, poor nutritional status among mothers, a physically demanding workload, and traditional practices and superstitions which reinforce poor nutritional status. For example, pregnant women are commonly told not to eat eggs, fish, fruit and vegetables, some meats, or milk because these foods are thought to pose a danger to pregnancy (PRB9401).

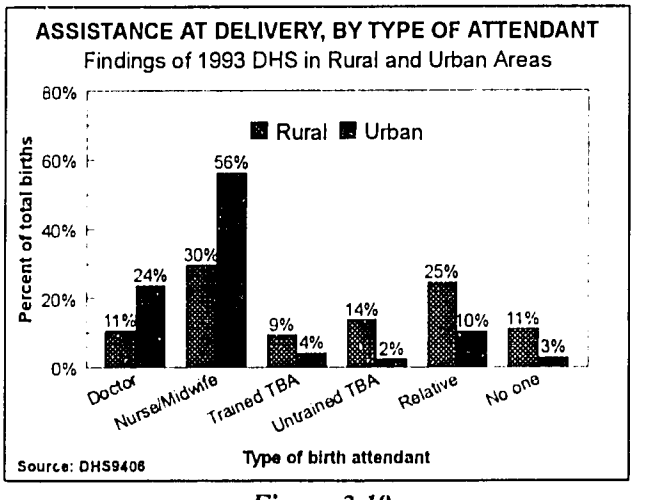



*Figure 2.19*

Data from the 1989 and 1993 DHSs do not indicate any significant improvement in use of trained health care personnel or health care facilities to assist at childbirth. The 1993 DHS found that 55 percent of births in the five years preceding the survey occurred at home. Figure 2.19 illustrates the differences in use of health care personnel at delivery in rural areas versus in urban areas. In all, 12 percent of total births were assisted by a doctor, 33 percent by a trained nurse or midwife, 21 percent by a traditional birth attendant (TBA), 23 percent by a relative, and ten percent (mostly in rural areas) by no one at all (DHS9406).

Another risk factor for maternal mortality is the common practice of female genital mutilation (FGM), which is estimated to have a prevalence of about 50 percent of adult women. This practice is reportedly decreasing in urban areas but remains common in rural areas, particularly around the Rift Valley (FGM9301). Long-term effects can include infertility, obstructed labor, or hemorrhage during childbirth. Female circumcision was banned by the Kenyan government in 1982 but up to now, the practice goes unabated in many communities (PRB9401).

# Specific Health Problems

## Vector-Borne Diseases

Some of Kenya's greatest public health hazards are tropical diseases carried by mosquitos, flies, worms, and other vectors. Among theses diseases, malaria has the greatest impact, gravely affecting children as well as adults. Other vector-borne diseases of significance include sleeping sickness, yellow fever, and leishmaniasis, each of which is briefly discussed below. Others, such as schistosomiasis and Guinea Worm disease, are discussed elsewhere under "diseases related to water and sanitation."

**Malaria.** Malaria is the leading cause of outpatient visits, accounting for 26 percent of all cases seen, and counts among the leading causes of death at all ages (AID9421). According to the MOH, reported cases of malaria have reached an annual total of six million (AID9422). The precise number of malaria-specific deaths is difficult to quantify, but since untreated severe malaria is likely to have a case-fatality rate (CFR) of around 50 percent and only a minority of these cases present in hospital, the count is likely to be very high (WHO9307). Among patients admitted with severe malaria, a CFR of 5.1 percent has been reported (AJM9401). Ten percent of survivors are said to suffer severe lasting effects (AID9422). As previously indicated in figure 2.17, a study for the UN estimated the total annual number of deaths due to malaria at 10,900 between 1976 and 1987, implying that malaria was the fourth-leading killer among children, after respiratory infections, measles and diarrhea. Morbidity and mortality rates due to malaria have reportedly increased significantly over the past decade, particularly due to increased resistance of malaria strains to prophylactic and curative drug treatment (AID9421).

Figure 2.20 illustrates the enormous impact on mortality rates which could be possible through the eradication of malaria. After spraying of pesticides in a targetted area in Kisumu District, the daily incidence of malaria dropped by 96 percent. In subsequent years, the crude death rate, which reflects mortality among all age groups, lowered by nearly 50 percent and the IMR dropped by 41 percent, reflecting decreased mortality among children over three months of age. Although this intervention was not practical on a larger scale, its short-term impact on a local level is clear (NRC9301).

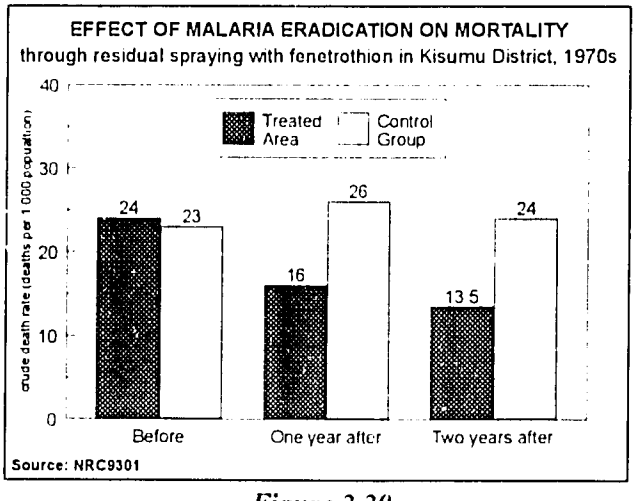



*Figure 2.20*

Severe malaria has its greatest impact among young children, pregnant women, and nonindigenous residents and visitors (AJM9401). Although infants are protected through maternal antibodies in the first few months of life, malaria in children is a common cause of convulsions, severe anemia, and malnutrition, and increases vulnerability to other childhood diseases. Cerebral malaria can lead to permanent brain damage. In pregnant mothers, especially in *primi gravidae*, malaria can lead to severe anemia, abortion, intra-uterine death, and/or low birth-weight babies, the last of which is one of the leading underlying causes of infant mortality (AID9421).

Transmission patterns vary geographically according to rainfall, vector species, and altitude. Malaria is most widespread in the warm lowlands around Lake Victoria and in the coastal region. Transmission is high in these areas, averaging one infective bite/person/week throughout the year. Unstable malaria occurs in areas of lower endemicity such as the districts of Machakos, Embu, and Kitui of Eastern Province, and Marigat and Ngurumani of Rift Valley Province. Epidemic malaria occurs in highland areas bordering endemic zones. Epidemics in 1988 (Uasin Gishu), 1989 (Nandi), and 1990 (Kericho) resulted in considerable adult and child mortality (AJM9401). Another epidemic focussed in four districts in southwestern Kenya in 1994 sent UNICEF, USAID, and other donors scrambling for second- and third-line drugs to avert further disaster (CAB9415). All land lying at altitudes above 1600 meters, including Nairobi and Mount Kenya and its surroundings, is malaria-free (AJM9401).

In order to examine trends in malaria prevalence and treatment among children in Kenya, the 1994 DHS asked mothers whether their children had experienced a fever in the preceding two weeks, and, if so, how the fever was treated. Although a fever can result from a variety of other conditions, including schistosomiasis, the data is generally accepted as illustrative of trends in malaria transmission and treatment. Prevalence of fever was found to be highest in Western and Nyanza Provinces, the lowland areas along Lake Victoria (see figure 2.21). Nearly half (47%) of the children with fever were taken to a medical facility (including 63 percent in Coast Province), 30 percent of the children were treated with an antimalarial drug, and 21 percent were administered antibiotics (DHS9407). Another recent study in a rural area of western Kenya found that the population was generally well-informed about the symptoms of malaria and that self-treatment with herbal remedies or medicines is extremely common. The authors recommended that increased attention be paid to the role of home treatment of malaria when policies are being developed for the management of febrile illnesses in sub-Saharan Africa (WHO9506).

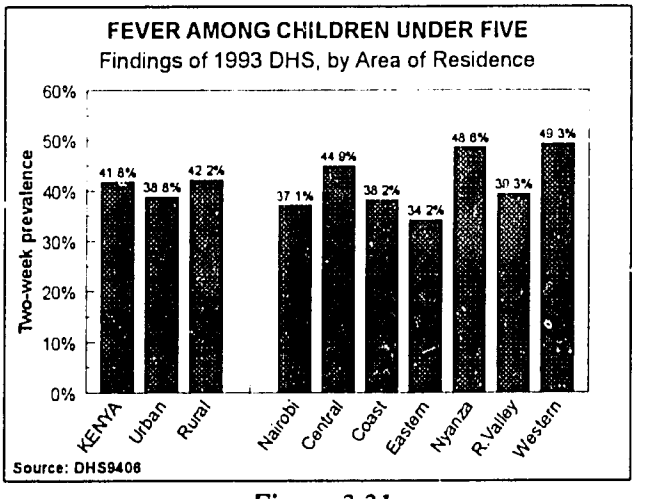



*Figure 2.21*

A variety of development projects in Kenya, including irrigation schemes for agriculture, dams and hydropower projects, and resettlement programs, have been shown to lead to increased malaria burden. A study in western Kenya, for example, showed that rates of malaria transmission, morbidity, and mortality were highest among residents of areas with rice irrigation schemes, where the IMR had increased from 110 deaths per 1000 live births to levels between 170 and 360 after the introduction of irrigation. Prevalences of malaria at irrigation schemes in Mwea and Hola are respectively 26 per cent and 54 per cent higher than in the nonirrigated surrounding areas. Prevalence of malaria has also increased around the Ahero irrigation scheme as a result of the creation of ideal breeding sites for mosquito vectors (WHO9307).

The malaria situation in Kenya is worsening because the most prevalent species of malaria, *Plasmodium falciparum*, which accounts for 80-90 percent of cases in Kenya, has developed resistance to a number of antimalarial drugs, including chloroquine. This has lead to treatment failure, resulting in more severe illness and death (AID9421). The MOH, in conjunction with KEMRI and AMREF, has established a simplified system to monitor the presence and degree of drug resistance in all malaria ecozones in Kenya. The MOH is also putting great emphasis on improving the delivery of antimalarial drugs in order to increase availablility in the most needy areas. Retailers country-wide, including kiosks, are now authorized to stock chloroquine (AID9424).

A recent study of malaria's drug-resistant properties in Malawi and Kenya concluded that chloroquine can no longer be considered adequately effective therapy of clinical *P. falciparum* malaria in very young children in these areas. The study assessed the clinical, parasitologic, and hematologic responses to chloroquine or

pyrimethamine-sulfadoxine among very young children in the two countries. The median time to resumption of clinical symptoms in chloroquine-treated children was 13.5 days in Malawi and 9.5 days in Kenya. Children treated with pyrimethamine-sulfadoxine maintained clinical improvement and had greater increases in their hemoglobin concentration during the follow-up period than did children treated with chloroquine. Treatment with chloroquine failed to produce either a durable clinical improvement or optimal hematologic recovery (JID9301). Resistance to pyrimethamine-sulfadoxine has also been documented. In an area of continuing transmission of *P. falciparum* on the Kenya coast, children treated with the drug experienced rapid parasite clearance, but a high proportion became reinfected within a short time. The frequency of pyrimethamine resistance *in vitro* in new infections was higher during the elimination phase of the drug from a previous treatment (TRS9301).

In addition to *P. falciparum*, other species of malaria found in Kenya include *P. malariae*, *P. ovale*, and *P. vivax*. Mosquito vectors are members of the *Anopheles gambiae* and *A. funestus* complexes. Vector control has become a haphazard effort due to financial constraints and is currently restricted to the control of malaria epidemics and severe outbreaks in endemic zones. While vector control has had historical success in urban areas, current activities need to more effectively target rapidly expanding peri-urban areas as well as agricultural zones and irrigation schemes displaying higher endemicity (AJM9401).

Insecticide-impregnated screens and bednets are gradually finding wider use in malaria control programs. The MOH, with support from UNICEF, has implemented an integrated malaria control program in four districts whereby the use of impregnated bednets is promoted as a community measure for malaria prevention. Studies carried out to determine the duration of the effectiveness of a permethrin-impregnated wall cloth (Mbu cloth) used in the Marigat area of Baringo District showed that the wall cloth remained effective for six months against *A. gambiae* (as well as four months against *Culex quinque-fasciatus* and ten months against *Aedes aegypti*)(TMP9201).

**Sleeping Sickness (African Trypanosomiasis).** Sleeping sickness is a disease borne by tsetse flies which prohibits the agricultural or pastoral use of large areas of central and eastern Africa. The disease can afflict wild and domestic mammals as well as humans. Kenya is one of a handful of countries where both of the parasite species infecting humans are present. Endemicity is limited to the Southwest of the country, with *T.b. gambiense* occuring in areas around and to the North of Lake Victoria and *T.b. rhodesiense* in separate areas to the North and East. In 1991, a total of 700,000 Kenyans were thought to be at risk for sleeping sickness. Kenya has not regularly notified WHO of annual case counts but reported a partial total of 90 cases for 1990 (VBC9101).

**Yellow Fever.** Yellow fever is an acute infectious viral disease of short duration and varying severity. Attacks are characterized by sudden onset, fever, chills, headache, backache, generalized muscle pain, prostration, nausea and vomiting. As the disease progresses, the pulse slows and weakens, even though the temperature may be elevated. Yellow fever is rare but endemic in Kenya. The infectious agent, a flavivirus, is transmitted by the bite of infective mosquitoes *Aedes aegypti* or *Aedes africanus*.

Kenya's first reported yellow fever outbreak since 1943 began in September 1992 and continued through March 1993. The outbreak was limited to the Baringo and Elgeyo Marakwet Districts in the Kerio Valley, northwest of Nairobi. A total of 54 cases and 28 deaths were recorded, including 18 cases (33 percent) among people 19 years old or younger and 19 cases (35 percent) among females. Epidemiological investigations indicated that the outbreak was consistent with jungle yellow fever in that young males were predominantly infected, rural exposure was a significant risk factor, non-human primates were abundant in the outbreak area, and appropriate forest-dwelling mosquito vectors, such as *Aedes africanus*, were present, while the urban vector of yellow fever, *Aedes aegypti*, was not abundant in the outbreak area. The outbreak was halted following a mass immunization campaign, during which nearly one million doses of yellow fever vaccine were administered to residents of the areas at risk. The disease continues to be a threat in all endemic and epidemic zones because it can reappear even after long periods of quiescence (WHO9503).

**Leishmaniasis**. Visceral leishmaniasis, or Kala-azar, is endemic in some parts of Kenya, including the districts of Baringo and West Pokot in Rift Valley Province and Kitui District in Eastern Province. The disease is caused by the parasite *Leishmania donovani*, which is transmitted by sandflies with a wide distribution of ecological habitats, with termite hills being the most preferred breeding sites (EAM9501). The disease commonly occurs in scattered cases among infants, children, and adolescents, but occasionally in epidemic waves. Incidence can be lowered through the use of antimalarial insecticides. In Baringo District, sandfly populations are highest during the two rainy seasons April-June and November-December. A significant association has been detected between the monthly abundance of sandflies and rainfall in the previous month (TMP9401).

The prevalence of visceral leishmaniasis and malaria in the human population of West Pokot district of Kenya was studied in 1986. Among over 2,000 people screened, prevalence of visceral leishmaniasis was much lower than that of malaria, with less than two percent of subjects in each of four age groups suffering active cases. A general decline of infection rates with altitude was observed for both diseases (EAM9202).

Several foci of cutaneous leishmaniasis, which is caused by the *Leishmania tropica* parasite, have been identified in central Kenya and the Rift Valley Province. Intensive transmission was detected at the Utut focus on the floor of the Rift Valley, where high infection and scar rates were found among illegal charcoal burners in a previously uninhabited forest reserve on a lava flow containing numerous caves and rock crevices inhabited by sandflies and mammals including hyraxes. Multiple lesions, predominantly in the head region, were common. One-third of cases occurred in people who had been in the area less than one year. Although most lesions healed within one or two years, some large, recrudescing lesions lasted several years (TRS9401).

**Filariasis** is caused by *Wuchereria bancrofti*, filarial worms which are spread by the bites of various types of insects. Effects include disablement due to elephantiasis, usually among adults, or episodic filarial fever, which is more difficult to identify but also functionally disabling (OUP9301). A 1985-86 study reported a prevalence of 24 percent among adults in villages known to be endemic in Coast Province (ATM9201).

**Human Hydatid Disease (Echinococcosis).** This disease is manifested in cysts caused by hydatids, the larval form of *Echinococcus granulosus* tapeworms. Kenya has the highest reported incidence of human hydatid disease in the world. The domestic dog is the main definitive host of the causative tapeworm. Up to about 30 percent of cattle, 15 percent of goats and 13 percent of sheep harbor the infection (JJV9001). In the semi-arid environment of Turkana, a prevalence of human hydatid disease of nearly 10 percent has been recorded among the pastoralists, yet their livestock exhibit much lower prevalence. In Turkana, the prolonged presence of dogs within small houses creates ideal conditions for the transmission of the parasite to man, while hostile environmental conditions and the lack of contact between dogs and livestock contributes to the lower infection rate in livestock. In the cooler and more moist conditions found in Masailand, where dogs are used for herding and *Echinococcus* eggs survive in the environment for longer than three weeks, livestock have a greater incidence of hydatid disease than in Turkana, but incidence in man is ten times lower (JHE9101).

## Acute Respiratory Infections (ARIs) and other Airborne Diseases

ARIs are among the top causes of infant and child mortality in Kenya. In 1987, 21 percent of all reported illnesses were diagnosed as respiratory infections, which were thought to be the leading cause of death among infants and young children in the 1980s (see figures 2.8 and 2.17). The Machakos study in the 1970s found that respiratory illnessess were the leading cause of death among all age groups (see figure 2.12). The predominant known causes of ARI mortality are bacterial and viral pneumonia, measles, and pertussis. The latter two are preventable through immunization and are discussed in more detail under vaccine-preventable diseases.

A study published in 1990 based on home and clinic surveillance found an incidence rate of 21 acute lower respiratory infections (ALRIs, the predominantly reported and most fatal ARIs), per child-year, a rate which is thought to be fairly well-representative of sub-Saharan Africa (NRC9301). Another recent study of Kenyan children with respiratory symptoms found over half to suffer low blood oxygenation, or hypoxemia. The clear association between hypoxemia and mortality suggests that the detection and effective treatment of hypoxemia are important aspects of the clinical management of ARIs in children in hospitals in developing regions (BMJ9301).

To obtain information on the prevalence of respiratory infections among children in Kenya, the 1993 DHS asked mothers whether each of their children had experienced a cough with rapid breathing in the two weeks preceding the survey. Overall prevalence was found to be 18 percent, with children in rural areas suffering significantly more than those in urban areas. Prevalence rates near or above twenty percent were found in Nyanza, Central, and Eastern Provinces while prevalence in Nairobi stood at just 12 percent (see figure 2.22). Among age groups, prevalence was highest among children ages 12-23 months (24.0%) and infants ages 6-11 months (22.6%). The survey found that 52 percent of children with a cough and rapid breathing were reportedly taken to a medical facility (DHS9406).

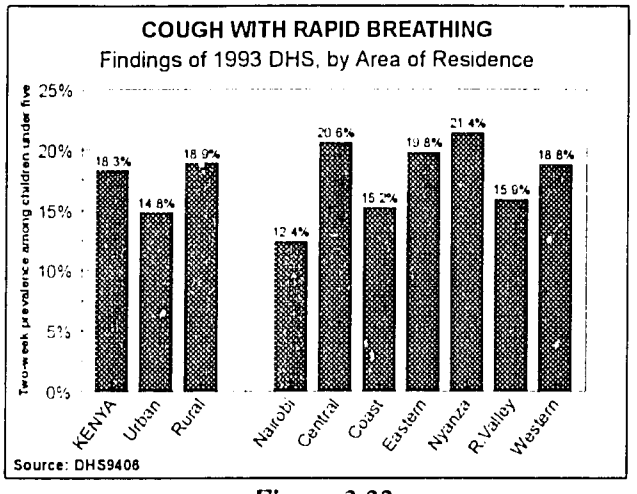



*Figure 2.22*

**Pneumonia**. As indicated in figure 2.13 above, pneumonia was the leading cause of death identified at four rural hospitals from 1975 through the late 1980s, when it was surpassed by malaria. The death rate remained constant at roughly 0.25 deaths per 1,000 population, but admissions due to pneumonia steadily declined over the fifteen-year period. As indicated in figure 2.23, CFRs found for pneumonia at the four hospitals were 4.9 percent among children and 11.2 percent among adults (JTM9501). The Machakos study found that postneonatal infants comprised the population group most affected by pneumonia (see figure 2.15 above).

**Meningitis**. Another airborne diseases of great significance in Kenya is meningitis. In a retrospective survey of neurological diseases as seen at Kenyatta National Hospital, which showed that neurological diseases constituted 7.5 percent of all medical conditions, meningitis was found to be the most common neurological disease at 23.1 percent of the total, followed by epilepsy (16.6 percent) and cerebrovascular diseases (15 percent)(EAM9204).

Although Kenya lies outside of Africa's "meningitis belt," an epidemic of meningococcal disease occurred in Nairobi in 1989, with the highest attack rates occurring in the city's largest slum areas. About 3,800 cases occurred between April and November. The CFR was reportedly 9.4 percent among hospitalized patients, far better than the extremely high CFRs reported from mission hospital data for 1976-90 (see figure 2.23). (The difference may be attributable to more sensitive reporting of non-fatal meningitis during the epidemic.) After a vaccination campaign, the weekly case count fell from a high of 272 in September to just 25 in January 1990. A case-control study estimated the

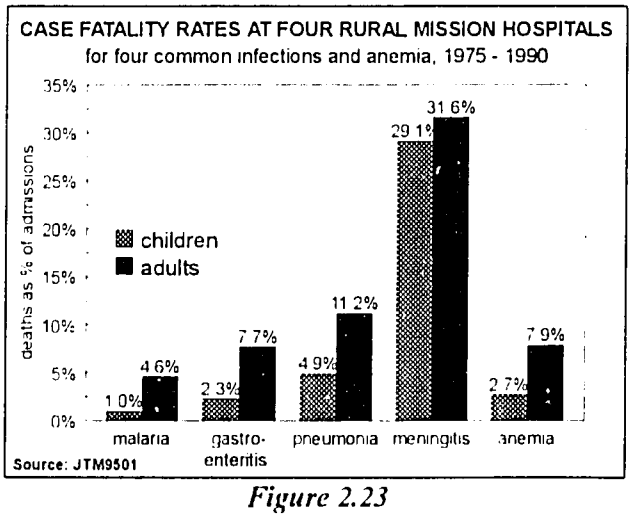



*Figure 2.23*

vaccine efficacy to be 87 percent. A model estimated that the vaccination campaign reduced the number of cases by at least 20 percent. The strain of meningitis responsible for this large epidemic was found to be closely related to those that caused other recent epidemics in Africa (JID9201).

## Diseases Related to Water and Sanitation

Limited access to safe water and inadequate sanitation measures are the major underlying causes behind a great deal of death and suffering in Kenya. Diarrheal diseases, which typically result from contaminated drinking water or food, afflict a significant proportion of children and adults throughout the country. When resulting dehydration is not treated properly, diarrhea can lead to death, particularly among young children. Other common diseases related to quality of water and sanitation include intestinal worms, schistosomiasis, common eye infections such as trachoma, and skin diseases. The various figures on mortality and morbidity presented above imply that these diseases together account for a share of roughly 10-20 percent of the total, but the real proportion is undoubtedly higher as many of these conditions commonly go unreported or play an important contributory role to other conditions, particulary nutritional deficiencies and the variety of diseases they can lead to.

As indicated in figure 2.24, only just over half of Kenya's population is thought to have reasonable access to safe water, a level which is typical among sub-Saharan and low-income nations but well below the median of 71 percent among all developing nations. The proportion of the Kenyan population with adequate sanitation measures, 44 percent, is likewise typical for the region but falls well below the median of 60 percent among all developing nations. Figures 2.25 and 2.26 below indicate that the problem is particularly acute in rural areas, where access to safe water is thought to have improved to above 40 percent since the 1980s while reported levels of access to sanitation have increased less rapidly.

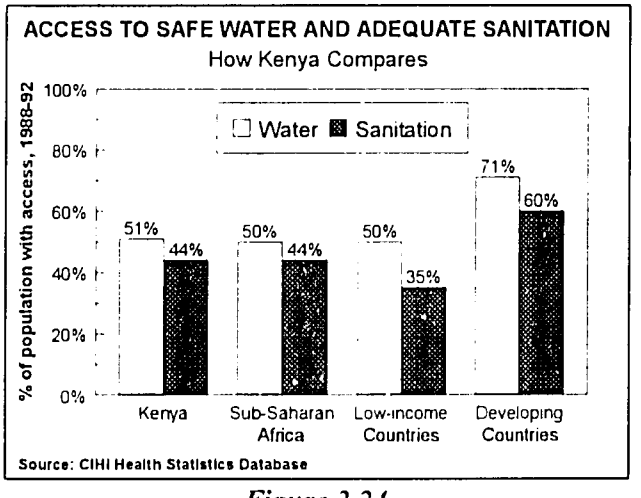



*Figure 2.24*

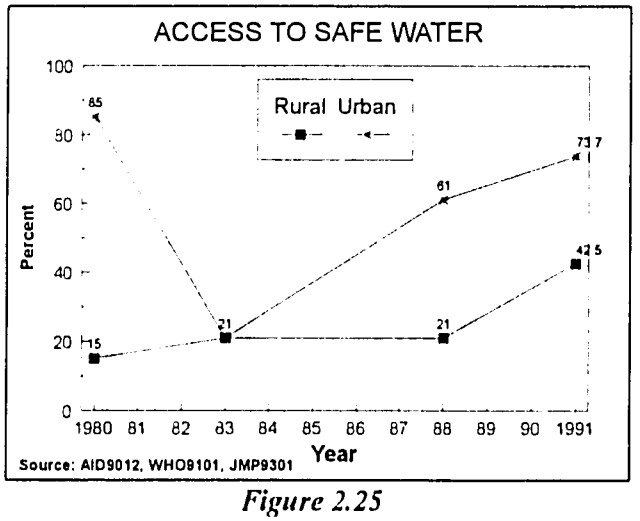



*Figure 2.25*

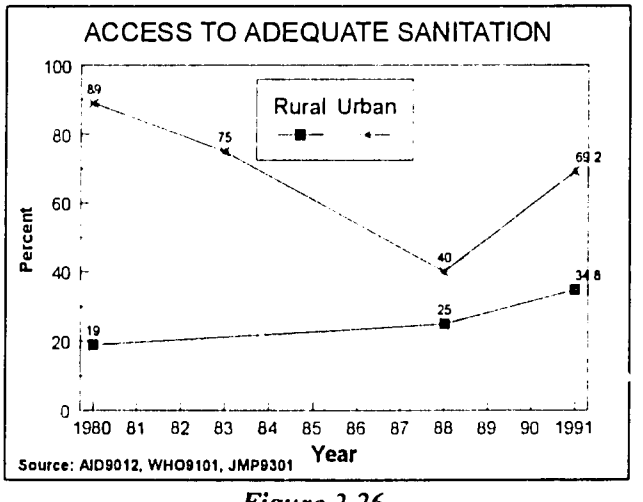



*Figure 2.26*

**Diarrheal Diseases.** According to the findings of the 1993 DHS, about one in seven Kenyan children suffers an episode of diarrhea in a given two-week period, a lower share than found by most other DHSs in developing countries around the world. In Kenya, children between 6 and 23 months of age were found to be particularly susceptible, with one in four experiencing a diarrheal episode during the two-week recall period before the survey. Two-thirds of the children with diarrhea also reportedly exhibited symptoms of malaria (AID9421). The 1993 DHS also found 24-hour prevalence rates of 5.5 percent among all under-fives and over ten percent of children ages 6-23 months. Diarrhea with blood, indicative of dysentery, was found to affect 2.4 percent of children over the two-week recall period, with higher rates found in rural areas and among children ages 6-35 months (DHS9406).

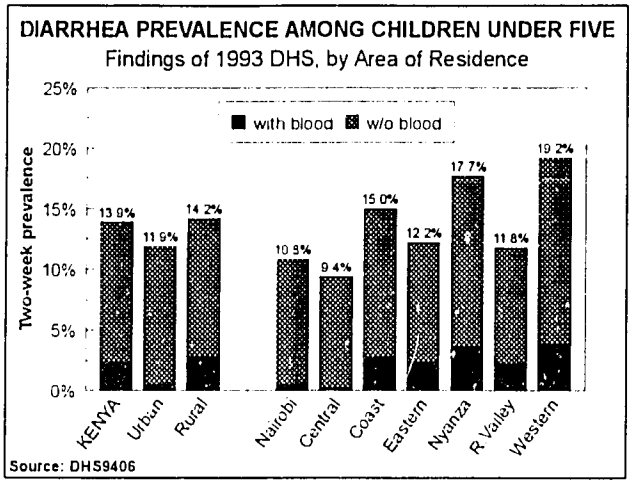



*Figure 2.27*

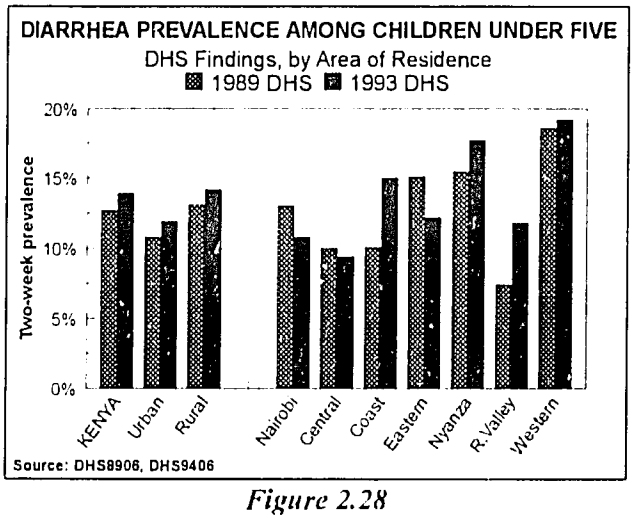



*Figure 2.28*

Figures 2.27 and 2.28 present DHS data on two-week prevalence of diarrhea by area of residence. Both surveys found slightly higher rates in rural areas. Among regions, the highest prevalence rates were found in Western and Nyanza Provinces. Higher rates in general found by the 1993 DHS may be explained by the timing of the survey between Februrary and August of that year, a period including the long rainy season, when diarrheal diseases may be more prevalent. Fieldwork for the 1989 DHS lasted from December 1988 through May 1989. The greatest increases between the two surveys were found in the Coast and Rift Valley Provinces; rates were found to have dropped somewhat in Nairobi and Eastern Province.

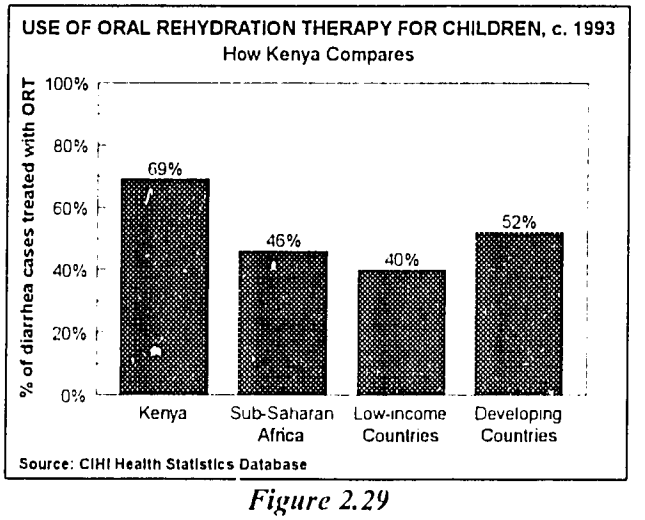



*Figure 2.29*

Diarrheal diseases are a very significant cause of child mortality in Kenya, as indicated in figures 2.16 and 2.17 above, but these data suggest that mortality due to diarrhea is not as severe in Kenya as in other sub-Saharan nations. Two reasons for Kenya's relatively lower mortality due to diarrhea may be lower prevalence rates and more frequent use of oral rehydration therapy (ORT) to prevent dehydration due to diarrhea. In 1991, ORT was thought to be used to treat nearly 70 percent of cases of diarrhea in Kenya (WHD9201). As indicated in figure 2.29, this level far exceeds rates found elsewhere in Africa and developing nations in general. The 1993 DHS found that 41 percent of children with diarrhea were taken to a health facility, nearly one-third (31.6%) received packets of oral rehydration salts (ORS) and nearly half (49.7%) received increased fluids. A total of 38.5 percent were found to have received neither ORS nor increased fluids and 17.3 percent received no treatment at all (DHS9406).

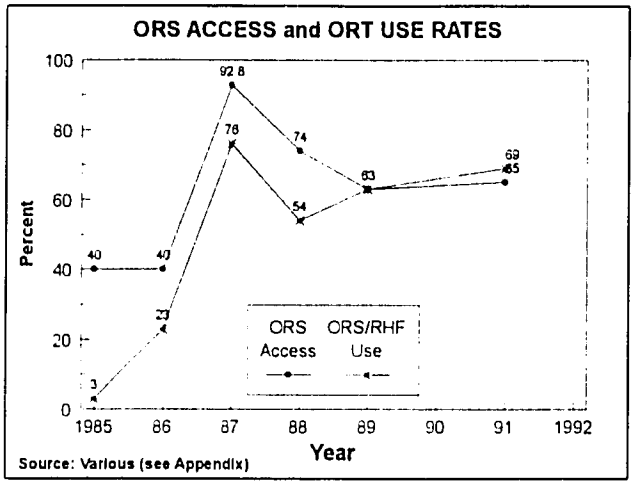



*Figure 2.30*

Figure 2.30 charts out statistics on ORS access and ORT use in Kenya generated over time by WHO's Control of Diarrheal Diseases Programme. With the exception of an unusually high figure reported for 1987, ORT use (measuring use of ORS and/or recommended home fluids (RHF)) has climbed steadily to its current rate since standing at just three percent in 1985.

**Cholera**. Cholera, an acute diarrheal disease, appears in sporadic epidemics in Kenya. The disease thrives among dense periurban and refugee populations lacking adequate sanitation measures. Cholera was reported to be present somewhere in the country for roughly half of the 1980s (LAN9101) and has been reported again in Kenya in 1995 (WHO9503).

**Trachoma**. Trachoma is a major cause of blindness in Kenya. Caused by repeated reinfection with the bacterium *Chlamydia trachomatis*, trachoma is hyperendemic in dry, dusty communities with poor sanitation and hygiene. Infection occurs during contact with infected ocular or other secretions and may be transmitted by flies. A nationwide blindness survey in 1981, which found that 0.7 percent of nearly 14,000 Kenyans examined suffered blindness, attributed 19 percent of the cases of blindness to trachoma. Other causes were cataracts (36%), glaucoma (9%), and macular lesions (7%). A smaller survey of the Turkana tribe in Northwest Kenya found a prevalence of blindness of 1.1 percent and attributed 20 percent of cases of blindness to trachoma (WHO9410).

According to a journal article published in 1995, ocular examination surveys carried out throughout the country by the International Eye Foundation found active trachoma in 19 percent of all persons examined. Half of those with trachoma were found to have moderate to severe inflammation. Prevalence varied from less than one percent in four agricultural regions with greater rainfall to 57 percent and 63 percent in two arid, pastoral regions. Within high-risk regions, there are wide variations in age-specific prevalence and severity of the disease. Overall prevalence was 28 percent in children younger than three years of age and 11 percent in persons older than 60. Potentially blinding effects of trachoma were found to be more prevalent in females than in males (OPH9501).

**Worm Infections**. Worm infections include a wide variety of diseases caused by helminths, schistosomes, and other organisms which contribute to various nutrition and health disorders. Figures 2.11 and 2.12 indicate that intestinal infections in particular can be relatively significant as a reported cause of death. Morbidity is difficult to quantify as many persons with helminth or other intestinal or blood infections do not seek treatment or are not specifically diagnosed as such. While many of these infections are treatable on a case-by-case basis, the most effective overall strategy is prevention through improved water supply, sanitation, and hygiene practices. Studies in Kenya have shown that one treatment against worm infections in children improves growth and fitness within four months. Other studies indicate that treating children for worms or anemia improves monthly weight gains at least as much as (and usually more than) school feeding programs, which represent a more labor-intensive, complicated, and expensive effort. A recent article in WHO's World Health Forum recommended that deworming programs operate in areas where worms are prevalent and undernutrition exceeds 25 percent (WHF9402).

Prevalence of intestinal parasites in Kenya has not changed significantly over time. The two most important varieties are hookworm and the common roundworm. A 1985-86 survey of people of all age groups (but biased toward children) living in the catchment area of Kilifi General Hospital, in Kenya's Coast Province, identified 19 species of parasites in blood and intestines, including three species of *Plasmodium* (malaria) and seven species of

intestinal helminths. Prevalences found for selected species of parasites are indicated in figure 2.31. Age-prevalence curves of the common infections were of two distinct types, possibly reflecting people's ability to mount a partially effective immune response. For example, while prevalence of hookworm, schistosomes, and strongyloides generally increased with age, prevalence of *ascaris*, *trichuris*, and malaria species peaked in early or mid-childhood before dropping off in adulthood. The majority of the people surveyed were found to have one (28%) or two (31%) infections; the survey found no infections among less than 15 percent of the sample and three or more among nearly 30 percent. There was no evidence of positive or negative influence of one infection on another (ATM9201).

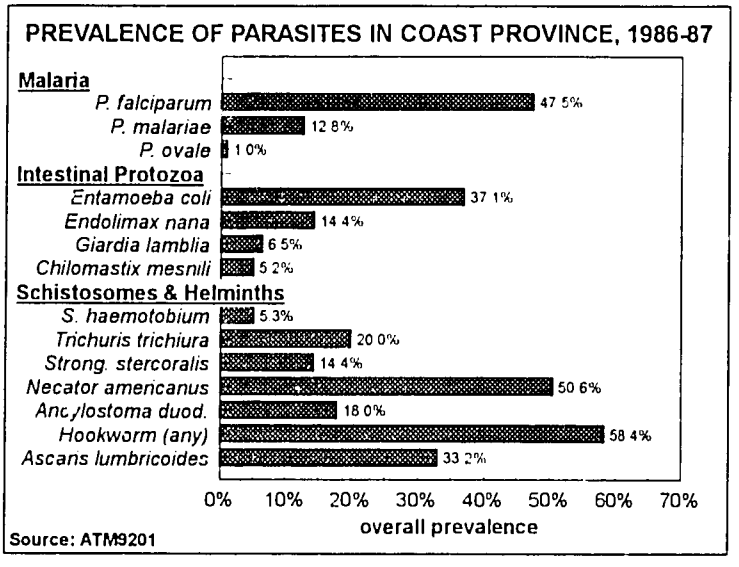



*Figure 2.31*

- **Hookworm infection (ancylostomiasis, uncinariasis, necatoriasis)** can cause severe iron and protein deficiency and is a leading cause of anemia among pregnant women. Prevalence of hookworm infection, which is picked up through the soles of the feet, varies from about 15 percent in Rift Valley Province to 55-70 percent in areas of Coast Province (WBK9101).

- **Roundworm infection (ascariasis)** can lead to retarded growth in children, deficiencies of vitamin A and zinc, and fatal obstruction of intestines. Infection can be contracted through eggs in contaminated food or the ground. Prevalence of roundworm in Kenya has been found to be around 25-35 percent (WBK9101).

- **Tapeworm infection (taeniasis)**, caused by *Taenia saginata* and *T. solium*, results from eating undercooked or raw beef or pork from animals in which the 'intermediate stage' of the worm was present. In Kenya, this infection is commonly found among the Masai, for whom underdone meat is a frequent food (ARN8501).

- **Schistosomiasis (Bilharziasis)** is a blood fluke infection acquired from water containing worm larvae which develop in snails. The disease is commonly found in irrigated areas with other vector-borne diseases such as sleeping sickness and filariasis (WBK9101). Both species of the fluke, *S. mansoni* and *S. haematobium*, are found in Kenya. Immediate effects of 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 difficult and expensive, infection can be limited if the population is sensitized to stay out of water courses (WHO9307).

Very high prevalence rates have been found among schoolchildren living near water development projects throughout Kenya. For example, rates of 90 percent for *S. haematobium* have been found in five of nine primary schools in a cotton project area in the lower Tana River Basin in the foothills of Mt. Kenya. In nine schools in a newly-settled area in the Machakos district, the mean *S. mansoni* rate was found to be 84 percent, with many children suffering from disease of the liver and spleen. Similarly, at the Taita-Taveta smallholder irrigation scheme, which covers more than 1000 ha., current prevalence of schistosomiasis is about 70 percent. In the Baringo District of the Rift Valley Province, *S. mansoni* infection in children has recently been identified for the first time, in association with small dams constructed for land reclamation (WHO9307).

The effects of water development projects on schistosomiasis prevalence have been particularly well-documented in the Tana River Basin. Figure 2.32 illustrates the sharp rise in prevalence of schistosomiasis following the initiation in the early 1950s of the large Mwea Irrigation Scheme, which covers 5836 hectares in the upper basin, and the Hola irrigation scheme, a project of 875 hectares in the lower basin. By 1972, prevalences of up to almost 80 percent were reported in villages surrounding the Mwea scheme. Near the Hola scheme, the prevalence of schistosomiasis among Pokomo children of school age was 70 percent by 1965; in 1982, prevalence in Pokomo and Orma schoolchildren was reported at 90 percent (WHO9307).

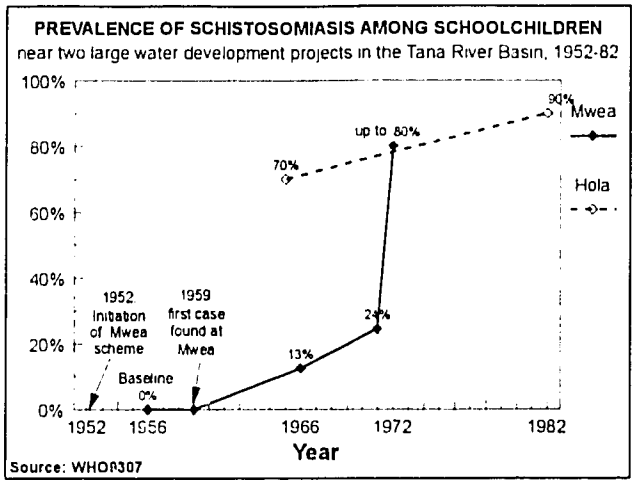



*Figure 2.32*

Relative success against schistosomiasis infection has been reported in the case of the Ahero rice irrigation scheme (Kano 1), which was established in 1968 on 840 hectares in the Kano plain of western Kenya. In 1971, prevalences of *S. haematobium* and *S. mansoni* infection among schoolchildren were 3.5 percent and 4.2 percent respectively. The distribution of both species of snail vectors, *Bulinus* and *Biomphalaria*, was patchy in the area. A systematic program of moluscicide application and treament of infected persons has subsequently kept the prevalence around one percent (WHO9307).

**- Guinea Worm Disease (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. Although Guinea Worm is not as prevalent in Kenya as in many of Africa's Sahelian nations, the disease has been tracked closely in recent years as part of an international eradication effort. In 1994, the disease was suspected to be endemic in five districts of Kenya (see figure 2.32).

With a national case search underway, Kenya's Guinea Worm Eradication Program (GWEP) reported 35 cases in 1993 and 37 in 1994. As of September 1995, the GWEP had not reported any new indigenous cases since April 1994, indicating that transmission may have been successfully interrupted. Program interventions include training of village-based health workers, health education for the general population, and distribution of cloth filters to screen drinking water. By 1995, the number of known endemic villages had been lowered to just 12. Important challenges remaining for the GWEP include dealing with the movement of infected persons among nomadic populations across international borders and the integration of surveillance and case containment of dracunculiasis with other programs (GLO9401, CDC9502, CDC9503).

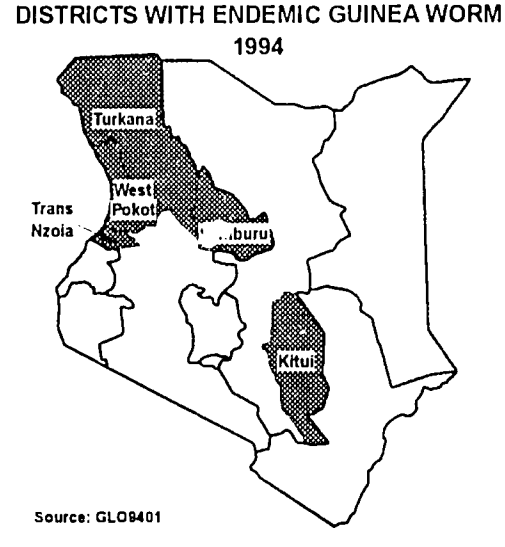



*Figure 2.33*

## Vaccine-Preventable Diseases

Vaccine-preventable diseases account for a significant share of illnesses and deaths among children in Kenya. As indicated in figure 2.17 above, measles was thought to be the second-leading cause of death among children in the 1980s; neonatal tetanus and pertussis also appear under the top causes of death among children. Poliomyelitis and diphtheria are less frequently reported but still of great public health significance. Another vaccine-preventable disease, tuberculosis, has greater impact among adults than children. Case totals reported to the WHO's Global Programme for Vaccines (GPV) between 1989 and 1994 are presented in table 2.1; rises and falls in these figures often better reflect fluctuations in reporting than actual changes in incidence.

**KENYA: REPORTED ANNUAL INCIDENCE OF VACCINE-PREVENTABLE DISEASES**

| Disease | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|
| Measles | 86,727 | 77,072 | 59,937 | 65,004 | 961 | 4,180 |
| Pertussis | 9,035 | 7,404 | 136,907 | - | - | - |
| Tuberculosis | 12,592 | 11,788 | 12,320 | 14,599 | 20,451 | - |
| Tetanus (total) | 1,048 | 1,692 | 933 | - | - | - |
| Neonatal Tetanus | - | 1,612 | 933 | 914 | 8 | 50 |
| Poliomyelitis | 1,559 | 1,528 | 10 | 0 | 2 | 108 |
| Diphtheria | 0 | 1 | - | - | - | - |

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

*Table 2.1*

Coverage with childhood vaccines is exceptionally high in Kenya. DHS findings on the vaccination status of one-year-olds indicate that coverage levels for most vaccines dropped slightly between 1989 and 1993 (see figure 2.34, but this difference may be explained by the fact that the first DHS only reported on children who possessed vaccination cards. Coverage with the recommended three shots of the diphtheria, pertussis and tetanus vaccine (DPT3) was found to be 87 percent in 1993, with coverage in rural areas lagging only slightly behind urban coverage (see figure 2.35). As indicated in figure 2.36, this rate stands well above the median among developing nations and far exceeds the typical level among sub-Saharan African nations.

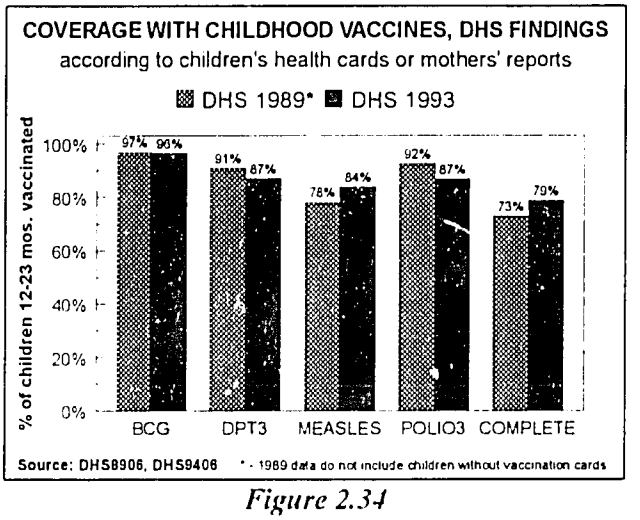
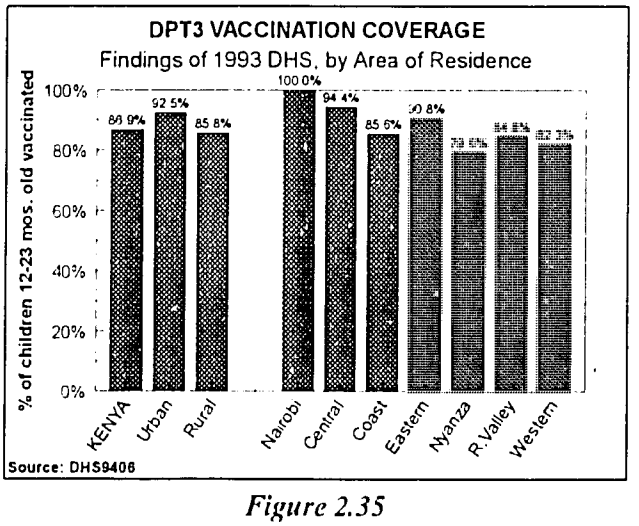



*Figure 2.34*

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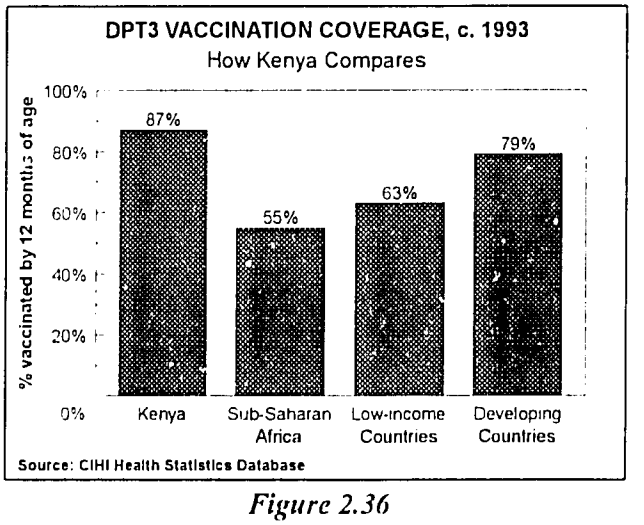



*Figure 2.36*

**Measles**. Measles is a highly communicable viral disease which has its most severe impact among young and malnourished children. Deaths due to measles most commonly occur in the second year of life. Measles is a more significant factor in child mortality in Africa than elsewhere due to higher fertility rates, which quickly replenish the population of unexposed children, as well as the common tendency of extended families living in enclosed areas. Measles can lead to other respiratory infections, severe diarrhea, and malnutrition and is probably an underlying cause of many more child deaths than specifically reported (NAP9301).

In Kenya, reported cases of measles have declined steadily since the total of nearly 90,000 in 1989 (see table 2.1); the number of actual cases occurring is unknown. The WHO estimates that about four percent of all measles cases in Kenya are fatal (WHO9103). Because measles occurs in epidemic cycles, its impact can vary widely from year to year. Despite an intensive vaccination program, the disease continues to pose a formidable challenge. Levels of vaccination coverage against measles by one year of age have now risen above 80 percent since standing around 55-65 percent through most of the 1980s (see figure 2.37).

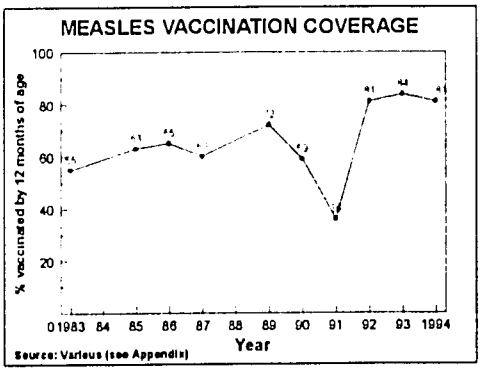



*Figure 2.37*

A study published in the East African Medical Journal in 1992 reported on hospital-based treatment of measles in Nairobi. Of 7,631 cases with a diagnosis of measles referred to Nairobi's specialized hospital for infectious diseases, 98 percent had the diagnosis confirmed. The case fatality rate (CFR) was just 1.75 percent, with 44 percent of deaths occurring among children less than 12 months of age. Children with a weight-for-age below 80 percent of an established median stayed in the hospital longest and had the highest mortality rate (EAM9203).

**Diphtheria**. The epidemiology of diphtheria in the developing world is poorly understood. The causative organism is widely present in Africa, but there are few reported cases of this childhood disease. Kenya has not reported any cases to WHO since reporting one in 1990. According to WHO, coverage rates for the recommended three doses of DPT vaccine have reached exceptionally high levels, now approaching 90 percent (see figure 2.38).

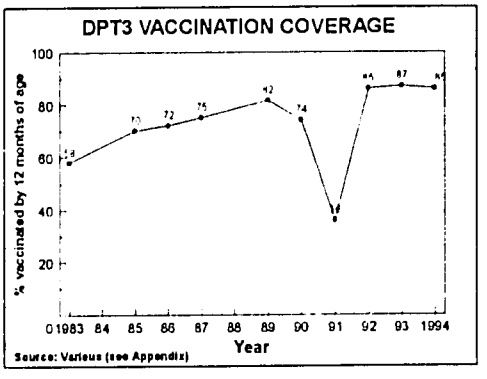



*Figure 2.38*

**Pertussis (whooping cough)**. The total of nearly 137,000 cases of pertussis reported in Kenya in 1991 is the highest single-year count ever reported to WHO by a single nation. Pertussis tends to produce epidemics every three to four years, with up to 90 percent of those at risk developing the disease; most cases are preventable through the DPT vaccine. 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); the Machakos project in the late 1970s observed CFRs of one percent for the total population and 2.6 percent among infants (NRC9301).

**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). Neonatal tetanus (NNT) in particular is thought to kill more children worldwide than any other vaccine-preventable disease except measles. However, according to the WHO, routine surveillance systems in most developing countries detect less than five percent of actual cases (OUP9301). The WHO estimates that 9,000 infants died from NNT in Kenya in 1991, the 12th highest count in the world, for a NNT mortality rate of seven deaths among neonatals per 1,000 live births (EPI9301).

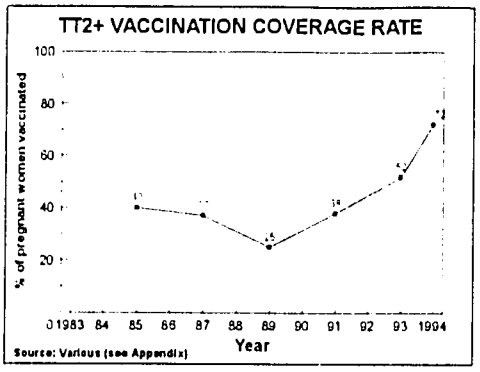



*Figure 2.39*

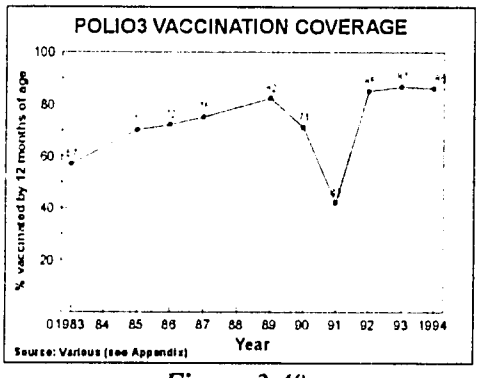



*Figure 2.40*

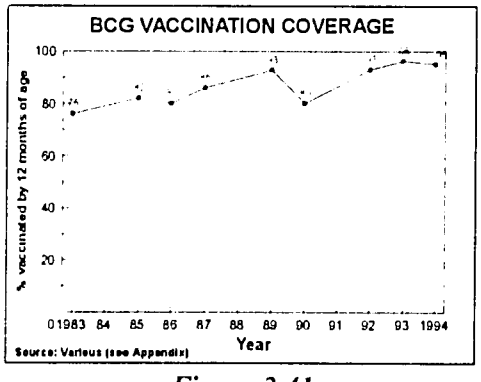



*Figure 2.41*

In the late 1970s, the Machakos project recorded an NNT mortality rate of just 1.2 per 1,000 live births; a 1987 study in three districts in Kenya observed rates of 14.1 for home deliveries and 4.3 in health facilities (NRC9301). The WHO estimate of seven (for 1991) may be based on two community surveys conducted in Kenya in the 1980s. The first survey, which observed over 6,500 live births in 1984-85 and found ar overall neonatal mortality rate of 16 deaths per 1,000 live births, found NNT to account for 67 percent of neonatal deaths, producing an NNT mortality rate of 11 per 1,000 live births, one of the higher rates found in Africa. A second survey, which observed 2,556 live births in 1989, found a higher neonatal mortality rate (21) but attributed only 15 percent of deaths to NNT for an NNT mortality rate of just three per 1,000 live births (OUP9101). It is tempting to read the difference as an improvement in health conditions, but it should be noted that vaccination of pregnant women to prevent NNT actually dropped to just 25 percent in 1989 before steadily rising to over 70 percent by 1994 (see figure 2.39).

**Polio**. After a brief respite, Kenya is once again among the leaders around the world in reported polio incidence. At the end of the 1980s, Kenya was reporting an astounding 1,500 cases per year, but the annual total has declined to just 100 cases in 1994 (see table 2.1). The goal of complete eradication remains elusive. According to reports by WHO/GPV, coverage against polio by age one with the recommended three doses is back above 80 percent after a brief lapse to just 42 percent in 1991(see figure 2.40).

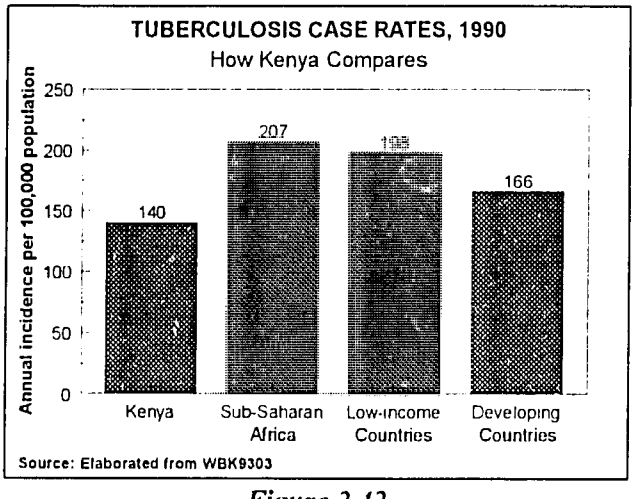



*Figure 2.42*

**Tuberculosis** (TB). The annual incidence rate estimated for TB in Kenya, 140 cases per 100,000 population, is one of Africa's lowest, standing well below the median among all developing nations (see figure 2.42). This estimate implies an annual total of close to 40,000 new cases, roughly twice the number reported to WHO in 1993, when reported cases had increased by 36 percent over the previous year (see table 2.1). Judging from the concentration of new cases in the 15-35-year-old age group, Kenya's National Leprosy and Tuberculosis Programme estimates that 75 percent of the increase reported in 1993 was attributable to HIV infection. Not included in the 1993 count were roughly 5,000 cases of TB among refugee populations. The CFR ranges from five to eight percent among individuals not infected with HIV but is about 30 percent for TB patients with HIV (AID9423).

Increased incidence of HIV/AIDS could triple annual incidence to 120,000 TB cases by the year 2000 (assuming overall prevalence of HIV rises to nine percent)(AID9422). After a brief lapse to 80 percent coverage in 1990, immunization of children against TB, which only requires a single, easily-administered dose of BCG vaccine, has remained above 90 percent, according to WHO/GPV (see figure 2.42).

**Leprosy**. The BCG vaccine has also been shown to be partially effective in preventing leprosy, which is found in Kenya's Western Province as well as in parts of Coast and Eastern Provinces (WBK9101). In mid-1995, WHO reported that Kenya had 738 registered cases of leprosy for a prevalence rate of just 0.28 cases per 10,000 inhabitants, one of Africa's lowest. All 738 cases are receiving multi-drug therapy (MDT), which has reportedly cured 14,000 Kenyans to date (WHO9508). These figures represent a vast improvement over a very short period of time, for just five years ago Kenya had over 3,000 registered cases and a prevalence rate of 1.3 (WHO9105).

## Nutritional Deficiencies

Malnutrition and disease are closely interrelated contributors to high morbidity and mortality throughout sub-Saharan Africa. 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. Malnutrition thus contributes to a much higher percentage of deaths than is specifically reported. In addition to protein-energy malnutrition (PEM), deficiencies in specific micronutrients, particularly Vitamin A, iron, and iodine, are significant public health problems. Experience in Kenya has identified several risk factors specifically associated with malnutrition, including inadequate income, lack of knowledge about proper feeding practices, adverse cropping patterns (e.g., choosing cash crops over subsistence crops), climatic conditions, and the heavy workload borne by women (WBK9101). Research in Embu on the slopes of Mt. Kenya found that malnutrition among local toddlers was primarily a result of insufficient food energy intake. The authors concluded that in most cases nutritional status could best be improved through consumption of more energy- and nutrient-dense food and reduced dependence on staple foods such as maize (AID9220).

Measuring for low height-for-age, or "stunting," is a common method for determining prevalence of chronic, long-term malnutrition. Prior to the 1993 DHS, Kenya had carried out four nationally representative surveys of the nutritional status of young children (1977, 1978-79, 1982, and 1987). The results indicated that a significant and increasing proportion of Kenya's children did not receive adequate food over an extended period of time. Measuring for stunting, the surveys found that roughly one-quarter of children ages 1-4 fell below a cutoff point of 90 percent of the median in a standard population. The extent of stunting rose gradually between 1977 (24%), 1978/79 (27%) and 1982 (28%), with the greatest deterioration found in Western and Nyanza Provinces (WBK9101).

The 1989 DHS did not include a section on nutritional status, but the 1993 DHS found that just under one-third (32.7%) of children suffered stunting (below two standard deviations from an international reference), and nearly one-eighth (12.2%) suffered severe stunting (below 3 SDs). Higher rates of stunting were found among children in rural areas and in the Coast and Eastern Provinces (see figure 2.43). The pattern of high rates of stunting in Coast Province is in accord with the findings of the earlier nutritional surveys. Long-term drought is suspected to have played a significant role in the high prevalence of stunting in Eastern Province (DHS9406).

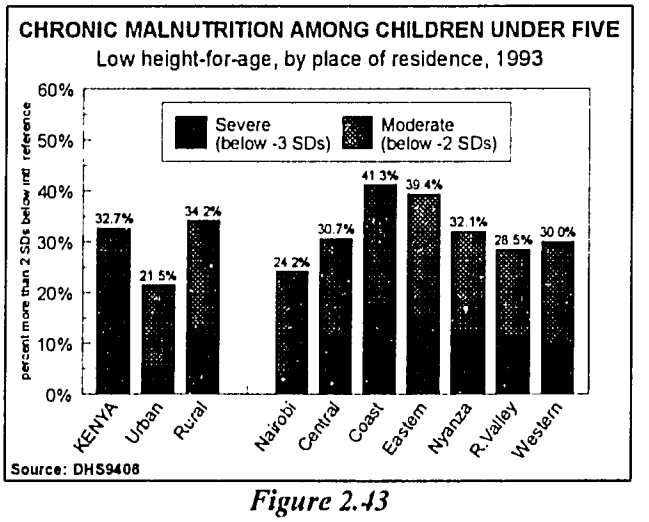



*Figure 2.43*

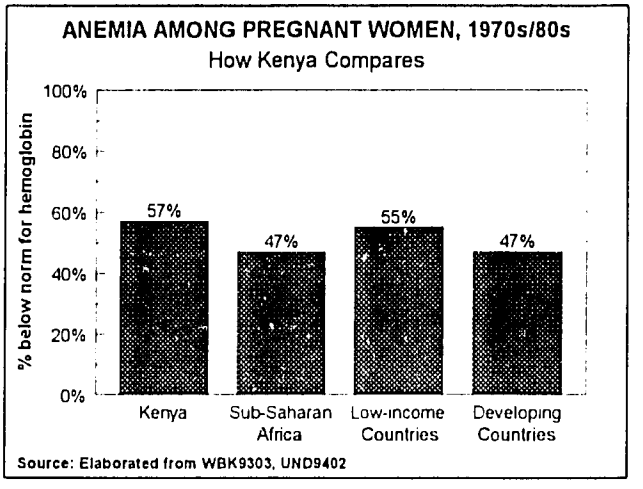



*Figure 2.44*

**Iron Deficiency (anemia).** Iron deficiency, when severe, can result in anemia, a shortage of iron in the blood. Anemia reduces physical productivity and children's learning capacity and, by reducing appetite, may inhibit children's intake and growth. Major contributors to anemia include parasitical diseases (malaria, hookworm, schistosomiasis), PEM, and congenital conditions such as sickle-cell anemia. The severe anemia common in endemic areas of Kenya is largely related to malaria and is an important factor contributing to morbidity and mortality. Women are particularly susceptible 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 57 percent of pregnant women in Kenya suffer anemia, well above the median among sub-Saharan Africa and developing countries in general (see figure 2.44).

It is estimated that at least one third of Kenya's children suffer anemia (WBK9101). A study of the efficacy of oral supplementary iron for primary school children in Kenya found that iron-supplemented children grew significantly more than other children in terms of height-for-weight, arm circumference and skinfold thickness. Hemoglobin levels among iron-supplemented children were also found to have improved significantly (NUT9001).

As previously indicated in figure 2.23, CFRs reported among mission hospital patients diagnosed with anemia were 2.7 percent among children and 6.9 percent among adults (JTM9501). More than 95 percent of pediatric blood transfusions are thought to be related to anemia caused by malaria (AID9421). Severe anemia among women in sub-Saharan Africa is also frequently treated with blood transfusions. A recent evaluation of practices in Western Kenya showed that women receiving transfusions were at a considerable risk of receiving HIV-infected blood. The risk of HIV transmission through blood products has led to a re-evaluation of the indications for transfusions (TRS9401).

**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 PEM, 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 (ARN8501). An international classification of countries by WHO noted that there is insufficient information on VAD in Kenya but a high probability of a significant public health problem in part or all of the country (AID9219).

**Iodine Deficiency.** In Africa, prevalence of iodine deficiency is generally highest in mountainous and flood-prone areas where iodine-deficient soils prevail. Women and children seem to be the most vulnerable to the serious consequences of long-term iodine deficiency, such as goiter (OUP9301). In Kenya, legislation on iodation was passed in 1989 to prevent iodine deficiency disorders. During 1990-91, staff from the National Public Health Laboratory Services randomly collected salt samples from retail shops, wholesalers, factories, and consumers in 40 districts or municipalities to determine the extent of salt iodation. The overall mean potassium iodate content was found to be lower than the legal requirement, possibly due to low iodation by manufacturers and/or losses of iodate during transportation and storage (EAM9401).

## Sexually-Transmitted Diseases (STDs)

STDs have an enormous impact on maternal and child health conditions. The most important in Kenya are the acquired immune deficiency syndrome (AIDS), syphilis, and gonorrhea. Other STDs of significance include chancroid, chlamydia, genital warts, herpes, and trichomoniasis. In 1985, Kenya had nearly 90,000 reported cases of gonnorrhea and 2,000 reported cases of syphilis (WBK9101). In 1994, the annual total of new AIDS cases reported to WHO approached 3,000 (WHO9501), a number which represents only a small fraction of the population infected with the human immunodeficiency virus (HIV), which leads to AIDS.

Figures 2.45-2.50 present findings on the prevalence of some of the most common STDs among various population groups in Kenya since the early 1980s. As indicated in the figures, these infections tend to afflict less than ten percent of the population at large but are harbored at much higher prevalence levels among certain high-risk groups, such as prostitutes, putting the general population at increased risk.

Figure 2.47 provides a time series on prevalence of various STDs among prostitutes in Nairobi. Gonorrhea and chancroid in particular appear to be on the rise among this group, which can act as a reservoir threatening the rest of the population. As indicated in figure 2.49 in the case of syphilis, STD prevalence among lower-risk groups also appears to be on the rise.

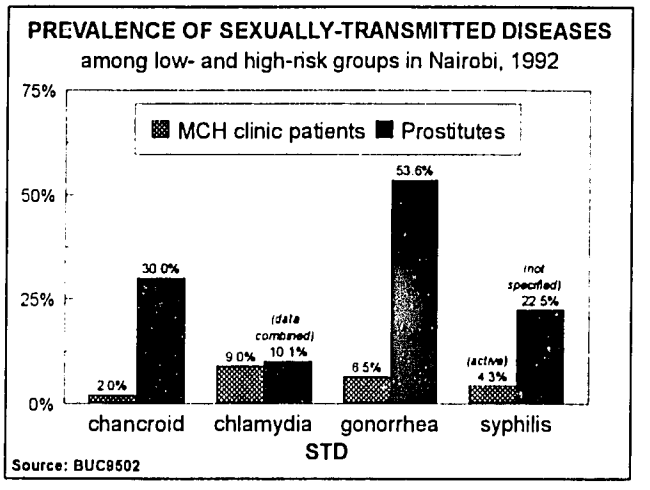



*Figure 2.45*

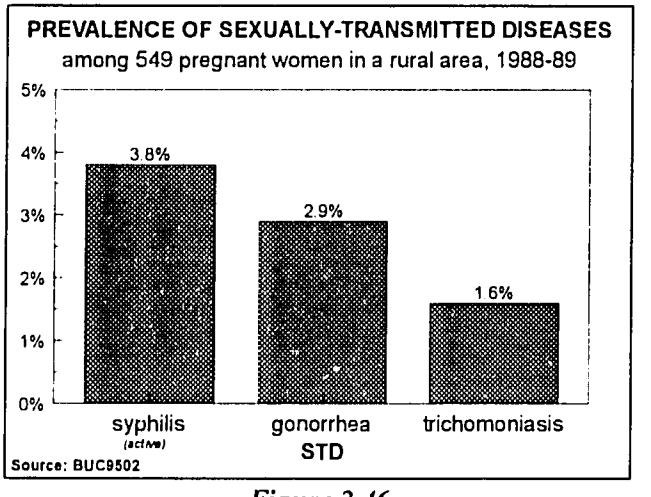
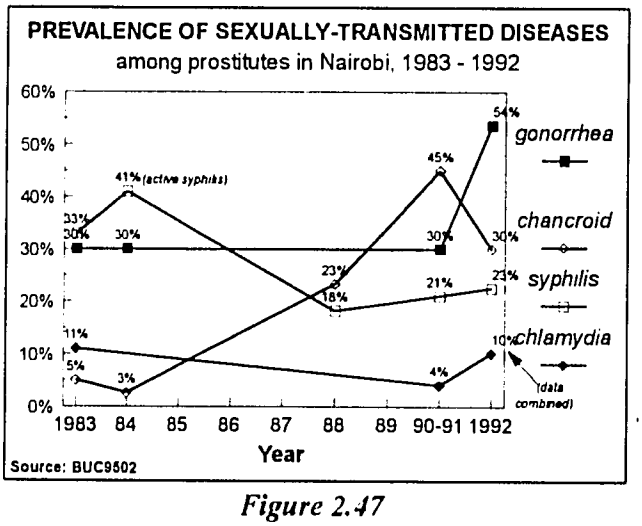



*Figure 2.46*

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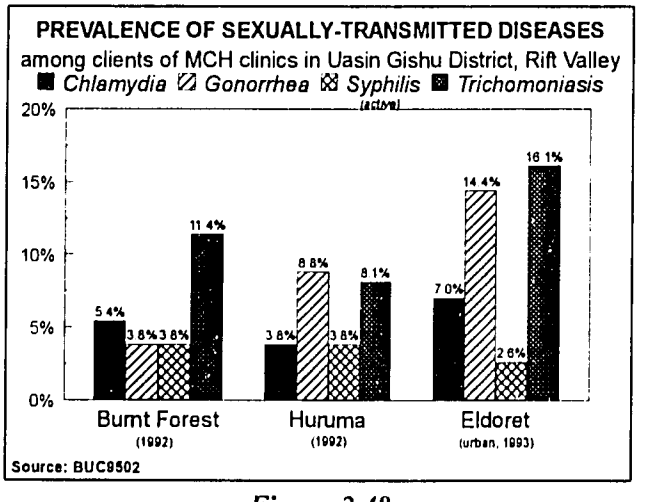


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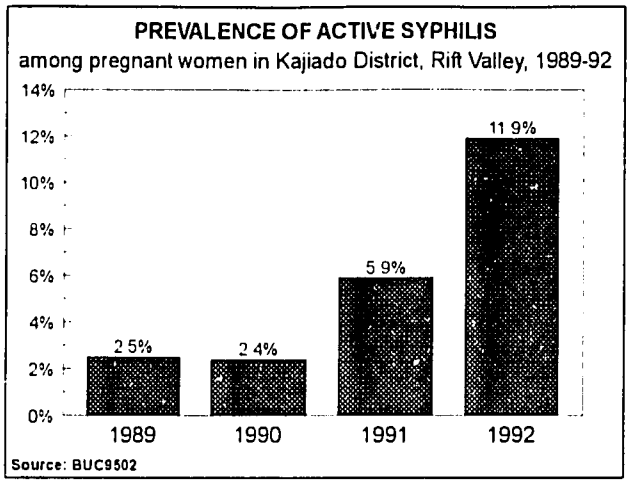


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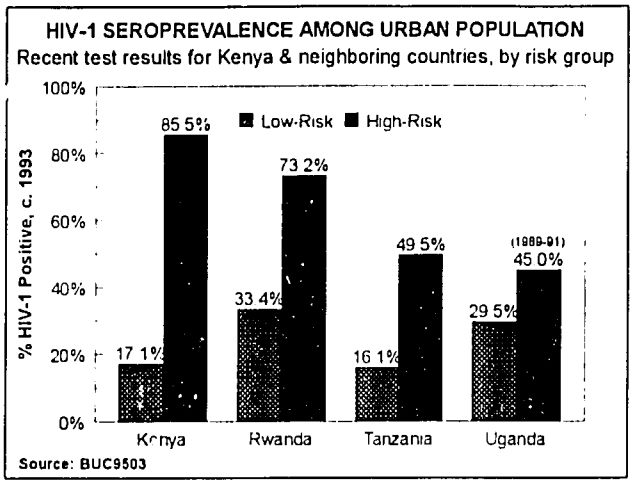



*Figure 2.50*

**HIV/AIDS**. After having reported over 38,000 cases of HIV/AIDS through mid-1993, the Government of Kenya revised its cumulative total to 30,126 at the end of 1993 (WHO9501). In either case, Kenya and its neighbors to the South and West are members of a handful of African nations hardest hit by the HIV/AIDS pandemic. As indicated in figure 2.50, reported HIV seroprevalence levels are staggeringly high, leading to an estimate in 1994 that 4.5 percent of the national population was infected with the virus that leads to AIDS. Some of the devastating direct impact projected for the population is illustrated in figure 2.7 above. Indirect repercussions include debilitating effects on economic and social structures. More information on the HIV/AIDS pandemic in Kenya and efforts to combat it appears in Section IV below.

# III. HEALTH SECTOR ASSESSMENT

## Health Care Services

### Access and Utilization of Services

According to UNICEF, more than three-quarters of the population of Kenya lives within one hour's travelling time to modern health services. While this level of geographic access far exceeds the norm among sub-Saharan African and low-income nations (see figure 3.1), it says nothing of the level of real access nor of the quality of the services offered. Furthermore, UNICEF's estimate for the entire country does not seem to conform with its estimate of access in rural areas at only 40 percent (UNI9501). A recent assessment of geographic access estimated that 65 percent of the population lived within 15 kilometers of a health facility in 1993 (AID9423).

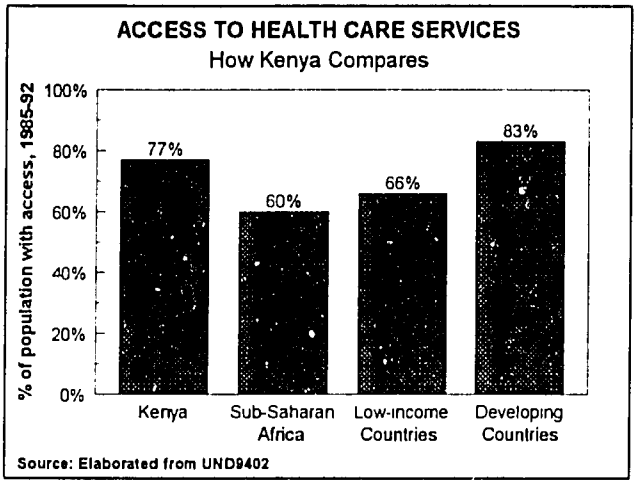



*Figure 3.1*

Measures of service utilization are also fairly positive. For example, vaccination rates reported in Section II indicate high use of maternal and child health services. The 1993 DHS found that use of antenatal and delivery services is also high, with mothers making antenatal visits to a trained health care provider before 96 percent of births in the five years preceding the survey. Nearly two-thirds (64%) of the births were preceded by at least four antenatal visits and over half (56%) by a visit in the first five months of pregnancy (DHS9406).

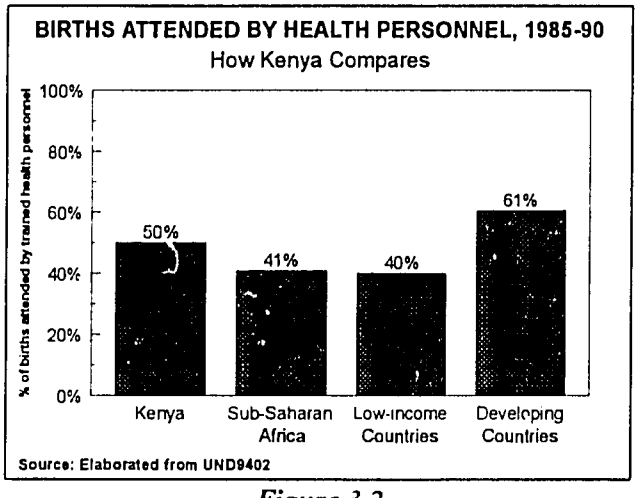
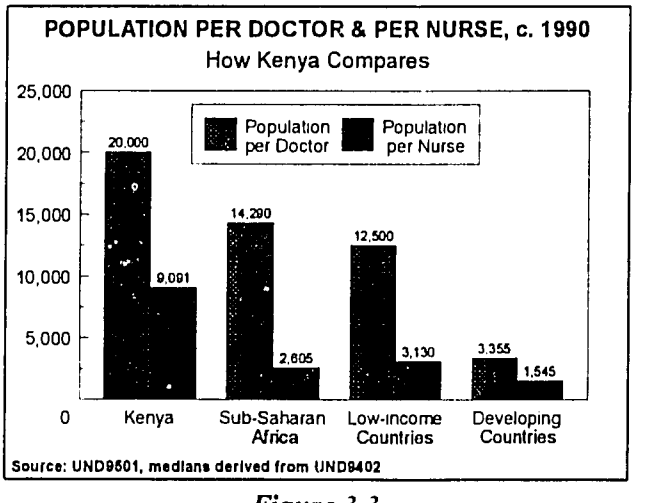



*Figure 3.2*

According to the UNDP's Human Development Report (HDR) 1994, half of Kenya's births are delivered by trained medical personnel, also well above the median among sub-Saharan nations (see figure 3.2). The 1993 DHS found that 44 percent of all births in the five years preceding the survey took place at a health establishment. The DHS also found that 12 percent of births were attended by a doctor, 33 percent by a nurse or midwife, and nine percent by a trained traditional birth attendant (TBA)(DHS9406).

### Health Care Personnel

Some data on availability of services in Kenya does not seem to support the notion of high access and utilization. According to the HDR 1994, Kenya had more than 70,000 inhabitants per physician and 22,000 per nurse in 1990, two of the highest such ratios in the world. Ratios of population to personnel vary widely

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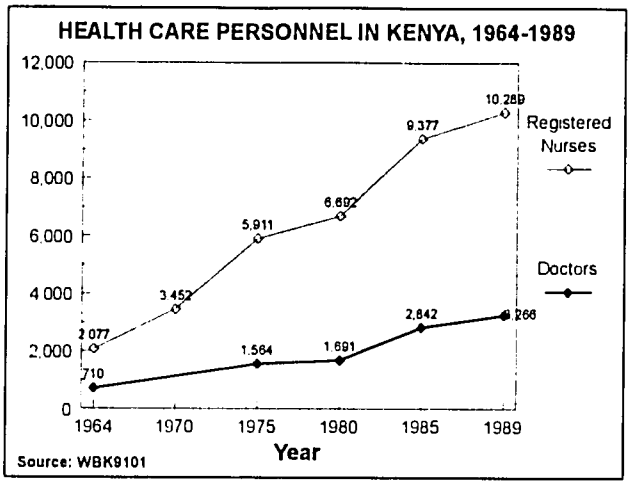


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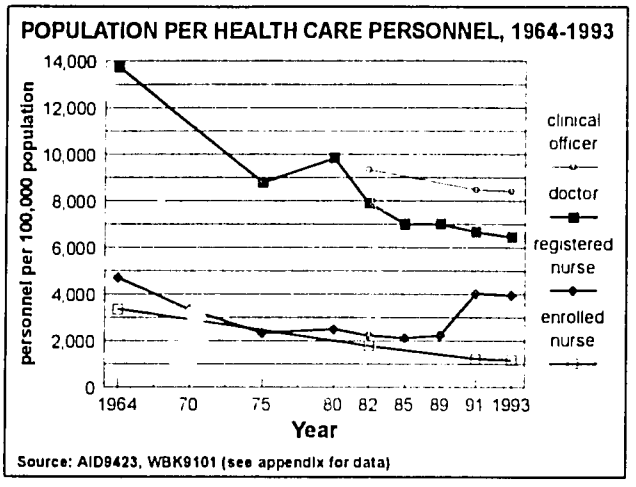



*Figure 3.5*

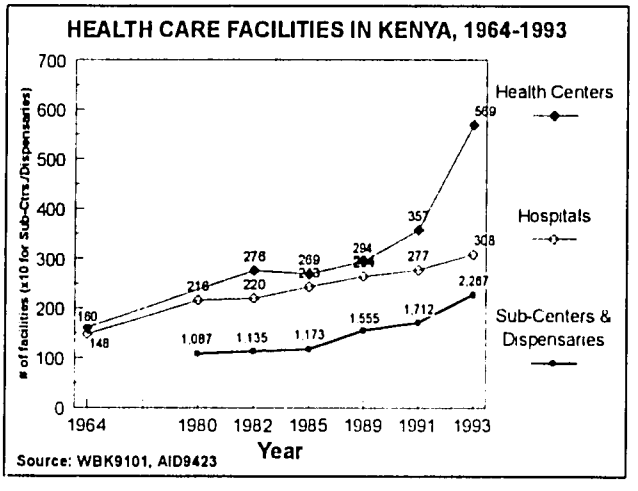
with the use of different data sources and definitions of health care personnel. In its 1995 report, the UNDP revised its figures markedly downward, but the new figures still indicate that trained medical personnel are relatively scarce (see figure 3.3). Recent government figures cited in an assessment for USAID produce more favorable ratios of 6,450 inhabitants per doctor and 3,950 per registered nurse in 1993 (AID9423).

Figure 3.4 illustrates the reported rise in numbers of doctors and registered nurses in Kenya since 1964. A time series of ratios calculated from various government reports indicates that the scarcity of trained personnel is slowly being alleviated (see figure 3.5 and table A5 in Appendix A). In 1993/94, there were reportedly over 9,200 personnel in training, of whom nearly half (4292) were training to become enrolled nurses (AID9423).

## Health Care Facilities

The total of 32,534 hospital beds and cots reported in 1989 (WBK9101) translates to just over 700 inhabitants per bed, just above a ratio of 680 reported by the government for 1987 (KEN8801). Figure 3.6 provides government counts of the increasing numbers of hospitals, health centers, and sub-centers/dispensaries in Kenya since independence.

The main provider is the MOH. Services of religious missions and traditional healers are also of great importance, while modern for-profit practitioners primarily serve more affluent urban residents (KEN9301). Figure 3.7 illustrates each sector's share of total health facilities and hospital beds. Facilities are most concentrated in Nairobi, which had more than three times more hospital beds per person than any other province in 1987 (KEN8801).

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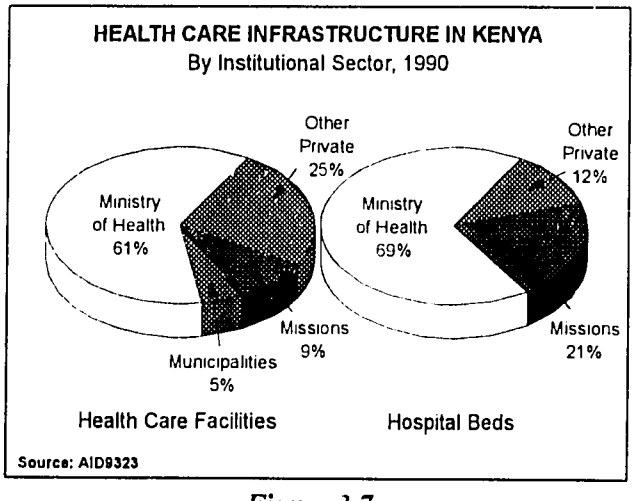



*Figure 3.7*

## Public Sector Services

In the Kenya Development Plan for 1994-96, the government embraces the attainment of "health for all by the year 2000" as its long-term objective in the health sector. Policies designed to achieve this goal include the promotion of community participation to increase health service coverage and accessibility, the consolidation of maternal and child health care with family planning services, increased collaboration between various government ministries, and the encouragement of non-governmental organizations (NGOs) to play a greater role in the delivery and financing of health care services (DHS9406).

**Ministry of Health**. The MOH is responsible for all preventive public health measures, clinical and hospital care for the majority of the population, registration of health practitioners, training of health professionals, and environmental and pharmaceutical regulation (OUP9101). The MOH also administers the National Hospital Insurance Fund (NHIF), which provides more than ten percent of the national population with catastrophic coverage. While one might expect such a fund to free up scarce public resources to serve the most needy, health care under the MOH remains predominantly urban and hospital-based, despite the country's primarily rural population base (WBK9004). A study by USAID's Health Financing and Sustainability (HFS) project found that existing preventive and primary health care (PHC) services do not operate at full capacity due to a lack of staff, drugs, supplies, and transportation (AID9017). In 1994, the public health system was further crippled by a doctors' strike which lasted from June to September (AID9514).

The minister of health appoints provincial and district medical officers (OUP9101). Provincial medical officers oversee the MOH health system and coordinate government and non-governmental services in each province (AID9423). Coordination at the local level is facilitated through rural health units and community health workers (CHWs), who are supervised by MOH facility staff (LSH9001). The MOH operates national, provincial and district hospitals, health centers, and dispensaries. Of all hospital beds nationwide, 69 percent are in MOH institutions, with eight percent of the total in Kenyatta National Hospital alone (AID9323). Also located within Kenyatta National Hospital is the semi-autonomous Medical Research Institute, which was established with donor funding to research tropical diseases in collaboration with the WHO (OUP9101).

At the end of the 1980s, the MOH introduced a decentralization plan designed to place more responsibility for planning, budgeting, financial management and program monitoring at the district and division levels. District Health Management Teams are to be responsible for technical and professional issues while District Health Management Boards set priorities and standards and manage district funds (AID9323). Other initiatives promoting local input in facility management include Kenya's variation of the Bamako Initiative, which has focussed on expanding geographical coverage through the establishment of locally-financed community pharmacies. Relying on CHWs to distribute drugs and carry out disease control activities, Kenya's Bamako Initiative program has succeeded in establishing services in peripheral areas but is criticized for its own marginality with respect to the rest of the established health care system (KEN9302).

**Local Government**. The Ministry of Local Government oversees and subsidizes locally-operated health services and appoints medical officers in Nairobi and three other cities (OUP9101). In 1989, municipalities owned 43 health clinics, 27 dispensaries, 25 health centers, six sub-centers, seven maternity homes and one hospital (AID9323). In 1982, the Nairobi City Council alone was in charge of a 350-bed maternity hospital with 11 subsidiary maternity units with 24 beds each, 24 health centers for preventive and curative services, and 22 dispensaries for emergencies and other treatment services. The City of Nairobi also provides environmental sanitation surveillance, control of communicable diseases, and health services for schoolchildren (OUP9101).

**Other Ministries**. Several other ministries and national entities are also active in the health sector. The University of Nairobi has a Faculty of Medicine and programs for pharmacists, dentists and nurses. The Ministry of Water Development works primarily in cities and small towns, leaving water and sanitation measures in rural

areas to a division within the MOH. The Ministries of Agricuture and Education provide education on basic health and nutrition and the Ministry of Social Services operates a few facitilities for the aged or disabled. Finally, the Ministry of Labor has programs monitoring occupational hazards and industrial hygiene (OUP9101).

## Private Sector Services

The private health sector consists of for-profit physicians and hospitals, pharmacies, drug peddlers, religious missions and other NGOs, industry-sponsored health services, and practitioners of traditional medicine. Also significant are specialized ancillary services such as private clinical laboratory and radiological services. Private sector services are estimated to represent 30-40 percent of all formal health services in Kenya (see figure 3.7). In mid-1994, there were 92 private hospitals in Kenya, including for-profit facilities and those run by churches or mosques (AID9423). A detailed examination of the private health sector and the role it plays in the Kenyan context appears in reference AID9423 (see Appendix C).

**Modern For-Profit Care.** A vigorous for-profit sector has emerged since the 1970s, particularly boosted by legislation in the late 1980s allowing supplementary private practice by government doctors and nurses. In 1982 it was estimated that at least 70 percent of all doctors (and virtually all dentists) in Kenya were in at least part-time private practice, primarily as general practitioners. About half of all private physicians practice in one of Kenya's four major cities. Only 12 percent of private nursing personnel are located in these cities, suggesting that nurses serve as a substitute for private physicians outside of the major cities (AID9323). Many parastatals and private enterprises with more than 500 employees operate their own clinics in order to provide basic curative care for employees (OUP9101).

**Non-Governmental Organizations (NGOs).** Mission health facilities and other non-profit private health care providers have served less affluent groups in rural areas since colonial times. In 1980, Catholic missions operated 27 hospitals, 55 health centers and 133 dispensaries and special clinics and Protestant missions operated 14 general hospitals, 29 health centers and 38 ambulatory care clinics (OUP9101). Major umbrella organizations include the Christian Health Association of Kenya (CHAK), which coordinates the activities of about 230 health facilities, the Kenyan Catholic Secratariat (KCS), and the Protestant Churches Medical Association. A Moslem group, Crescent Medical Aid (CMA), directly runs 12 mosque-based health faci'ities (AID9423). Other important voluntary organizations include the Red Cross, the Leprosy Society, the Child Welfare Society, the Catholic Relief Fund for Malnutrition, and the Lion's Club (OUP9101). Of the many international NGOs involved in the health sector, the Aga Khan Foundation is particularly active in provision of PHC services in and around Kisumu and Mombasa (AKF9101).

**Traditional Medicine.** Practitioners of traditional medicine include TBAs, herbalists, bone-setters, "trance-healers," and other healers. Although long embattled by modern practitioners, traditional medicine is arguably the most important part of the health sector, partly because of limited access to modern services. The modern medical sector has only recently begun to pursue meaningful collaboration with the traditional sector. The African Medical and Research Foundation (AMREF), for example, has recently trained traditional healers in villages in western Kenya to dispense drugs and some contraceptives and the Kenyan government has requested that AMREF expand the project (WBK9303). For a discussion of conflict and cooperation between modern and traditional systems of medicine in Kenya, the reader is directed to reference IDR9401 (see Appendix C).

An estimate for 1990 places the nationwide number of traditional practitioners at 95,000 (AID9215). TBAs alone were estimated to number nearly 8,000 in 1994 (AID9423). The 1993 DHS found that TBAs had assisted over 20 percent of births among women surveyed (DHS9406). The authors of a study of traditional medicine in coastal Kenya reported that TBAs had delivered about one-third of births in Kwale Province in the late 1980s but provided neither antenatal nor postnatal care. Although it is commonly thought that the number of traditional practitioners in Kenya is declining, the Kwale researchers observed the number to be increasing gradually with population growth (HPP9003).

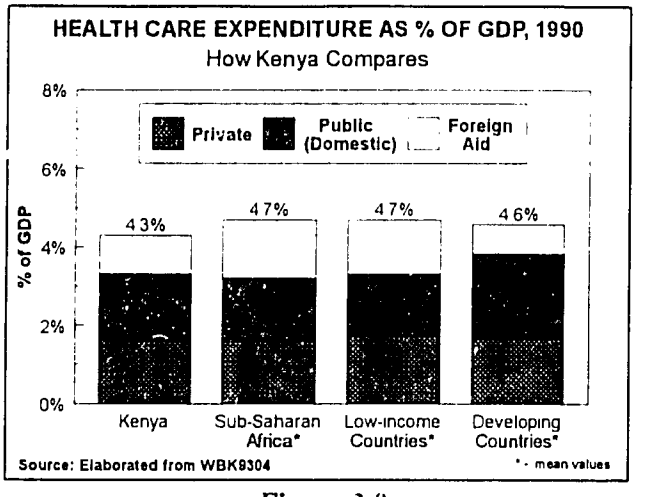
## Health Care Financing

According to the World Bank's World Development Report 1993, total expenditure on health in Kenya amounted to $375 million in 1990, or 4.3 percent of the country's GDP, just under the average among sub-Saharan African nations (see figure 3.8). About 60 percent of this total corresponded to public spending on health, including $84 million in official foreign aid flows (WBK9303).

Figure 3.9 illustrates the proportions of total health funding estimated for various public and private sources. Figure 3.10 illustrates an earlier estimate of the share of recurrent expenditures attributable to each of the sources. Private, out-of-pocket expenditures are now thought to comprise a much larger share of the total than the 41 percent indicated in figure 3.10. A 1990 study by the World Bank concluded that combined public and private health insurance provides coverage to 11.4 percent of the population, the highest share in sub-Saharan Africa, through roughly five percent of total health expenditures (WBK9004).

## Foreign Aid for Health

Donor activities in the health sector are substantial in Kenya. The most active external agencies are USAID, the World Bank, and UNICEF. Foreign aid for health amounts to close to one-quarter of overall health funding, a much higher share than that found in most developing countries. However, whether measured as a share of total spending (see figure 3.11) or on a per-capita basis (see figure 3.12), Kenya's level of foreign aid for health is still lower than that of most countries in sub-Saharan Africa.

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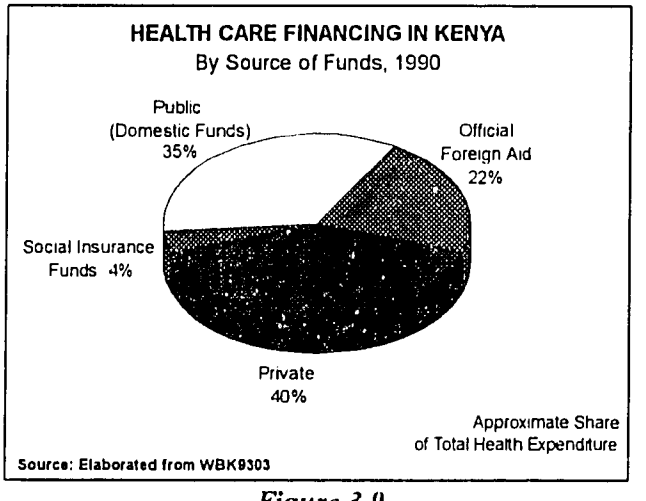


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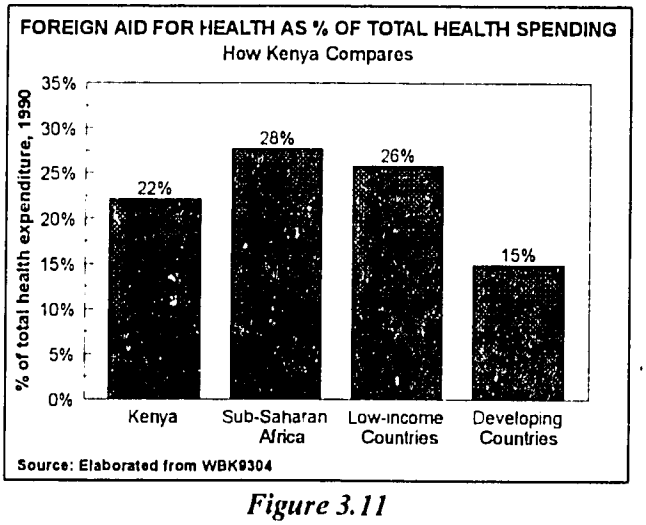


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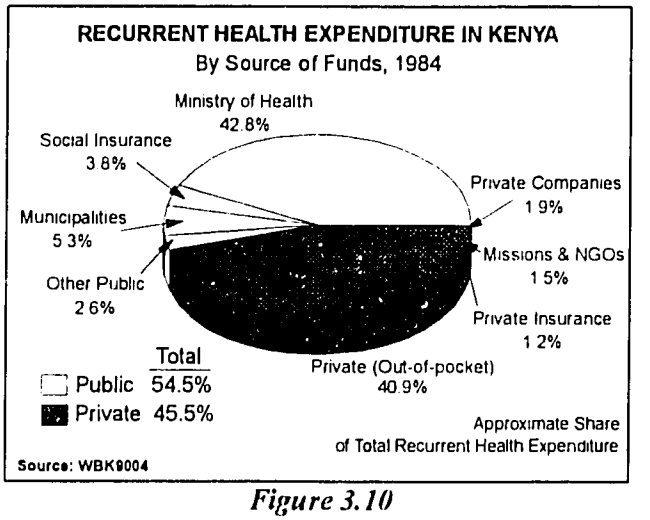


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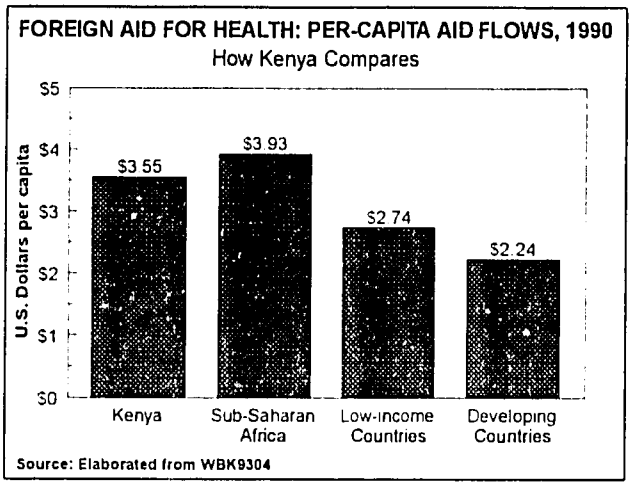


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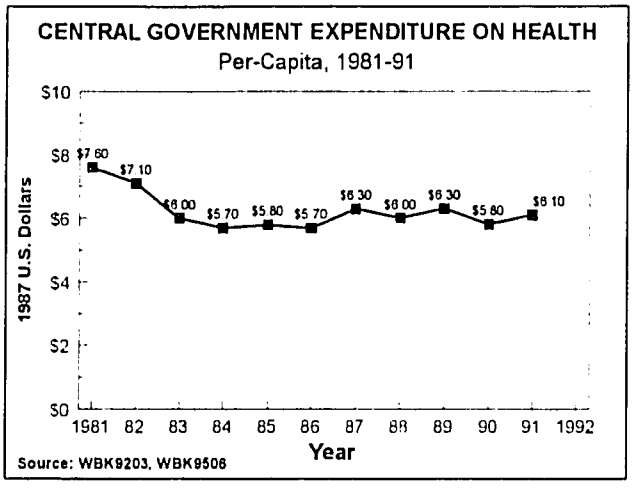


*Figure 3.13*

## Public Financing for Health

Domestic government spending on health is thought to account for less than 40 percent of overall health spending. Expenditures are made at the central level as well as by local governments and municipalities.

**Central Government Funding.** Figure 3.13 illustrates the gradual decline in the early 1980s of per-capita spending on health by the central government. Since 1983, spending has hovered around six U.S. dollars (fixed 1987 value) per person (WBK9506). An analysis for USAID using MOH figures calculated a more precipitous decline in per-capita spending from $9.50 in 1980/81 to just $4.50 in 1992/93 (AID9422).

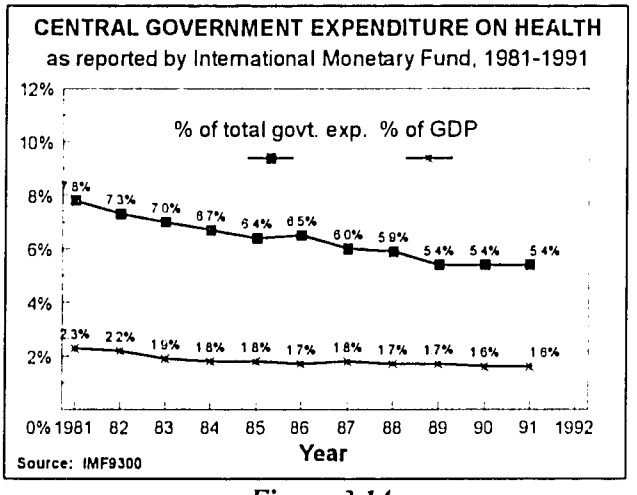


*Figure 3.14*

The share of health spending within the total government budget has varied over time, making a fairly substantial drop in the mid-1980s before recovering somewhat through the early 1990s. Divergences among data sources using different numbers and methodologies are significant, but the downward trend in the 1980s is fairly consistent. Government figures reported to the the IMF show a steady pattern of decline from nearly eight percent of total spending in 1981 to just 5.4 percent in 1991. As a share of GDP, public spending on health made a similar decline, finishing at 1.6 percent in 1991 (see figure 3.14).

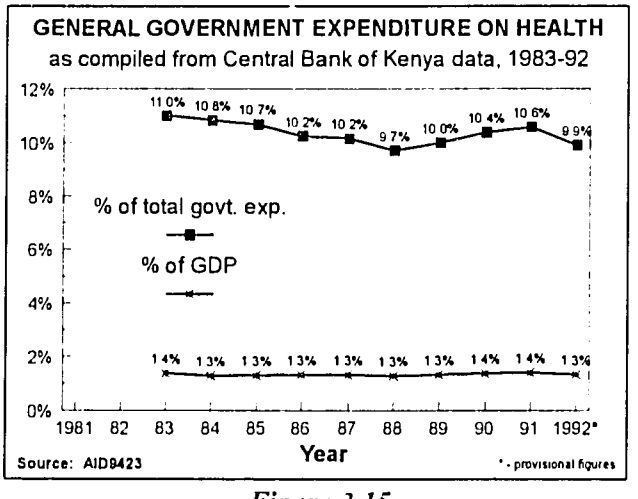


*Figure 3.15*

Government figures provided for a USAID sector assessment indicate a much higher share of at least ten percent of total spending for most of the 1980s (see figure 3.15). In 1986, the government announced that it intended to reduce allocations to health care from nine to eight percent of recurrent expenditures. According to these figures, central government health expenditure maintained a level of 1.3 to 1.4 percent of GDP throughout the 1980s and into the -90s (AID9423).

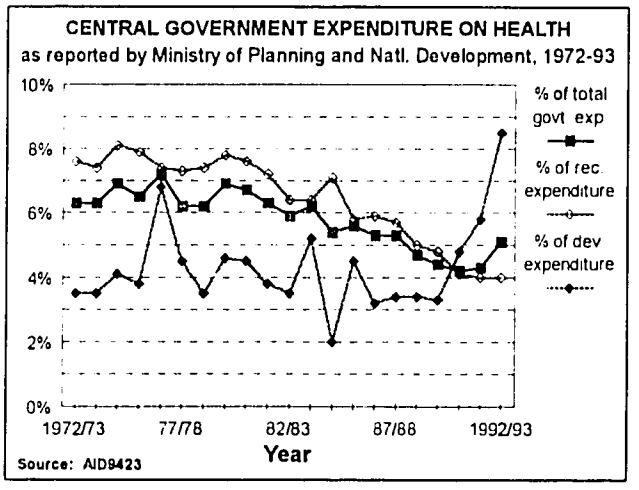


*Figure 3.16*

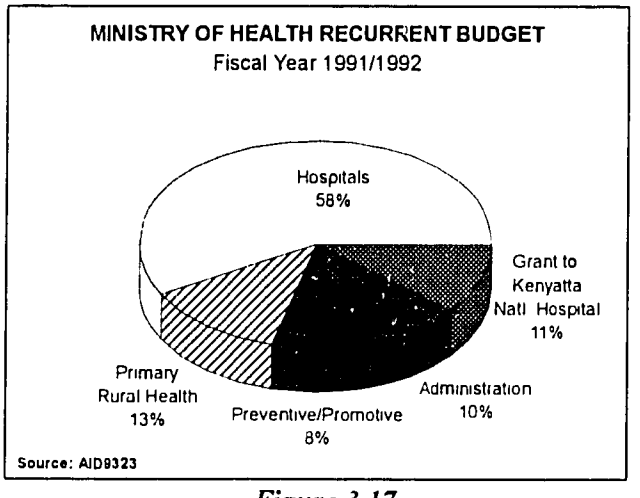


*Figure 3.17*

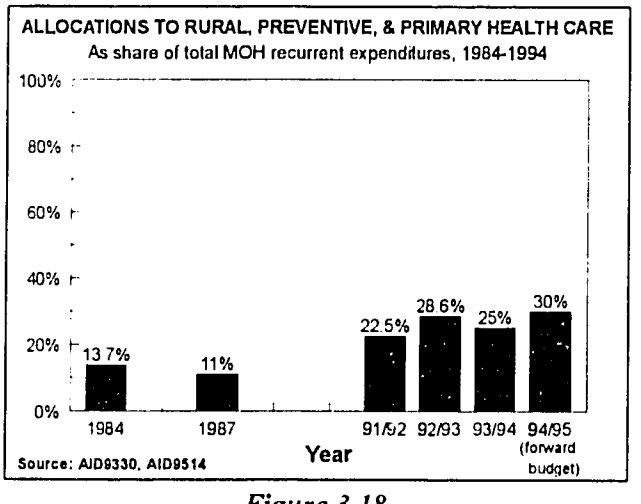


*Figure 3.18*

Yet another data source using government figures indicates a gradual decline in health spending from a peak of over seven percent in the mid-1970s to just over four percent in the early 1990s. As indicated in figure 3.16, the share of health within total recurrent expenditures was slightly higher than the overall share until 1990, when development costs for health began to absorb a much higher share of total development expenditures. The share of development expenditures within total health expenditures has risen 11.8 percent in 1986/87 to 38.4 percent in 1992/93 (AID9423).

**Allocation of Public Health Funds.** Figure 3.17 provides a recent breakdown of the MOH recurrent budget by program area. The emphasis on hospital-based care is clear, totalling 69 percent in this case. Growth in the workforce and concurrent reductions in overall expenditure have combined to create a situation of increased domination of wages and salaries at the expense of service quality, as evidenced by pervasive shortages of drugs, declining outreach activities, and lack of infrastructural maintenance (AID9423).

In addition to financing services directly under the ministry, the MOH budget includes subsidies for missions and other NGOs addressing health needs of the rural poor (AID9322) and for the private heath care of government employees. The latter absorbed 2.2 percent of the total MOH budget in 1986 (WBK9004).

Although urban, hospital-based care continues to dominate the budget, allocations to preventive and primary health care (P/PHC) services are reportedly growing. According to USAID's mission in Kenya, allocations for curative services dropped from 80 percent of recurrent MOH expenditures in 1987/88 to 69 percent in 1991/92. Meanwhile, combined allocations to rural and P/PHC services grew from just 13.7 percent of MOH expenditures in 1984 to 28.6 percent for 1992/93 (see figure 3.18). The largest share of P/PHC resources is allocated to family planning and maternal and child health services (AID9514).

A 1990 study by the HFS Project on P/PHC expenditure found the MOH to be suffering an annual shortcoming of about 420 million Kenyan Shillings ($20 million) in recurrent funding, a gap which amounted to 20 percent of the entire MOH budget and 37 percent of recurrent P/PHC expenditures. Shortcomings in funds for staffing comprised nearly 40 percent of the gap, followed by building maintenance (19%), drugs (18%) and supplies (16%)(AID9017).

**Local governments.** In 1985, local government spending was estimated to account for about six percent of total health spending. Since then, local government health expenditures have grown at an annual rate of 4.9 percent (AID9423). According to the IMF, local governments have consistently reserved more than ten percent of their budgets for health care and health-related services (see figure 3.19). A recent study prepared for USAID, apparently using a different methodology, reported that 45 percent of local government expenditures were devoted to health in 1994 (AID9423). The health program of the Nairobi City Council absorbed 60 percent of its budget in 1982 (OUP9101). Of 348 million Kenyan Shillings allocated to health by local governments in 1990, 230 million, or about two-thirds, derived from direct transfers from the national government (IMF9300). The remainder of costs are at the municipality's expense.

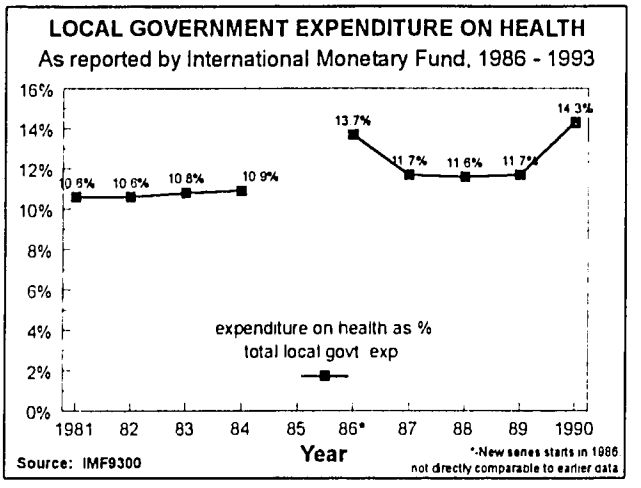


*Figure 3.19*

**Cost Recovery.** Since 1992, public health facilities have charged user fees for inpatient and outpatient care. In the past, user fees applied in colonial Kenya but were abolished soon after independence in order to increase availability of basic services. This policy stood until 1989, when the MOH began to implement a cost-sharing scheme in government hospitals and health centers in order to supplement the increasingly insufficient revenue base from general taxation. The new policy was unclear in many respects, particularly concerning exemptions for the poor, and health workers were never properly trained to implement it. With the scheme in place, utilization of public health services dropped 40-50 percent in some districts. Income from fee revenue reportedly covered just 3 1 percent of the overall recurrent health budget and there was no discernible improvement in service quality. Within less than a year most of the newly introduced fees were cancelled, after which the only remaining charges applied to laboratory and X-ray procedures and, in a severely modified form, inpatient care (KEN9301, HPP9501).

The current system of user fees was phased in gradually between April 1992, when fees were re-introduced in major hospitals, and September 1993, by which time all national, provincial, and district hospitals and health centers charged for services (HPP9501). The government is now also attempting to improve cost recovery for care of insured patients at Kenyatta National Hospital in Nairobi (WBK9303). USAID's mission in Kenya, which has been closely involved in health sector reform activities, reports that Kenyatta National Hospital expects to earn over 11 percent of its budget from service fees and NHIF insurance payments and that some provincial hospitals are succeeding in covering all non-personnel recurrent costs through cost-sharing revenues (AID9330). In 1994, collected fees and insurance re-imbursements reportedly amounted to about 12 percent of the entire non-wage recurrent budget. The amounts collected, however, represent only about 30 percent of total potential revenue, partly due to the effects of the public doctors' strike in June - September 1994 (AID9514).

Under the MOH's decentralization plan, District Health Management Boards now manage district health funds. Facilities are allowed to retain up to 75 percent of user fee revenues to address local priorities; each facility has an Executive Expenditure Committee to oversee the expenditure of these funds (AID9323). USAID's mission in Nairobi reports that cost-sharing revenue available for P/PHC at the district level has risen from $6.8 million in 1990/91 to $14.5 million in 1992/93 (AID9330).

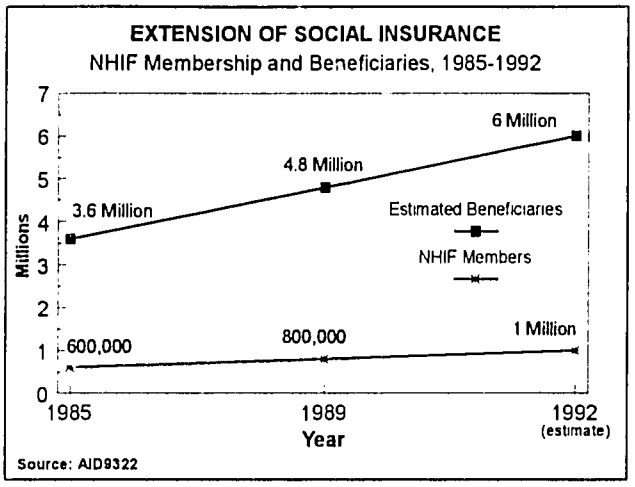


*Figure 3.20*

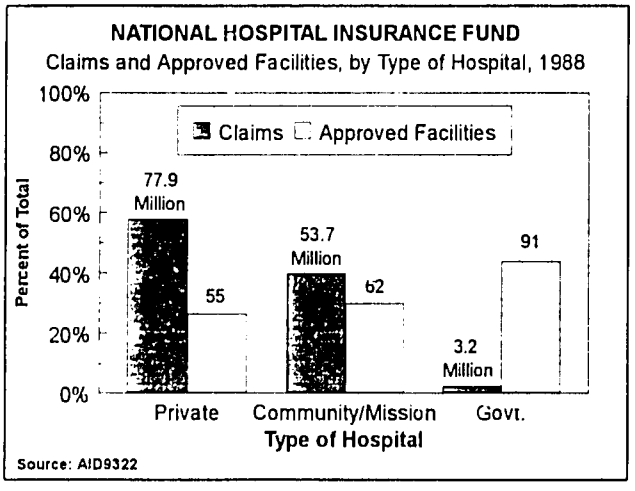


*Figure 3.21*

**Social Insurance**. The National Hospital Insurance Fund (NHIF), managed within the MOH, covers inpatient costs for formal sector employees and their families. This system provides primarily catastrophic coverage to about 10-20 percent of the population, the highest level of any social insurance coverage in sub-Saharan Africa, through four percent of total health expenditures (seven percent of public health expenditures)(WBK9303).

Beneficiaries present health cards to approved service providers, who are subsequently reimbursed by the fund. After rapid expansion in the 1980s (see figure 3.20), NHIF membership has now surpassed one million, according to the HFS Project, which estimated the total population covered at six million in 1992, roughly one-quarter of the national population (AID9322). Studies under the World Bank, however, estimate membership at 2.1 million for 1990, the basis of the bank's claim that social insurance covers ten percent of the population (WBK9004).

Membership in the fund is compulsory for all formal sector employees earning more than 1,000 Kenyan Shillings per month and voluntary for those earning less. The NHIF receives funds for its administrative budget directly from the Kenyan treasury, which it then reimburses at the end of each year. Members' compulsory contributions are deducted from their wages and range from 30 to 320 Shillings per month depending on members' level of income; voluntary members pay a flat rate of 60 Shillings per month. Current proposals call for a ten percent contribution by employers, who currently only collect and transfer their employees' contributions (AID9322).

The fund primarily covers inpatient care at approved private hospitals and nursing and maternity homes. Coverage of services at government hospitals is restricted but likely to expand in the near future. Also under consideration is the expansion of coverage to outpatient services. Figure 3.21 depicts the different types of facilities approved by NHIF and each type's share as a percentage of total facilities and reimbursements. Despite allegations of widespread fraudulent claims, the HFS Project reports that the fund has been generating a surplus of premiums over claims, possibly due to restrictive benefits and reimbursement rates. In theory, beneficiaries do not make co-payments, but in practice they are commonly charged by health care providers for the difference between actual fees and the level of reimbursement offered by the fund (AID9322).

## Private Financing

The World Bank estimated that private expenditure on health amounted to 1.6 percent of Kenya's GDP, or roughly 40 percent of total health spending (WBK9303). Similarly, the recurrent cost estimates presented in Figure 3.9 indicate a share of just over 45 percent for the various private sector actors, a share predominantly made up of out-of-pocket spending (WBK9007). Modern for-profit services tend to charge considerably more for outpatient care than the user fees established by the MOH (KEN9301). Fees at private urban hospitals are typically more than twice as high as NHIF reimbursement levels; patients are expected to provide the difference. On the other hand, rural mission hospitals charge fees well below the level of reimbursement (AID9322). A study in two districts found that use of private services dropped by 32 percent after the MOH suspended user fees in 1990. The re-introduction of cost-sharing in public health facilties has likely led to increased utilization of private services (HPP9501).

The results of a Rural Household Budget and Expenditure Survey in 1981/82 indicated that the lowest-income groups in two districts were spending at least 3.5-4.0 percent of total household income on health care (KEN9301). A 1992 survey found that Kenyans dedicate roughly two percent of non-food expenditures to health care. Lower income groups were found to have about one-fifth the per-capita spending level of the "non-poor," but this represented a much higher share of overall spending by the poor (see figure 3.22).

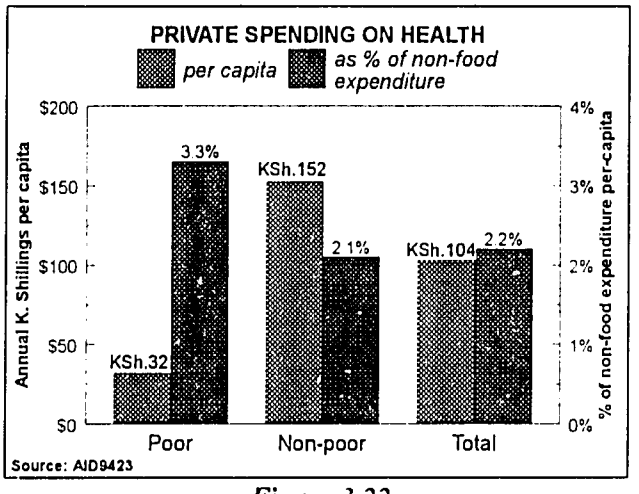


*Figure 3.22*

Missions and other NGO facilities are also financed through government subsidies, covering up to thirty percent of operating costs, and external sources, which cover from 20 to 50 percent of costs (AID9323). A 1989 report estimated that mission hospitals generate one-third of their revenues through NHIF reimbursements, which in effect serve to subsidize the care of the less affluent (AID9322).

Direct private health insurance is limited to people in middle- and high-income groups. Private group health insurance is available for some formal sector workers employed by parastatals or private companies in the major cities. Expansion of private insurance is thought to have been limited by the NHIF. Private policies were reported to cover about 60,000 enrollees in 1985, primarily for ambulatory care (WBK9004). Another source estimated that 100,000 Kenyans were covered through group insurance in 1989 (AID9340). Although the contribution of private insurance to total health care financing is still minimal, it is reported to be rapidly growing (AID9423).

A recent study by the HFS Project identified several alternative means by which Kenyans have shared the risk of incurring major outlays for health care. From independence through the 1980s, many communites financed expenses for catastrophic illnesses among individuals as well as some infrastructural expenses for local health facilties through a system of voluntary resource pooling known as Harambee. Since the early 1980s, Harambee funds reportedly expanded hospital inpatient capacity by 144 hospital wards nationwide. Although communities have successfully attracted public health services through such capital outlays, this practice has become less attractive since the government began to charge for services in public health facilities. Cooperative risk-sharing for catastrophic illnesses, however, remains common among families in rural and urban areas alike. In some rural areas, cooperatives and community groups have established prepayment schemes to cover members' medical expenses at participating facilities. Other prepayment schemes include revolving drug funds established with the assistance of UNICEF to stock community pharmacies in eight localities (as of 1990) along the lines of the Bamako Initiative (AID9340).

# IV. HIV INFECTION AND AIDS

As of the end of 1994, Kenya was estimated to have one million adults (8.3% of the adult population), and over 30,000 children infected with HIV. Reported totals of AIDS cases have varied widely, but even the lower figures are among Africa's highest. The current total of 56,573 reported cases (see figure 4.1) is the highest in Africa and third-highest in the world, reflecting the gravity of the pandemic in Kenya as well as the less advanced state of case reporting in many other African nations. The true number of cumulative cases in Kenya is thought to be up to three times higher (WHO9515, AID9330).

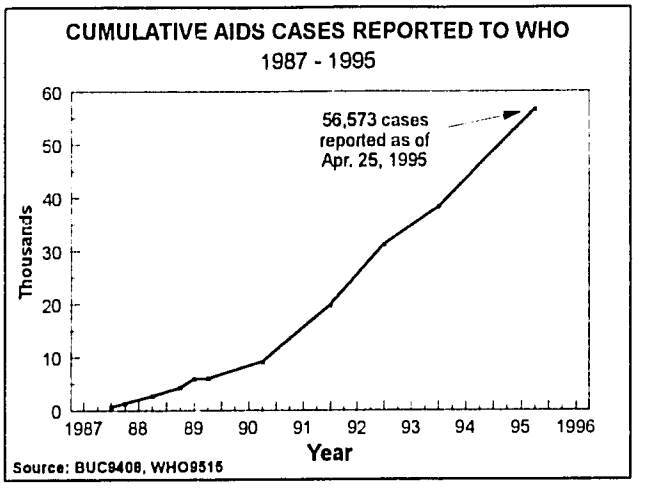


*Figure 4.1*

Figure 4.2 depicts the distribution of cases reported through 1992 by province. Annual incidence rates of just over ten new reported cases per 100,000 population in 1992 and 1993 were lower than rates reported from many other African nations, a phenomenon suspected to reflect the government's reluctance to release more accurate case totals (AID9330, AID9423). After revisions in 1995, incidence rates of 40.7 for 1993 and 24.8 for 1994 were respectively sixth- and seventh-highest on the continent (WHO9515).

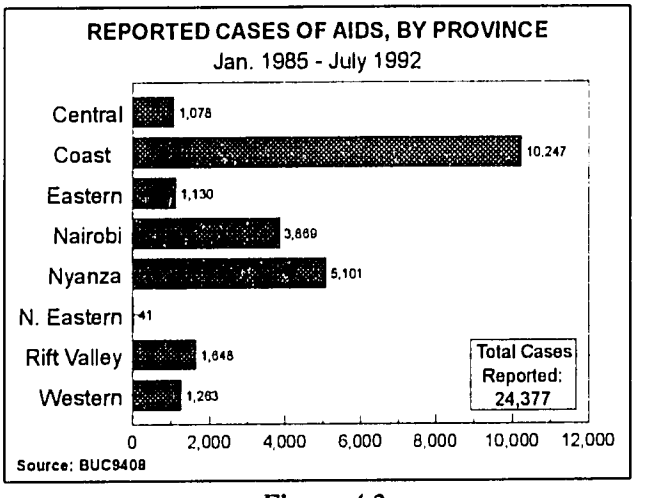


*Figure 4.2*

Results of HIV seroprevalence tests provide a far better indication of the current and possible future status of the pandemic. Figure 4.3 illustrates recent findings among various population groups as well as an estimate by the U.S. Bureau of the Census of total seroprevalence for 1994. As previously indicated in figure 2.50, these rates are comparable to those found in neighboring countries to the South and West. Rapidly rising levels of infection have been detected both among the general population (see figure 4.4) and higher-risk groups such as prostitutes and STD clinic patients (see figures 4.5 and 4.6). Levels among prostitutes in Nairobi appear to be the continent's highest at over 80 percent (BUC9503).

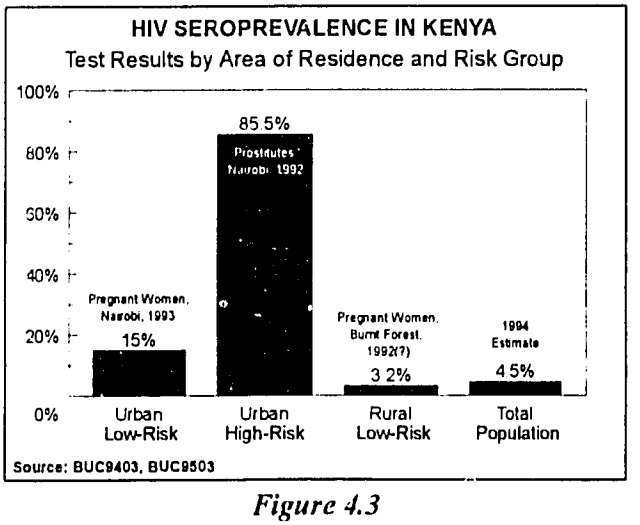


*Figure 4.3*

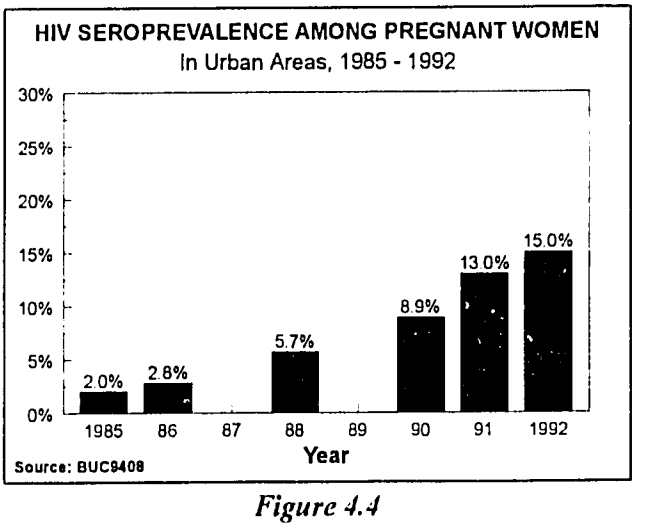


*Figure 4.4*

The primary mode of HIV transmission is heterosexual; although seroprevalence has been higher among males in the past (see figure 4.7), levels are now nearly even, as indicated by a male-to-female ratio below 1.4:1 in November 1993 (AID9325). Areas of particularly high prevalence are the western border with Uganda and along trucking routes between Mombasa, Nairobi, and the western border (AID9316). Rising HIV seropositivity continues to be observed at all 13 sentinel surveillance sites (antenatal clinics) around the country except Kisumu District (Nyanza), where infection levels may have levelled at around 20 percent (AID9423).

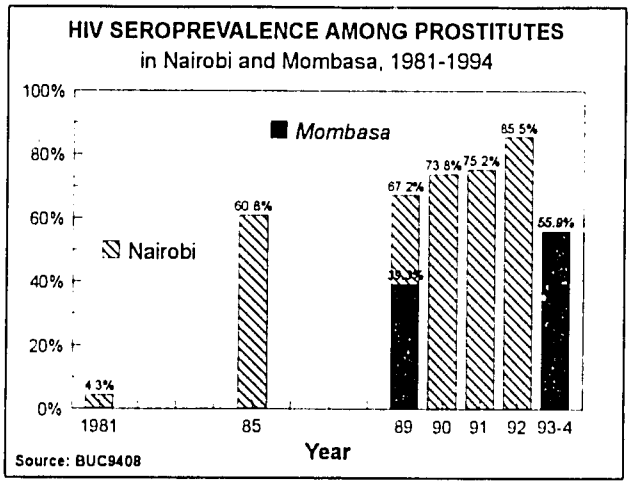


*Figure 4.5*

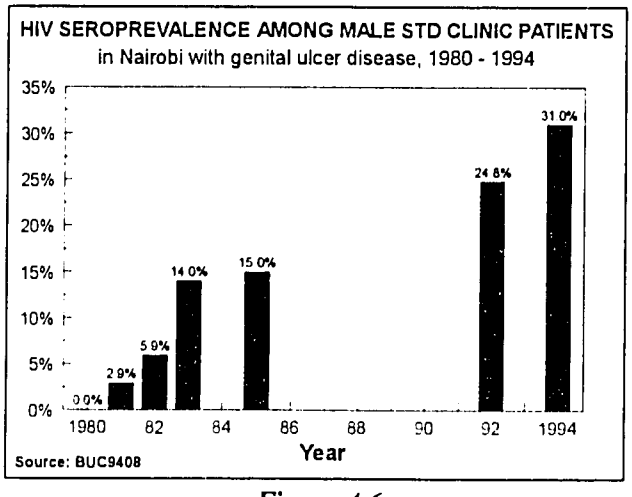


*Figure 4.6*

In 1993, estimates of the direct impact of HIV/AIDS on infant and child mortality were made to aid analysis of the 1993 DHS findings (see figure 4.8). Estimates for 1990 imply that AIDS directly accounted for about four percent of infant mortality and over 11 percent of under-five mortality. Estimates for 1993, based on rising seroprevalence rates, indicate much greater impact. Mortality rates due to AIDS were thought to be about twice as high in urban areas as in rural (AID9421).

These estimates do not consider the considerable indirect impact of the AIDS pandemic. An assessment supported by USAID estimated that there will be between 500,000 and 1.1 million AIDS orphans in Kenya by the year 2000. The cost of hospital care and loss of labor due to AIDS was estimated at $310 million for 1991, or two to four percent of the GDP, and could equal six to 15 percent of the GDP by the year 2000 (AID9310). AIDS patients were reportedly occupying 15 percent of Kenya's hospital beds in 1993 (AID9330). As previously indicated in figure 2.7, the U.S. Bureau of the Census projects that Kenya's U5MR will exceed 120 deaths per thousand live births in 2010, more than twice the rate projected without AIDS. Life expectancy is projected to be just 40 years in 2010 instead of 67 years as projected without AIDS (BUC9403).

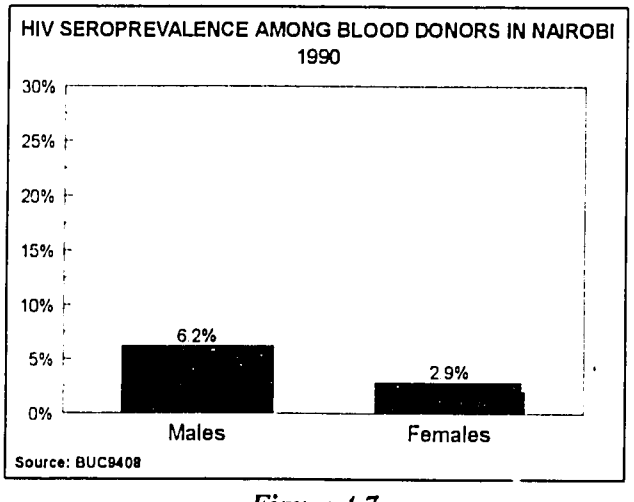


*Figure 4.7*

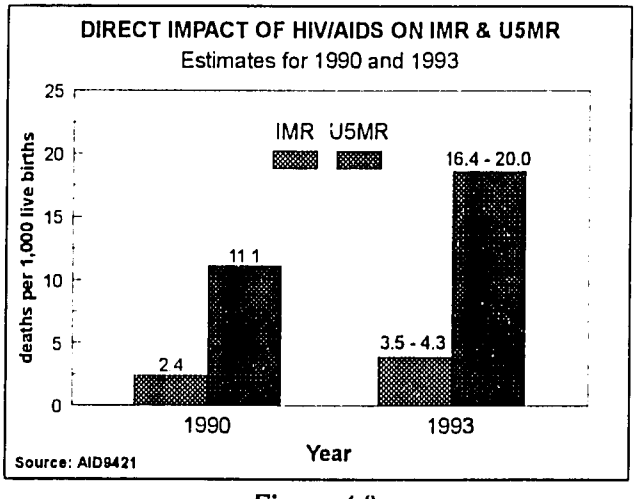


*Figure 4.8*

## National AIDS Control Program

**Kenya National AIDS Control Programme** (KNACP), Ministry of Health, Nairobi. Kenya was among Africa's first nations to respond to the threat of HIV/AIDS through the creation of a multi-sectoral National AIDS Committee (NAC) in 1985. All AIDS-related activities are coordinated and managed by an AIDS Programme Secretariat (APS). Priorities under the program are pursued by subcommittees on IEC (information, education and communication) activities, clinical case treatment issues, blood screening and transfusions, epidemiology, and scientific review of research proposals, protocols and publications (KEN9201).

IEC activities conducted with the collaboration of other ministries (education, culture, law, etc.), the National Council for Population and Development (NCPD), NGOs, and private sector services have targetted high-risk groups (youth, prostitutes, prisoners, army personnel, truck drivers), health workers, policy makers, teachers, community leaders, journalists and the general population. Major activities include television and radio broadcasts, newspaper articles, distribution of publications and other printed materials, and the addition of AIDS and STD education to secondary school curriculum (KEN9201). The 1993 DHS found that 88 percent of men and 67 percent of women reported hearing about AIDS on the radio in the month before the survey (DHS9406). Since 1990, the MOH has distributed over 173 million condoms supplied by USAID. According to calculations made for USAID, the overall government program has averted an estimated 110,000 HIV infections. Private sales of condoms promoted by USAID doubled to 4.8 million between 1993 and 1994 (AID9514).

## Local Non-Governmental Organizations with AIDS Activities

NGO activities are coordinated by the **Kenya AIDS NGOs Consortium**, which was founded in 1989 and currently counts more than 40 participating member organizations (AID9423), some of which are listed below.

**Aga Khan Health Services**, based in Nairobi with an office in Mombasa, helped implement a USAID-funded AIDS education and condom distribution program for high-risk groups in Mombasa (AID0002).

**AIDS Orphan Support Organization of Kenya** places AIDS orphans with families and provides counselling and skill-building training (WHO9301).

**Crescent Medical Aid Kenya** (CMA) provides STD clinical and counselling services for the urban poor in and around Nairobi. A member of the NAC, the organization distributed over one million condoms in a twelve-month project supported by USAID's AIDSCAP program (AID9310,WHO9102).

**Family Life Promotion Services** provides integrated family planning and STD/AIDS prevention services to low-income urban residents of Nairobi, including commercial sex workers (AID9310).

**Family Planning Association of Kenya**, a member of Kenya's NAC, operates family planning clinics throughout Kenya and offers counselling and education services to prevent the spread of HIV/AIDS (WHO9102).

**Federation of Kenyan Employers** is promoting higher sensitivity to HIV/AIDS in the workplace and assisting interested businesses in the design of HIV/AIDS policies (AID9424).

**KANO Maendeleo Ya Wanawake** (KANU MYWO) received support from USAID to integrate training and community education for AIDS prevention into ongoing programs targetting women in five districts (AID0002).

**Kenya Catholic Secretariat**, a member of Kenya's National AIDS Committee, operates clinics and hospitals and provides HIV/AIDS counselling and education services (WHO9102).

**Kenya Red Cross Society**, in addition to screening donated blood for HIV, provides counselling, counsellor training, and training of traditional birth attendants and other health workers, and has produced and distributed diverse educational materials on HIV/AIDS (WHO9102).

**Know AIDS Society of Kenya**, a Nairobi-based support group with nearly 1,300 HIV-positive members in 1993, lobbies for the rights of people with HIV/AIDS and promotes AIDS awareness through various IEC activities (WHO9301, KEN9201).

**Miujiza Theatre Company** performs theater and video presentations to provide AIDS education to adult and school-age audiences (AID9316).

**The National Council of Churches in Kenya** (NCCK) promotes HIV/AIDS education among religious leaders, health workers, people with HIV or AIDS and their partners/families, youth and the general public. NCCK is a member of the National AIDS Committee and produces *Challenge*, a quarterly newsletter on AIDS (WHO9102).

**Network of AIDS Researchers of Eastern and Southern Africa** (NARESA), based in Nairobi, has coordinated HIV testing, counselling and research activities in eight African nations (WHO9102).

**University of Nairobi, Department of Medical Microbiology**, a WHO Collaborating Center for STD research, provides blood testing and counselling for STD patients and operates clinics and hospitals offering care for patients with AIDS and other STDs (WHO9102).

**Young Men's Christian Association of Kenya** (YMCA) promotes HIV/AIDS awareness among at-risk groups and education for the general public in Kenya and Rwanda (WHO9102).

## International NGOs with AIDS activities in Kenya

(AID9310,AID9325,NCI9201,WHO9102,WHO9301)

Actionaid, London
AIDS and Reproductive Health Network
African Medical and Research Foundation (AMREF)
American Foundation for AIDS Research
CARE
CARE Britain
CARE Canada
Catholic Fund for Overseas Development, London
Catholic Organization for Joint Financing of Development Projects (CEBEMO), Netherlands
Catholic Relief Services
Center for Development and Pop. Activities (CEDPA)
Christian Aid, London
Colegio Universitario Aspiranti Medici Missionari (CUAMM), Padua, Italy
Danchurchaid, Copenhagen
Danish Ass.for Intl. Cooperation / Danish Volunteer Svc.
Family Health International
Institute of Tropical Medicine, Antwerp, Belgium
Institute for Development Training
International Community for the Relief of Starvation and Suffering (ICROSS)
Intl. Development Research Centre (IDRC), Canada
Intl. Federation for Family Life Promotion (IFFLP)
International Planned Parenthood Federation (IPPF)
Irish Missionary Union, Dublin
Johns Hopkins University
MAP International
Marie Stopes International, London
Medical Mission Institute of Würzburg, Germany
Medical Missionaries of Mary, Ireland
Memisa Medicus Mundi, Rotterdam
Military and Hospitaler Order of St. Lazare of Jerusalem (Obedience of Malta), Luxembourg
The Names Project
Norwegian Red Cross
Norwegian Church Aid
Pan-African Anti-AIDS Organization, Paris
Pathfinder International
Plan International
Program for Appropriate Technologies in Health (PATH)
Population Services International
Scottish Catholic International Aid Fund (SCIAF)
Supply of Equipment to Charity Hospitals Overseas (ECHO), London
Women Against AIDS Network
World Vision International
Worldview Intl. Foundation (WIF), Colombo, Sri Lanka

## International Donors supporting AIDS activities in Kenya

(GAP9300,UNF9200,AID9310,WHO9301,CAB9410)

Canadian International Development Agency (CIDA)
Danish International Development Agency (DANIDA)
Finnish International Development Agency (FINNIDA)
Norwegian International Development Agency (NORAD)
Overseas Development Authority (ODA), United Kingdom
Swedish International Development Agency (SIDA)
United Nations Children's Fund (UNICEF)
United Nations Population Fund (UNFPA)
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 | 140 | 124 | 113 | 103 | 93 | 85 | 77 | 71 | 68 | 63 | UNP9400 |
| Under Five Mortality | 263 | 238 | 193 | 175 | 157 | 142 | 130 | 120 | 113 | 107 | JEE9504 |
| Crude Birth Rate | 53 | 53 | 53 | 53 | 53 | 51 | 47 | 45 | 44 | 42 | UNP9400 |
| Crude Death Rate | 24 | 22 | 20 | 18 | 16 | 14 | 12 | 12 | 12 | 11 | UNP9400 |
| Avg. Annual Growth Rate | 3.1 | 3.1 | 3.2 | 3.4 | 3.7 | 3.7 | 3.5 | 3.5 | 3.2 | 2.9 | UNP9400 |
| Total Fertility Rate | 7.7 | 8.0 | 8.1 | 8.1 | 8.1 | 7.8 | 7.2 | 6.5 | 6.0 | 5.5 | UNP9400 |

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

| YEAR | ACCESS TO SAFE WATER | | ADEQUATE SANITATION | | SOURCE |
|---|---|---|---|---|---|
| | Rural | Urban | Rural | Urban | |
| 1980 | 15 | 85 | 19 | 89 | AID9012 |
| 1981 | NA | NA | NA | NA | |
| 1982 | NA | NA | NA | NA | |
| 1983 | 21 | 21 | NA | 75 | WHO9101 |
| 1984 | NA | NA | NA | NA | |
| 1985 | NA | NA | NA | NA | |
| 1986 | NA | NA | NA | NA | |
| 1987 | NA | NA | NA | NA | |
| 1988 | 21 | 61 | 25 | 40 | AID9012 |
| 1989 | NA | NA | NA | NA | |
| 1990 | NA | NA | NA | NA | |
| 1991 | 42.5 | 73.7 | 34.8 | 69.2 | 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 | 40 | 3 | WHD8700 |
| 1986 | 40 | 23 | WHD8800 |
| 1987 | 92.8 | 76 | WHD8900 |
| 1988 | 74 | 54 | WHD9000,WHD9001 |
| 1989 | 63 | 63 | WHD9100,DHS8906 |
| 1990 | NA | NA | |
| 1991 | 65 | 69 | WHD9201 |
| 1992 | NA | NA | |

*Table A3. ORS Access and ORS/RHF Use, 1985-1991*

| YEAR | VACCINATION COVERAGE | | | | | SOURCE |
|---|---|---|---|---|---|---|
| | BCG | DPT3 | Measles | Polio 3 | TT2+ | |
| 1983 | 76 | 58 | 55 | 57 | NA | WHE8700 |
| 1984 | NA | NA | NA | NA | NA | |
| 1985 | 82 | 70 | 63 | 70 | 40 | WHE8701 |
| 1986 | 80 | 72 | 65 | 72 | NA | WHE8701 |
| 1987 | 86 | 75 | 60 | 75 | 37 | WHE8800,WHE9200(TT2+) |
| 1988 | NA | NA | NA | NA | NA | |
| 1989 | 92.8 | 81.5 | 72.1 | 82.2 | 25 | DHS8906,MRF9002(TT2+) |
| 1990 | 80 | 74 | 59 | 71 | NA | WHE9100 |
| 1991 | NA | 36 | 36 | 42 | 38 | WHE9202 |
| 1992 | 93 | 86 | 81 | 85 | NA | WHE9301 |
| 1993 | 96.3 | 86.9 | 83.8 | 86.7 | 51.9 | DHS9406 |
| 1994 | 95 | 86 | 81 | 86 | 72 | WHE9501 |

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

| YEAR | Population per | | | | SOURCE |
|---|---|---|---|---|---|
| | Doctor | Registered Nurse | Enrolled Nurse | Clinical Officer | |
| 1964 | 13731 | 4694 | 3344 | NA | WBK9101 |
| 1970 | NA | 3331 | NA | NA | WBK9101 |
| 1975 | 8786 | 2325 | NA | NA | WBK9101 |
| 1980 | 9836 | 2485 | NA | NA | WBK9101 |
| 1982 | 7893 | 2210 | 1783 | 9320 | AID9423 |
| 1985 | 6995 | 2120 | NA | NA | WBK9101 |
| 1989 | 7001 | 2222 | NA | NA | WBK9101 |
| 1991 | 6667 | 4016 | 1206 | 8475 | AID9423 |
| 1993 | 6452 | 3953 | 1171 | 8403 | AID9423 |

*Table A5.Population per Health Care Personnel in Kenya, 1964-1993*

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

### *II. Definitions*

#### *Demographic indicators:*

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

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

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

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

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

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

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

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

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

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

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

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

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

#### *Child survival indicators:*

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

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

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

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

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

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

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

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

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

*Other health sector indicators:*

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

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

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

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

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

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

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

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

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

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

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

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

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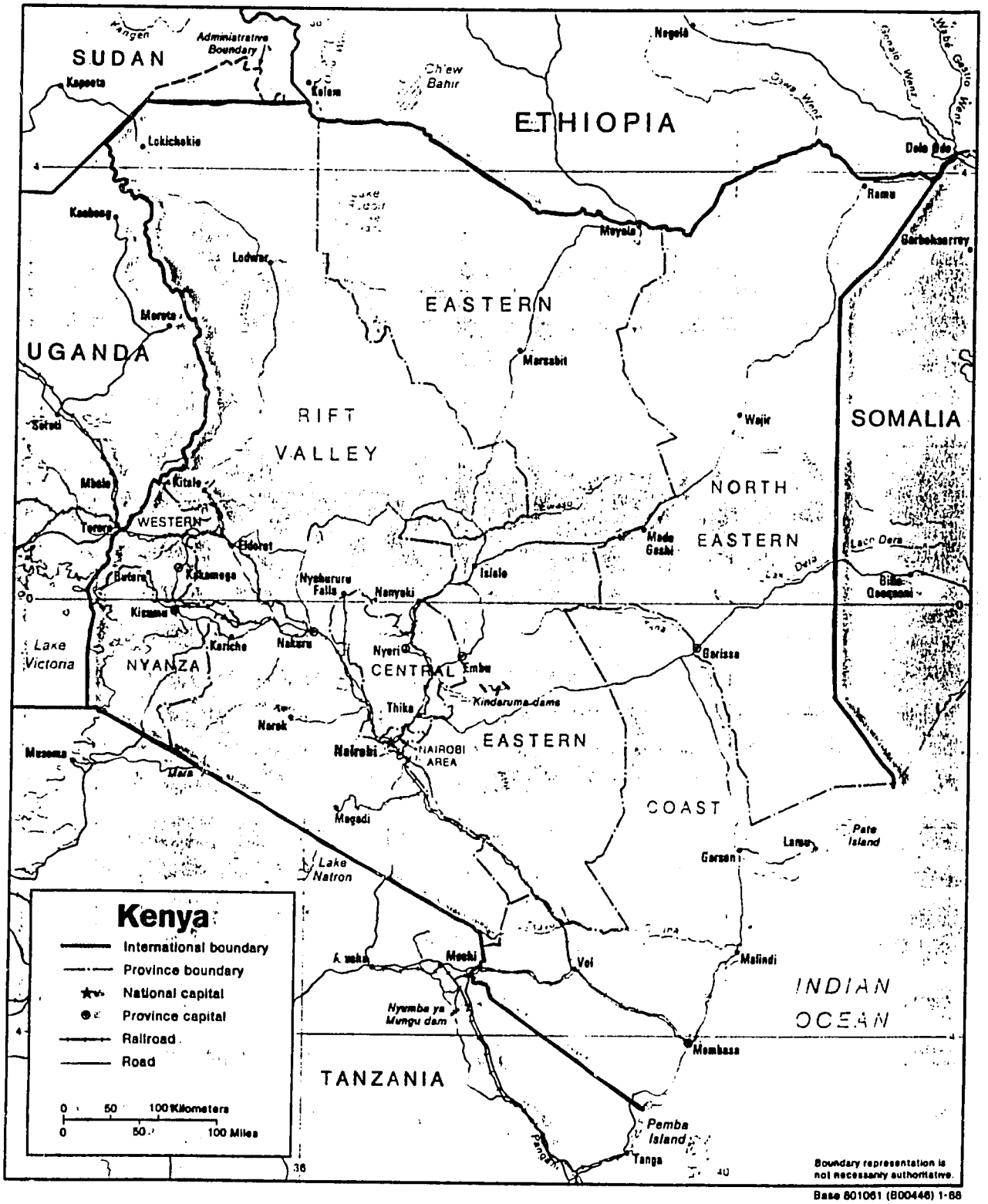
SUDAN
ETHIOPIA
UGANDA
SOMALIA
TANZANIA
EASTERN
RIFT VALLEY
NORTH EASTERN
WESTERN
NYANZA
CENTRAL
EASTERN
COAST
NAIROBI AREA
INDIAN OCEAN
Administrative Boundary
Kapoeta
Kolom
Lokichokio
Negelé
Dolo Ado
Rama
Moyale
Garbaharrey
Kaabong
Lodwar
Moroto
Marsabit
Soroti
Wajir
Mbale
Kitale
Eldoret
Mado Gashi
Lake Dera
Kisumu
Nakuru
Nyeri
Embu
Garissa
Lake Victoria
Kericho
Kindaruma dams
Thika
Narok
Nairobi
Meşadi
Lake Natron
Mazeras
Mara
Pate Island
Lamu
Garsen
Kajiado
Moshi
Voi
Malindi
Nyumba ya Mungu dam
Mombasa
Pemba Island
Tanga
Pangani
Kenya
International boundary
Province boundary
National capital
Province capital
Railroad
Road
0 50 100 Kilometers
0 50 100 Miles
Boundary representation is not necessarily authoritative.
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