Technical Study 58e

West African Sources of Health and Mortality Information: A Comparative Review

Allan G. Hill and
Wendy J. Graham

Infant Mortality and Health Studies

The International Development Research Centre is a public corporation created by the Parliament of Canada in 1970 to support research designed to adapt science and technology to the needs of developing countries. The Centre's activity is concentrated in six sectors: agriculture, food and nutrition sciences; health sciences; information sciences; social sciences; earth and engineering sciences; and communications. IDRC is financed solely by the Parliament of Canada; its policies, however, are set by an international Board of Governors. The Centre's headquarters are in Ottawa, Canada. Regional offices are located in Africa, Asia, Latin America, and the Middle East.

Publications on this subject:

Mortality and Morbidity: The Matlab Experience* (IDRC-TS56e)
S. D'Souza, A. Bhuiya, S. Zimicki, K. Sheikh

Efecto del Descenso de la Fecundidad en la Mortalidad Infantil (IDRC-TS57s)
E. Taucher

West African Sources of Health and Mortality Information: A Comparative Review* (IDRC-TS58e)
A.G. Hill, W.J. Graham

Techniques de collecte et d'analyse de données sur la mortalité périnatale à Kinshasa, Zaïre (IDRC-TS61f)
D. Nzita Kikhela

Child Health and Mortality in Sub-Saharan Africa: An Annotated Bibliography from the 1975–86 Literature/Santé et mortalité infantiles en Afrique subsaharienne : bibliographie annotée de la documentation de 1975 à 1986 (IDRC-259e,f)
Fiona Mackenzie (Compiler/Compilatrice)

Research Issues in Child Health and Child Care in West Africa: Proceedings of a Workshop, Accra, Ghana, 22–26 September 1986* (IDRC-266e)
Fiona Mackenzie (Editor), Kodwo Ewusi (Associate Editor)

**Il existe également une version française de ces publications.*

Technical Study 58e

West African Sources of Health and Mortality Information: A Comparative Review

Allan G. Hill and
Wendy J. Graham

Infant Mortality and Health Studies

Postal Address: Box 8500, Ottawa, Ont., Canada K1G 3H9

Hill, A.G.
Graham, W.J.

IDRC-TS58e

West African sources of health and mortality information: A comparative review. Ottawa, Ont., IDRC, 1988. viii + 63 p.: ill. (Infant mortality and health studies series)

/Health indicators/, /mortality/, / information sources/, /information recording/, / Mali/, /Senegal/, /Gambia/, /Sierra Leone/ - /information needs/, /comparative analysis/, /data collecting/, /references/.

UDC: 002:613(66) ISBN: 0-88936-506-7

Technical editor: K. Kealey

A microfiche edition is available.

Abstract

Since the Alma-Ata declaration of 1979, there has been a steadily increasing demand for information on current trends in health and mortality in all developing countries. The information systems in developing countries, including full birth and death registration often with sophisticated methods for linking this information with other sources such as the population census, are clearly inappropriate for most developing countries. Although special surveys do provide valuable information on health and morbidity, they are relatively expensive to conduct and analyze and may not be the most appropriate tool for measuring the effects on mortality or morbidity associated with a particular health program.

In this book, the availability of different sources of information is reviewed for four West African countries. The survey shows that a great deal of potentially valuable information is being collected, much less of it analyzed. Some series are particularly valuable for the study of trends. There are often severe problems of interpretation because, in the routinely collected data from the health services, there are large selection biases that can be difficult to circumvent.

The conclusion based on this work is that further development of techniques for the collection and analysis of data routinely produced by the health services is probably a more productive route to follow than attempting to install expensive registration systems as found in developing countries. Although it may be too radical a thought to abandon all attempts to achieve full coverage of births and deaths at least at the national level, for many countries some more original exploitation of existing sources may be more valuable in the short term.

Résumé

Depuis la déclaration d'Alma-Ata en 1979, le besoin d'information sur les tendances actuelles en matière de santé et de morbidité dans les pays en développement ne cesse d'augmenter. Les systèmes dont disposent les pays développés, systèmes d'enregistrement des naissances à terme et des décès souvent associés à des méthodes avancées permettant de lier ces données à d'autres sources d'information telles les données de recensement, ne répondent pas du tout aux besoins de la plupart des pays en développement. Bien que des enquêtes spéciales génèrent des données précieuses sur la santé et la morbidité, leur conduite et l'analyse de leurs résultats coûtent relativement cher; ce type d'enquête peut ne pas convenir lorsqu'il s'agit de mesurer l'incidence d'un programme particulier de soins de santé sur la mortalité et la morbidité.

Ce livre décrit les différentes sources d'information qui existent dans quatre pays de l'Afrique de l'Ouest. L'enquête relève que quantités de données potentiellement utiles sont recueillies, mais que nombre d'entre elles ne font l'objet d'aucune analyse. Certaines sont même particulièrement utiles à l'étude des tendances. De graves problèmes d'interprétation se posent souvent car les statistiques que recueillent habituellement les services de santé présentent d'importants biais qu'il est parfois difficile d'éliminer.

L'étude permet de conclure qu'il vaudrait mieux, dans les pays en développement, améliorer les méthodes de collecte et d'analyse des données que recueillent les services de santé qu'y créer les systèmes coûteux d'enregistrement qu'utilisent les pays industrialisés. Sans abandonner tout espoir de disposer un jour de statistiques exhaustives de natalité et de mortalité, du moins au niveau national, il serait, à court terme, sans doute plus avantageux pour beaucoup de pays en développement qu'ils exploitent de manière plus originale leurs sources d'information.

Resumen

A partir de la declaración de Alma-Ata en 1979, se ha presentado una demanda siempre creciente de información sobre tendencias actuales en salud y mortalidad en todos los países en desarrollo, incluyendo el registro completo de nacimientos y defunciones a menudo mediante métodos complejos que vinculen esta información con otras fuentes como los censos poblacionales, métodos que resultan claramente inadecuados para la mayor parte de los países en desarrollo. Aunque las encuestas especiales proporcionan información valiosa sobre salud y morbilidad, éstas son relativamente costosas de realizar y de analizar y pueden no ser el instrumento más apropiado para medir los efectos de un determinado programa de salud sobre la mortalidad o la morbilidad.

En este libro, se rese a la disponibilidad de distintas fuentes de información para cuatro países africanos. la rese a muestra que se recoge gran cantidad de información potencialmente valiosa pero se analiza muy poco de ella. Algunas series son de valor especial para el estudio de las tendencias. Se observan a menudo severos problemas de interpretación debido a que, en la información recogida rutinariamente de los servicios de salud, hay fuertes sesgos de selección difíciles de superar.

La conclusión de este trabajo es que el desarrollo ulterior de técnicas para la recolección y ánalisis de información producida rutinariamente por los servicios de salud es tal vez una senda más productiva para seguir que el intento de instalar costosos sistemas de registro como los que se encuentran en los países desarrollados. Aunque pueda ser muy radical pensar en abandonar todo intento por alcanzar un cubrimiento completo de nacimientos y defunciones al menos a nivel nacional, para muchos países una explotación más original de las fuentes existentes puede ser más valiosa en el corto plazo.

CONTENTS

FOREWORD

The Population, Health and Development (PHD) project of IDRC's Social Sciences Division was created in 1983 as a temporary mechanism to support and to strengthen the capacity of developing country researchers in carrying out interdisciplinary investigations of the persistent problems of high levels of infant and child mortality and poor health. To this end, and with the active involvement of the Health Sciences Division of International Development Research Centre (IDRC), the project has organized a number of activities: a series of interdisciplinary regional workshops in Latin American and Africa of health scientists and social scientists; preparation of two research bibliographies; and sponsoring of several researchers to international conferences. In addition, the PHD project has commissioned a series of technical research papers on widely recognized problems or gaps in infant mortality research. These papers were reviewed by peers and published in the IDRC Infant Mortlity and Health Studies series. They are intended to address specific methodological and conceptual issues in the research and data sources, collection, and analysis.

It should be noted that the Infant Mortality and Health Studies series is not intended to be based exclusively on original or primary data. Rather, the series of monographs is intended to examine and update researchers whose work successfully integrates conceptual and methodological approaches from both the health science and the social science research traditions. Where appropriate, a field manual approach and style was encouraged. Otherwise, an operational and illustrative approach was used in preparing the papers for publication.

"West African Sources of Health and Mortality Information: A Comparative Review" illustrates the potential utility of existing health data in four West African countries (Mali, Senegal, The Gambia, and Sierra Leone). These are data other than population surveys and censuses that can be used to complement and evaluate more standard sources of demographic data. This publication should contribute to a rethinking, improvement, and increased use of extant data collected in African health institutions. The authors, Allan G. Hill and Wendy J. Graham, both of the London School of Hygiene and Tropical Medicine, have worked extensively in the area of health research in Africa.

Sandra Witt
Coordinator
Population, Health and Development Project
IDRC

ACKNOWLEDGMENTS

The authors would like to thank all the officials and individuals in Mali, Senegal, Sierra Leone, and The Gambia who so obligingly provided reports and statistics and, at the same time, were prepared to describe honestly the advantages and shortcomings of the information systems for which they were responsible. Their many comments on an earlier draft of the paper have been taken into account in preparing this final version.

INTRODUCTION

The inadequacies of information on health and mortality in West Africa drawn from the "traditional" sources - the census, vital registration, and the health services - are now well recognized. Incomplete and uneven coverage of the population, differential reporting of events, and gaps in the flow of information are all familiar problems. The underlying reason for most, if not all, of the inadequacies is the weak economic position of many West African states. With declining internal revenues, worsening terms of trade, rising interest charges, and the drought-initiated recession, all governments in the region have been forced to cut back on public expenditure. In these circumstances, it is not surprising to find that the systems for the collection, analysis, and publication of health and mortality data have seriously lapsed in many West African countries and have not improved at all in the remainder. There is little point in dwelling on this shortage of financial resources. It is a problem not readily resolved by the adoption of a new approach or of a novel set of techniques. At this point in the 1980s, however, when many West African states have reached a plateau in terms of their postindependence economic growth, it may be more useful to take stock of the existing reporting systems. Because many of these are in a state of decay, it is appropriate to try to establish those elements of the system that could be discarded without serious loss and those that in future could be gradually integrated to produce a modest but effective information network.

Over the years, many of the international agencies have offered African countries advice on how to establish and maintain a health information system. Some important reforms have been successfully instituted as a result. There are also instances, however, where countries have been encouraged to build up elaborate and costly systems that cannot be sustained effectively in the long term. Complete but basic reporting of a few key variables from a representative selection of restricted geographical areas seems to many to be preferable to a more complex national system with unknown levels of accuracy or completeness. The development and maintenance of the information network, however, depends on the following conditions:

- A strong demand for the health and mortality statistics at all levels in the hierarchy of potential users from, say, village health worker to government minister;

- The information must be of obvious practical value in the planning, monitoring, and evaluation of programs designed to reduce mortality and morbidity;

- A two-way flow or feedback of information must occur between the level at which it is collected and the level at which it is aggregated, summarized, and interpreted;

- The general population must perceive some advantage to reporting vital events, the incidence of infectious diseases, and other morbid conditions. These advantages may include, for example, being issued with an identity card or burial permit or, perhaps more important, receiving treatment for the illness; and

- The government must maintain a strong financial commitment to support at least a skeleton reporting system from domestic revenues.

The prospects for improving the quality and the quantity of health information in the four selected countries are closely tied up with the prospects for satisfying these five conditions.

ROLE OF HEALTH AND MORTALITY INFORMATION

One of the problems that besets the collection of health and mortality information is that each new health program invariably requires and develops its own statistical system. A good example of this can be found in the reporting networks being devised within primary health care schemes. All health ministries and central statistical offices have numerous demands to meet and, as a consequence, many countries have endured frequent revisions of their data collection activities. In The Gambia, this has certainly been true for almost every year since 1980 (Gambia 1985:16), and in Sierra Leone, the World Bank has been developing a program to restructure the entire health statistics system. Part of the problem lies in the confusion of aims and in the lack of understanding about the reasons for collecting health and mortality data. It is a contention of this report that a more rigorous comparative approach, whereby existing data from more than one source are brought together for checking and analysis, is capable of yielding useful insights in the short term and providing guidance on necessary and appropriate revisions to the reporting system.

The collection of health information has a dual purpose aside from pure research. First, it can be used to identify the levels, trends, and differentials in diseases as an essential precursor to the selection of health priorities and programs and for subsequent monitoring and evaluation. These activities are clearly important, especially in developing countries where decisions on the allocation of slender resources for health care necessarily assume an enormous significance. Second, the continuous collection of health information is justified at quite another level - for the management of the individual patient (Cox 1984; Snell 1984). This dual purpose acts as a powerful counter argument to those who claim that mortality and morbidity data are a luxury for developing countries.

To a certain extent, recent demographic research has become more involved with the use of statistics generated by the health services because of an increasing concern with processes. Although the outcome is variable, death is still of paramount importance, new analytical frameworks have been developed (e.g., Masuy-Stroobant 1983; Mosley 1983; Garenne and Vimard 1984; Mosley and Chen 1984; Akoto 1985; van Nooren and van Vianen 1986) that try to incorporate the whole sequence of events and factors contributing to illness and, sometimes, culminating in death. As a result, there is a growing tendency both to use proxy variables and to construct more complex theories. Thus, although direct measures of death (a relatively rare event) are in many circumstances still very difficult, explanation may proceed by careful substitution of surrogate or proxy variables in the analysis.

This report is based on a detailed examination of just four West African countries - Mali, Senegal, Sierra Leone, and The Gambia. Their experience is not typical of Africa as a whole or, indeed, of West Africa. One particular advantage, however, in the choice of these four countries - a choice dictated largely by considerations of time, finance, and accessibility - is that two of the countries are francophone and two are anglophone. The description for Mali is based on several years fieldwork there, whereas the sections on Senegal, Sierra Leone, and The Gambia are based on shorter visits together with valuable assistance from colleagues with long experience of field conditions in these countries. All four countries were visited by the authors during the period from late September to early November 1985, but other visits and contacts have taken place since then.

As far as possible, the same general topics were investigated in each country, namely, the situation regarding census and vital registration statistics; the availability and representativeness of survey data on health and mortality; the coverage, accuracy, and content of health services information; and the existence of other small-scale studies of health and mortality. This report is organized around these main headings with separate comments on each country. The introductory section sets out the main characteristics of the four countries, whereas the conclusion includes recommendations on possible routes to improvement in the existing systems. Finally, it is worth mentioning here that numerous difficulties were encountered simply trying to establish the types of information gathered, the methods of collection and aggregation, and indeed which branch of the administration is responsible for these activities. Lack of documentation was a notable feature in all four countries. It is hoped that this report and the other reports produced by the International Development Research Centre (IDRC) based on regional summaries (IDRC 1986a,b) will help to form the initial step in the integration of the existing and largely independent sources of mortality and morbidity data.

BACKGROUND

Although all four countries selected for detailed examination lie in sub-Saharan West Africa, there are some important differences between them that stem partly from their different colonial histories and their geographical circumstances. The figures presented in Table 1 are an attempt to identify some of the contrasts, although clearly

Table 1. Socioeconomic indicators for the four selected countries.

Indicators[a]	Mali	Senegal	The Gambia	Sierra Leone
Area (1000 km^2)	1240	196	11	72
Population (mid-1984 '000s)	7562	6541	725	3784
Urban (%) (1983)	19	34	30	23
GNP/capita (1983 USD)	160	490	290	330
CBR (1983) (per 1000)	48	46	49	49
CDR (1983) (per 1000)	21	19	23	27
IMR (1980-85) (per 1000)	180	142	174	180
Life expectancy at birth (1983)	45	46	36	38
Annual growth of population 1980-2000 (%)	2.5	2.9	2.7	2.3

Sources: World Bank, 1986 (Tables 1, 19, and 20); United Nations (forthcoming).

[a]GNP, gross national product; CBR, crude birth rate; CDR, crude death rate; IMR, infant mortality rate; USD, United States dollars.

many of these demographic indicators are only approximate measures of the national situation based on partially complete sources often drawn from the most developed parts of the country. Apart from the obviously high levels of child mortality and fertility common to all four, there are a number of other characteristics worth stressing.

In the sub-Saharan savanna belt of West Africa, the single rainy season and the long, hot dry season are features that have a strong bearing on health and health statistics. The rains bring the insect-borne diseases as well as water-transmitted infections, whereas the long dry season produces a concentration of stress factors (Chambers et al. 1981; Hill 1985), and probably some loss of immunity to malaria because of the reduction in the number of infectious bites. In some cases, the rains adversely affect clinic attendance and the delivery of health care and, thus, although there is a real increase in morbidity in the community, the statistics may in fact indicate the reverse.

Although levels of urbanization are still relatively low in sub-Saharan Africa, the overconcentration of skilled people and health resources in the principal urban areas is striking. This, together with the uneven distribution of the population and health facilities within the rural areas, results in a high level of mobility despite the generally poor communication system in all four countries. This mobility certainly complicates the analysis of health services statistics, partly because of the difficulty of establishing the catchment population for use in the calculation of rates (Diesfeld 1979). The situation is further aggravated by the existence of private and traditional medical sectors that lie outside the reporting network for official health statistics. Moreover, the existence of subpopulations with very different demographic and health characteristics and needs also complicates the interpretation of aggregate data and poses a special problem for the identification of groups that are at risk. The available data for the four countries indicate an age structure dominated by children, especially those under 5 years of age who form the target group for many of the health programs, together with women of reproductive age.

The imposition of two major contrasting European systems of administration in colonial West Africa has produced some obvious differences that persist today, including the systems of administration and taxation. Generally, the hierarchical structures found in the two English-speaking and the two French-speaking countries are similar (Table 2), but in the latter territories there are frequently parallel services that appear to duplicate each other's functions and, thus, to add to the overall cost of government. The existence of overlapping services aggravates the problems of collecting and centralizing reports on births, deaths, and illnesses as the responsibilities are divided between different ministries often with different priorities and demands for data. Recent changes in the administrative systems in the four countries have generally involved small modifications rather than major reorganizations and, as a result, have made the procedures even more complex and cumbersome to operate.

Table 2. The administrative hierarchy in the four West African countries.

Mali	Senegal	The Gambia	Sierra Leone
Regions (7) (Gouverneur)	Regions (12) (Gouverneur)	Divisions (5)	Provinces (3) and Western Area
Cercles (Commandant)	Departements (30) (Prefet)	Districts (46)	Districts (12) and Western Area
Arrondissements (Chef)	Arrondissements (85) (Chef) Chiefdom Sections		Chiefdoms (147)
Villages (Chef)	Villages (Chef)	Villages and Hamlets	Villages
+ District of Bamako	+ Region de Cap Vert + Communes (34)		

Mali

Mali's main handicap is its climate. More than half of its area is semidesert, and the whole country north of Segou would be uninhabited were it not for the river Niger. The river is, however, an unreliable resource because the flood level, although partially controlled by the Selingué dam and the Markala barrage, is largely a function of the quantity of rain received in Senegal and Guinea. Between about July and February in good years, navigation between Kolikoro (60 km east of Bamako, the capital) and Gao is possible but large parts of the Niger flood zone or "inner delta" are inaccessible except on foot or by canoe. Everywhere in Mali, the contrast between the dry and the wet seasons is pronounced, with malaria and diarrheal diseases prominent just after the rains. Apart from these climatic difficulties, the health sector has some special problems.

In colonial times, the major epidemic diseases were dealt with by military-style campaigns mounted at irregular intervals. The service responsible was known as "Grandes Endemies," and it continues to function within the Ministry of Health. Recently, an organization known as the Centre National d'Immunisation has been established whose function is the more regular delivery of vaccines, especially to children. This is just one specific example of the general problem referred to earlier concerning the existence of parallel services with overlapping responsibilities. An example of the other administrative problem concerns the very centralized nature of the health system. In Mali, the senior medical officer in each region is the Mêdecin-chef who is responsible for all medical services and health problems in the province. Although his staff in the regional centre does report directly to him, other services such as the Service d'Hygiêne or the hospital service may have closer direct contact with their counterparts in Bamako. Thus, there are times when the proper route for

As a final note, it should be stressed that infant and child mortality in Mali is high and largely unchanging (Hill et al. 1983; Ouaidou 1984), although sharp regional contrasts are known to exist. In Bamako, infant mortality appears to be around 100/1000 with 14% of children dying before the age of 2 and 18% dying before age 5 (Hill et al. 1986). In a survey of the Fulani of the inner Niger flood zone, conducted in 1982, infant mortality was estimated to be 220/1000, and almost half of the children died before their fifth birthday (van den Eerenbeemt 1985). The smaller towns probably have child mortality levels between these two extremes. A study in Mopti and Sevaré in 1985 indicated that infant mortality was about 125/1000 and that 30% of children die by age 5. One factor is obviously the low level of vaccination; in Mopti in 1985, for example, the following proportions of last-born children had been vaccinated - 42% against tuberculosis; 11% against measles; 9% against tetanus and whooping cough; and 4% against polio (Hill et al. 1986).

Senegal

Senegal is a more prosperous country than Mali, as reflected in the per capita gross national product (GNP) (see Table 1), in part because of its location and natural resources but also because of the favoured position it occupied in French colonial times. Two factors, however, are currently causing strains, namely general economic difficulties including the decline of groundnuts as an export crop and the enormous gap in development between the region containing the capital Dakar (Cap Vert) and the rest of the country. These two factors have several effects on the health sector.

First, it is remarkable to find that in a country endowed with a concentration of hospitals, institutes of medical research, and doctors, which is rare in West Africa, infant and child mortality remains high. The 1978 national fertility survey suggested a rate of 112/1000 for infant mortality in the country as a whole. Second, the private medical sector in Dakar, including doctors, hospitals, and private pharmacies, is large and flourishing. Elsewhere in Senegal, the availability of medical personnel is very poor. Immunization coverage is surprisingly low in rural districts and, although the country is reasonably compact, people often have to travel long distances to obtain health care. Probably most striking is the general decline of standards in recent years. This decline extends to the data systems. In the 1970s, vital registration was almost complete for Dakar but, since the beginning of the 1980s, the Direction Nationale de la Statistique has decided not to publish health statistics as the coverage and completeness of reporting is so poor.

The regional inequalities in child survival and health care provision have been the subject of two recent studies by Gueye and Sarr (1985) and Cantrelle et al. (1986). In Niakhar, infant mortality was as high as 210/1000 in the studies conducted by Cantrelle in the late 1960s, but this has fallen recently. By comparison, infant mortality rates were about 60/1000 for Dakar and 80 in St Louis in 1980. One-third of the hospitals and 82% of the doctors practice in Dakar where 44% of the adult population is literate compared with only 20% overall literacy in the country (Cantrelle et al. 1986:95).

The Gambia

The Republic of The Gambia covers a narrow area of just over 11,000 km^2, on either side of the Gambia river. Away from the marshland adjacent to the river, the terrain is semi-arid savanna, with an average of just 90-115 cm of rain a year. Apart from its small size, a further distinctive feature of this country is the high average population density of 47 persons/km^2, with a range in the rural areas of from 13 to 58/km^2. A good general description of the demographic situation is available in Caldwell and Thompson (1975). The economy of The Gambia is dependent upon agricultural production, especially of groundnuts, to provide both internal revenue and foreign exchange, although tourism has increased in importance recently. Recurrent droughts and the high rate of population increase have taken their toll on both cash-crop and food production and limited the state's capacity to improve the health status of the population.

Despite these economic constraints, the government retains a strong commitment to the delivery of primary health care (PHC) to both the rural and the urban population. There has been an immunization program in The Gambia for some time now with high rates of coverage and efficacy. Nonetheless, mortality levels remain high largely because malaria, the diarrheal diseases, and respiratory tract infections are still important. The Gambia remains critically short of medical personnel, although several donors have offered support for training centres for nurses and midwives. In addition, a well-established research program is run by the British Medical Research Council. Several of its recent projects, especially the health surveillance work at Farafenni, are discovering important lessons for health delivery.

The Gambia is an interesting case study in Africa because of its firm commitment to primary health care and a resistance to the provision of hospital-based, centralized care. The important question is whether the primary health care program will substantially improve the health of the population and reduce mortality. There are some important reservations being expressed about the effectiveness of the PHC approach elsewhere (see Chen 1986; Rifkin and Walt 1986). The richness of The Gambia's demographic and health statistics, the new follow-up studies linked with the hepatitis B vaccination program, the existence of several detailed research sites including the Farafenni "population laboratory," and the administrative convenience of health and vital registration data being the responsibility of the same ministry, make the country an ideal place in which to seek answers to several key questions about the impact of health programs on morbidity and mortality.

Sierra Leone

The Republic of Sierra Leone, like The Gambia, is a relatively small country by African standards (Table 1). There are four distinct topographical regions: a mountainous peninsula jutting into the Atlantic, coastal swamps, coastal plains, and an interior plateau and mountain range. The climate has two markedly different seasons - a rainy season from May to October and a hot, dry season from November to April. Unlike Mali, Senegal, and The Gambia, Sierra Leone lies outside the semi-arid climatic belt, with humidity remaining

relatively high throughout the year and with an average annual rainfall of 330-380 cm.

The population of Sierra Leone is unevenly distributed between 13 administrative units. The communications infrastructure is very poor, with many parts largely inaccessible at certain times in the year. Population densities vary from 13 persons/km^2 in Koinadugu district in the northeast to 566/km^2 in the Western Area on the mountainous coastal peninsula. The latter area includes the administrative and commercial capital, Freetown, which includes about 10% of the total population in 1974 (Kandeh and Dow 1985).

The economy of Sierra Leone is dominated by the agricultural sector, although the mining industry is the major source of export earnings. Economic growth has been depressed since the early 1970s and particularly from the beginning of this decade. As in Senegal, the economic situation in Sierra Leone has adversely affected the health sector. In 1977/78, the government allocated less than 8% of the total recurrent public expenditure on health. The resources available both for the provision of health care and for the development and maintenance of an information system have been severely constrained for many years now.

The concentration of health services and personnel in the Western Area has its historical roots in the division between the Colony around Freetown (constituted a municipality in 1893) and the Protectorate covering the remainder of the country. Thus, although the sources of morbidity and mortality information are also most developed in the Western Area, the disease picture that emerges is unrepresentative of the other districts and is, therefore, of limited use for national planning. This stems both from the relatively privileged position of the Western Area already mentioned and from its favourable geographical circumstances. Although there is some consensus on the levels and principal causes of infant and child mortality in this area, the situation in the remainder of the country is largely unknown.

CENSUS AND VITAL REGISTRATION DATA

Censuses

The availability of census data in the four countries for the estimation of child and adult mortality is summarized in Table 3. Both the general lack of a regular series of decennial censuses and the absence of certain key questions (e.g., on children ever born and surviving) in the census schedules and reports, seriously limit the usefulness of this source of information. Despite many illustrations of the value of asking respondents about the survival of close relatives (e.g., mothers, children, spouses, brothers, and sisters), these simple questions have yet to be widely accepted, especially in the francophone countries. There are many disadvantages in asking about household deaths occurring in a specified reference period, but

Table 3. A summary of the availability of the data needed for mortality estimation from the censuses of the four selected countries.

	Mali	Senegal	The Gambia		Sierra Leone		
Questions	1976	1976	1973	1983	1963	1974	1985
5-year age distribution	X	X	X	X	X	X	X
Children born alive by mothers' ages	-	-	X	X	-	X	X
Surviving children by mothers' ages	-	-	X	X	-	X	X
Survival of last-born child	-	-	X	X	-	-	X
Household deaths in last 24 months	X	X	-	-	-	-	-
Survival of parents	-	-	X	X	-	X	X

Note: X, available; -, not available.

perhaps the most persuasive argument for their replacement by questions on the survival of parents and children is that the latter set of questions are simpler to ask and to answer.

Although African censuses now tend to consist of a very simple household questionnaire, if a more detailed schedule is also applied in the immediate postcensus period, the data obtained can be used to make national estimates of mortality and fertility. Strangely, this economic combination of a short census form for universal use and a longer form for a representative proportion of households has never been used in the four countries under study. The census is an expensive undertaking and most national statistics offices are, not surprisingly, unwilling to pursue fieldwork that they consider supplementary to the main enumeration. Although the organization of a universal count of dwellings and people together with a more complicated sample survey is more demanding than just the basic census, this is outweighed by the gains from the reduction of the overall time spent in the field and from the extra detail obtained on key subjects.

Mali

The single Malian census of December 1976 appears to have been well-planned and organized but, unfortunately, there is no basis for an evaluation of the coverage because there was no postenumeration survey. The attempt to estimate the de jure population by asking about usual household members absent on census night has resulted in some confusion between temporary absentees and long-term emigrants and, as a result, there is a possibility of some double counting. The most significant flaw in the census, however, is the absence of questions on the number of children ever born and surviving. The number of household deaths occurring during the 24 months before the census was asked on the back of the form. A check with the Brass Growth Balance equation indicates that perhaps only two-thirds of even the adult deaths were reported this way and the completeness of information for children is much lower still. An analysis of the 1976 census results has just been produced by the Directorate of Statistics (Mali, DNSI 1985). It is encouraging to note that the questionnaire for the census schedule for late 1987 is much more complete, containing all the main indirect questions on child and adult mortality.

Senegal

In the 1976 census, the only questions asked on mortality and fertility were about household births and deaths in the 12 months preceding the enumeration. Very little analysis of these data is possible because of the difficulties in attributing the births and child deaths to particular women. Both births and deaths are, however, clearly underreported.

The Gambia

The first census in The Gambia incorporating socioeconomic questions was carried out in 1973 by the Central Statistics Office, followed by the combined Population and Housing Census of 1983. In both censuses, questions were included for the estimation of age- and sex-specific mortality. The full results of the 1973 census were made available in 1976, whereas those for 1983 are still being processed.

This delay between fieldwork and analysis is one of the major drawbacks of censuses for mortality research. The high costs involved and the relative infrequency of the enumeration are two further disadvantages. In many instances, the census is the only source of mortality data for all parts of the country, providing a picture of regional variations for one moment in time.

Sierra Leone

In contrast to The Gambia, censuses have been carried out in Sierra Leone, but not for the entire country, for over a century. The first census to include questions enabling indirect estimation of mortality that involved asking mothers about the survival of their children and all respondents about survival of their parents was conducted in 1974 (Okoye 1980). Before 1974, only crude estimates of mortality could be calculated from the age-sex data of the 1963 census (Thomas 1983). The most recent census was carried out in December 1985, using similar mortality questions to those used in 1974.

The results of the 1974 census were the subject of some controversy that delayed their publication until 1980. The controversy centred around the extent of underenumeration, now regarded as probably less than 10% (Sierra Leone 1985). Dispute also raged over the levels of infant and child mortality, with the former eventually accepted as lying between 225 and 250 (Okoye 1980) compared with the figure of 248 produced by the pilot survey to the census (Blacker et al. 1980).

Establishing the accuracy of the 1974 census mortality statistics is hampered by the lack and inadequacies of comparative data from the vital registration system and by the absence of a postenumeration survey. However, a study conducted shortly after the 1974 census by the Ministry of Health and the World Health Organization (WHO) (Sierra Leone and WHO 1980) does provide some basis for comparison. Thus, for example, while the census reported an infant mortality rate in the Western Area of 168/1000, the other study recorded a figure of 152/1000. It is widely acknowledged that the level and pattern of mortality in this more developed part of the country is lower than that found in the remaining areas (Kannisto et al. 1984) and that mortality is also likely to be most underreported where it is highest. Analysis of the 1974 census (Okoye 1980) gives some indication of regional patterns and reveals that of the 13 administrative units, Pujehun had the highest infant mortality rate at 294/1000. As Okoye (1980) notes "It is difficult to attribute the rather high level of infant mortality in this region to inconsistency in the data. The 1974 Census figures in fact showed that for each age group of women, the proportion of children ever-born reported dead was consistently highest in Pujehun District. The indices for the district may therefore represent the actual situation."

Vital Registration

Only in small parts of the four countries, usually the largest towns, is registration of vital events reasonably complete. Even in the principal cities, however, there is often significant underregistration of both births and deaths. Adult deaths are probably the most completely recorded simply because in urban areas burial permits

are required for interment in a cemetery. Generally, however, the number of burial permits issued annually exceeds the number of deaths reported in the civil registers. Children dying at an early age and especially deaths occurring before baptism, are frequently missing from both birth and death registers. They may also be omitted from the registers of burial permits because small children are sometimes buried in the domestic compound. Moreover, birth registration is frequently late because proof of registration is often not required until the child enters school or until an adult is issued with an identity card.

These flaws in the vital registration systems make the available statistics very difficult to use simply because of the uncertainties and inherent biases in the population covered. It is perhaps not surprising to find that reporting procedures that are essentially based on a European system are not wholly appropriate for tropical Africa. This is partly reflected in the confusion about the aims of recording vital events and, in turn, in a division of responsibilities for the data collection among several ministries. The key question is whether these countries have a need for a continuous registration system involving, for example, the issue of identity cards for all adults and the maintenance of a complete register of all citizens. If this is the case, then there is also a need to accept and implement the reforms necessary to improve and maintain the system, despite all the costs and difficulties. Alternatively, if birth and death records are being collected to measure movements of the population and for health surveillance, it is easier to foresee some prospects for increasing the quality and coverage of these reports by integration with the health information system. Some observations on the existing registration systems in the four countries follow by way of elaboration on these general points.

Mali

As in other former French territories, the responsibility for the reporting and publication of birth and death reports is split between several ministries. Legally, all births and deaths have to be reported to the nearest civil registration office that forms part of the Ministry of the Interior, often located in the "mairie" in towns, but elsewhere is a function performed by a centrally appointed official such as the Chef d'arrondissement. To register a death that has not occurred in a clinic or a hospital, an official from the Service d'hygiène (Ministry of Health) is supposed to view the corpse to verify that the cause of death is a natural one and to attribute a probable cause of death. Again, in towns only, a burial permit is required for interment in the supervised cemeteries. This is issued by the Service d'hygiène. Very few early childhood deaths could be found in the registers in either Bamako or Mopti in 1985, although others have found infant death reporting quite complete. (It is interesting to note here that two researchers - Fargues and Thiam - are currently studying the Service d'hygiène death statistics in Bamako in a joint INED - Institut du Sahel research project.) Record keeping generally appears to have been better in the past; in Mopti, less than 80 deaths had been registered in 1985, in part because closure of the cemetery (no further space) had, in effect, dispensed with the need for burial permits. Because burial normally occurs within 24 hours of death, the burial permit is often obtained before the civil registration death certificate, which requires the purchase

of fiscal stamps, a prolonged visit to an office open only during normal government working hours, and possibly some entanglements related to taxation. Not surprisingly, many people dispense with the legal death certificate except where it is required to settle matters related to inheritance. Deaths that occur in clinics and hospitals lead automatically to the issue of a burial permit but the relatives of the deceased are responsible for legal registration of the death. There is thus a double disincentive to register deaths of small children because, legally, both a birth and a death certificate have to be completed, and these involve costs in both time and money.

Essentially, the same procedures apply to birth registration. Mothers giving birth in a maternity clinic or a hospital are given an "Acte de naissance" on discharge that they are responsible for having converted into a legally acceptable "Declaration de naissance." Birth registers are maintained in these health facilities showing the outcome of each maternity, in addition to other items of information (see Hill and Macrae 1985 for details). Those who give birth at home are supposed to bring the baby (with the placenta as proof of ownership, in some cases) to a health facility where the birth is entered into the register and an "Acte de naissance" issued. The rural population is almost entirely excluded from these arrangements. Only when a birth certificate is needed later in life is there a chance that surviving children will have their births registered.

Although in urban areas there is some degree of cooperation between the registration systems involving the ministries of the interior and of health, the latter has a much more extensive reporting network. Health facilities are not, however, the legally recognized centres for birth and death registration. Furthermore, it is the Ministry of Planning and its Directorate of Statistics that are finally responsible for the collation and presentation of all reported births and deaths. It would, therefore, appear that the basic organization of the registration system is the principal obstacle to more complete coverage and that minor reforms are not likely to be very effective. Only a major change in national administrative structure would pave the way for the Ministry of Health to assume more responsibility for birth and death registration.

Senegal

Many of the general points concerning Mali also apply to Senegal. There are, however, two principal differences. One concerns the special position of the environs of Dakar, the other concerns the important role played by private medicine.

When France endowed the three "communes de plein exercice" with local self-government (St Louis and Gorée in 1872; Dakar in 1880; Rufisque in 1887), a dual system was established with the "originaires" of these areas being regarded as if they were part of the metropole, and the rest of the population subject to direct colonial rule through the Commandants de Cercles (now Dépertements) and the chefs de territoire. Until recently, birth and death registration was believed to be quite complete on the peninsula surrounding Dakar known as "Cap Vert." Elsewhere, the registration data are very incomplete. Much of the interesting history of the development of the early colonial medical services in French West Africa is clearly laid out in Girard (1953) and in Hailey (1957). As part of the legacy of this

colonial experience, private hospitals and doctors are numerous in Dakar today. Thus, any attempt to improve birth and death registration has to include a system for reporting vital events that occur in private clinics.

Apart from these two differences, the process whereby the Service d'hygiène first produces an "Attestation de décès," which can then be converted into a "Bulletin de décès" issued by l'État civil, is exactly the same as in Mali. The costs are 250 FCFA per certificate. Similarly, a "Certificat d'accouchement" issued by a hospital or a clinic serves as the essential documentation to obtain the legal "Declaration de naissance." All the statistics on the different certificates issued are maintained by different services - by the Division des Statistiques in the Ministry of Health, by the État-Civil of the Ministry of the Interior, and by the Directorate of Statistics of the Ministry of Planning. Any analysis of these data is conducted by La Division des Enquêtes et de la Démographie of the Statistics Directorate working in conjunction with the Bureau Central du Recensement.

The analysis by Cantrelle et al. (1986) depends very heavily on the survey sources but some plausible trends in infant and child mortality can be discerned for the two cities of Dakar and St Louis using the civil registration data. At face value, these figures show little steady improvement in child mortality over the 1973-80 period but the problem with using such partially complete figures is that real trends may be obscured by changes in the completeness of death reporting or in the characteristics of the base population, usually as a result of migration.

The Gambia

In The Gambia, the registration of births and deaths is the responsibility of the Ministry of Health, Labour and Social Welfare (MHL and SW), and is centrally controlled by the Registry in Banjul. It is from this central office that birth and death certificates are issued and in which the birth and death registers for the entire country are maintained. The process of registration differs between the rural areas and the urban area of Greater Banjul. In the former, district health inspectors based at health centres are responsible for recording births and deaths and notifying the Central Registry through quarterly returns. These notifications are entered in the relevant registers. Table 4 indicates the type of information retained in the registers. For Greater Banjul, the emphasis is placed more on the relative of the newborn child or deceased person to report the event to the Central Registry. In the case of deaths, the relative must obtain a medical certificate, completed by a doctor and providing a cause of death, before obtaining a burial permit from the Central Registry. The death is entered in the appropriate register and a death certificate may also be provided for a small fee. Because in the urban area all burials must take place in a cemetery controlled by the Town Council, for which a burial certificate is required, it has been suggested that death registration is complete for Greater Banjul. There is no equivalent control for burials in the rural areas and, although there are no published estimates of the extent of underreporting, from the passive nature of the registration process this can be expected to be considerable.

Table 4. Information available from births and deaths registers in The Gambia and Sierra Leone.

	The Gambia		Sierra Leone	
	Births	Deaths	Births	Deaths
Date of event	X	X	X	X
Place of event	X	X	X	X
Name	X	X	X	X
Sex	X	X	X	X
Age at event	N/A	X	N/A	X
Occupation	N/A	X	N/A	X
Occupation or rank of father	X	X	X	-
Place of residence	-	-	-	X
Place of birth	X	-	X	X
Cause of death	N/A	X	N/A	X
Duration of illness	N/A	X	N/A	X
Medical officer's name	N/A	-	N/A	X
Name and description of informant	X	X	X	X
Name and surname of father	X	N/A	X	N/A
Name and maiden name of mother	X	N/A	X	N/A
When registered	X	X	X	X

Note: X, available; -, not available; N/A, not applicable.

Although vital registration comes under the local administrative centre of the Ministry of Health in the rural areas, its link with the system of birth and death recording, which has recently been developed as part of the primary health care program, is unclear. It will be shown subsequently that this is also the case in Sierra Leone. The PHC reporting system in The Gambia not only provides one possible way to gauge the extent of underreporting in the existing vital events notifications but in the rural areas, at least for death registration, it also represents a potential replacement. Moreover, in some situations, such as northern Nigeria and in parts of Sierra Leone, as discussed later, village reporters are employed to provide regular

reports on vital events. Such decentralized efforts could be complementary to the parallel initiatives instigated under the PHC system.

The problem of underrecording of live births is regarded as less serious overall, partly because of the need for birth certificates, issued by the Central Registry, for school entry and examination and for particular types of employment, and partly because a fee is levied for late birth registration. In The Gambia, it is estimated that 90% of children under the age of 5 years in 1982 possessed child welfare cards on which their date of birth was recorded (Gambia 1985). (This source of information will be discussed later.)

The aggregation of vital statistics does not appear to be carried out routinely, at least at the national scale and, consequently, there is comparatively little in the way of published figures, especially for the rural areas. The newly established Health Statistics and Epidemiology Unit, also part of the MHL and SW, may be expected to improve the situation, although the means for exchanging information with the Central Registry is not yet fully developed.

Sierra Leone

As with The Gambia, the vital registration system in Sierra Leone is an activity under the responsibility of the Ministry of Health. Although the system is scheduled to undergo major revisions and, at present, is in a state of flux (see later), it still basically relies upon the work of full-time registrars in the Western Area and at the provincial township and district levels, on part-time registration assistants, often local authority clerks. In 1 of the 3 provinces and in 9 of the 12 districts, however, these posts have been vacant for a considerable period (Sierra Leone 1981). Although a law passed in 1983 has made registration legally compulsory throughout Sierra Leone, in practice it still continues to function under two systems:

(a) Compulsory registration operating in the Western Area, which encompasses Freetown, and in a number of other mostly noncontiguous areas throughout the country covering less than half of the total population.
(b) Optional registration in the remaining areas.

As is the case in The Gambia, vital registration is only regarded as reasonably complete in one part of the country, the Western Area, where an estimated 90% of births and deaths were registered in 1980 (Sierra Leone 1981), although it is not at all clear how such an estimate was made. Throughout the remainder of Sierra Leone, coverage is placed at around 15%.

The precise procedures adopted for registering a birth or death appear to vary throughout the country. Away from the Western Area, the relatives of the newborn child or deceased person report to the nearest registration office and details of the event are entered directly into a register. In addition, since the passage of the new registration law in 1983, any health worker who is aware of a birth is legally required to notify the registrar. In the Western Area, the mechanisms that attempt to ensure complete death registration are similar to those adopted in the urban area of Banjul in The Gambia. Again, all burials must take place in cemeteries controlled by the

town council and for this a burial permit is required (see Appendix). Details of the death given by an informant, such as a relative, are recorded by the registrar in a register and a death certificate and burial permit are issued for a small fee. The headings used in the death register are indicated in Table 4.

In regard to the reporting of cause of death, two distinct procedures are followed in the Western Area. If a qualified medical doctor is able to attend the deceased and complete a medical certificate of death (Appendix), then the cause is attributed and noted in the register. In the absence of such a medical diagnosis, the registrar uses a questionnaire (Appendix) to interview the relative reporting the death, which attempts to obtain what is regarded as an uncertified cause. For the Western Area from 1972 to 1975, about 58% of infant deaths aged under one, and 43% of children aged 1-4 were certified (Wurie 1979).

The aggregation of vital statistics is undertaken manually by the Medical Statistics Unit of the Ministry of Health. Monthly returns are supposed to be provided by all medical units and registration offices, although in practice only the vital events reported in the Western Area appear to be returned on a routine basis for both age and cause-specific mortality. The aggregated data produced by the Unit is sent to the Central Statistical Office for further analysis and publication in the Annual Statistical Digest. The most recent figures available from vital registration are for the Western Area in 1983, giving an infant mortality rate of 130/1000 live births.

Since the early 1970s, various attempts have been made to improve the vital registration system in Sierra Leone, and a UNFPA-supported project has been in operation over the last 5 years (UNFPA 1984). The two principal aims of the project are to unify the vital registration laws and provide uniform and universal legislation for the country, and to secure effective implementation of the law through reorganization and training of the registration hierarchy. Other more specific changes proposed include the introduction of registrars at the chiefdom level and notifiers of vital events at the village level (Appendix), standardization of forms and registers, development of triplicate forms, reorganization of the system for receiving and processing returns, and alterations to the information recorded at the time of registration. With regard to the latter, it is interesting to note the suggestion to include questions on children ever born and children surviving to be posed during birth registrations. To date, the approach has been to concentrate on introducing some of the changes in two model areas, the Eastern Province and parts of the Western Area. A recent evaluation of the activities in these two areas reached disappointing conclusions, noting that vital registration still remained passive and attributing this to failure to motivate the population, poor transport and communications, and administrative difficulties (Kannisto et al. 1984). The evaluation team also observed many irregularities in the registration procedures including, for example, the omission of deaths occurring in medical units, and noted that the administrative and personnel structure of the registration system does not take advantage of the reporting networks evolving from the health services, including reporting by traditional birth attendants. This observation also applies to The Gambia.

HEALTH SERVICES INFORMATION

In many of the developing countries, the health services provide the principal source of continuous information on morbidity, especially for children under five and pregnant women. Although the structure of these services obviously varies from country to country, generally it is possible to recognize five major sources of data:

(a) Hospital (mostly inpatients) services;
(b) Maternity clinics;
(c) Clinic and other lower order health units, e.g., dispensaries and treatment centres (mostly for outpatients);
(d) Primary health care services; and
(e) The transmissible disease surveillance system.

Equally, there are two levels of information available from these sources, first, individual's records and, second, aggregated data. The potential uses of these data are enormous, both in terms of patient management and in the design, implementation, and evaluation of health policies and programs, as well as for epidemiological research. Actual uses, by comparison, are often very limited despite the considerable amount of time and money spent on improving the health information system at all levels.

One of the major considerations affecting the use of health services sources for mortality and morbidity research is the question of selectivity. This is all the more critical in view of the inequitable distribution of and access to health facilities, both governmental and nongovernmental, found in most developing countries. In trying to assess the relevance of the selection factors, it is important to note the distinction between the community-based reporting system derived, for example, from the outreach facilities of a primary health care program or through community disease surveillance and the information from fixed facilities, such as major referral hospitals. Obviously, the former sources are likely to provide a more representative picture overall, although the quality of the diagnostic information is likely to be poorer than from the latter sources. Moreover, without the full integration of data derived from these various sources, there are a number of problems related to the question of catchment populations for the calculation of rates, with the potential for both double reporting and losses caused by referrals.

Mali

Although the responsibility for the collection and interpretation of all the service and health statistics produced by the nation's hospitals, clinics, and other centres is concentrated within a single ministry, in practice, each of the directorates has an almost

independent system of reporting. A médecin-chef is often faced with demands for a monthly report by several directorates, each requiring a common set of background statistics (population, health personnel, equipment, etc.) together with information on the work of specific interest to the directorate. Thus, for instance, a quite comprehensive report required by the Directorate of Family Health overlaps considerably with the reports demanded by the Immunisation Service and the Service des Grandes Endemies. More coordination would lighten the reporting load for the health service employees at all levels as well as producing a series of statistics of greater analytic value.

An Annuaire Statistique is published at irregular intervals. The tables available in the 1983 edition, published in 1985, are as follows: deaths by cause, morbidity by cause, total persons seen, infrastructure by region, and health personnel.

The regions also publish statistical abstracts; for Mopti in 1975 (published 1981), deaths are shown by cause, sex, and broad age groups (0, 1-4, 5-14, and 15 and over). The total numbers of vaccinations by type are also reported.

None of these data is easy to interpret principally because statistics on the population at risk are lacking. Even assuming constant coverage rates and unchanging definitions of morbid states, the time series is too short to permit trend analysis of the numerators alone.

By far the most interesting series of statistics on child mortality is contained in the registers maintained in the country's maternity clinics. In the urban areas, covering perhaps a fifth of the total population, it appears that about two-thirds of the mothers give birth in a maternity clinic or a hospital (Hill et al. 1986). In most clinics, mothers are asked to give their age, parity, and the number of their children still alive, while the birth weight of the newborn, its sex, and mode of delivery are also recorded. Lefèvre (1986) has demonstrated how a simple analysis of the birth weights might be used to identify clinics where low birth weights are common. Abstracting the figures on children ever born and surviving for mothers of different ages would be an obvious way of obtaining an estimate of child mortality for the group of mothers giving births in maternity clinics. Some additional work involving a subsidiary inquiry among a sample of mothers giving births in the clinics would allow other systematic relationships to be examined (e.g., birth weights, birth intervals, and child survival), as Hill et al. (1986) have already demonstrated.

Unfortunately, all these analyses concern only the subpopulation of mothers who are in contact with the health services. For research on child mortality among the general population, a more representative sample of mothers is needed. Aguirre and Hill (1987a, b) have now shown that the proportions dead of previous last-born children among mothers seen up to 18 months after a birth can be adjusted to yield values close to the probability of dying between birth and exact age 2. Thus, during an immunization program, for example, when a high proportion of all mothers are encountered, reasonable estimates of early child mortality could be obtained by asking the questions on the survival of the next-to-last child.

Senegal

The general position in Senegal, apart from Cap Vert, is not unlike that in Mali except that the health services, both private and public, are much better developed and, as a result, a higher proportion of the population of greater Dakar is covered by these services. The existence of a flourishing private sector in Dakar complicates the task of collecting and analyzing the available data. Hospital reports for three of Senegal's 12 hospitals are not in fact submitted to the Ministry of Health.

In the statistical yearbooks for Senegal, the health sector is discussed in a few pages of text with figures interspersed. Some coverage figures are presented in the 1983 edition of "La situation économique du Sénégal" (published in 1985). There we read that 60% of the health personnel were in the Cap Vert region, and that 77% of births to women in urban areas occur in maternity clinics, compared with 15% for rural mothers. Only about a third of all pregnant mothers make a prenatal visit. More disturbing is the decline during the 1980s in the number of vaccinations performed, BCG excluded. The explanation is also included in the yearbook: the public health sector's share of the national budget declined from 9% of the total in 1970-71 to 5.8% in 1980-81. Of this budget in the 1977-81 plan period, 55% was allocated to hospitals (Garenne et al. 1985).

More detailed information is available in a report entitled "Statistique sanitaires et démographiques," which seems to appear biennially. These data concern the public and not the private sector. The privileged position of Cap Vert emerges very clearly: with 22% of the nation's population, the region consumes 40% of the health budget and contains 64% of the country's doctors (Sénégal 1985). Although much of the report consists of service statistics, there is some attempt to estimate EPI coverage rates, although the size of the target population is quite uncertain. Using the narrowest definition of the target population, we obtain the following coverage rates: BCG, 60%; measles, 56%; yellow fever, 57%; and DPT3, 51% (Sénégal 1984:107).

The edition of 1983 (Sénégal 1984) contains the results of a special survey conducted to supplement the statistics routinely reported. Health personnel at all levels were asked about the services they were involved in providing as well as more general issues concerning the "politics" of health care. The findings are not of specific interest here, but the idea of conducting a small survey among a sample of health units is an interesting one. When reporting from the periphery to the central ministry is poor, this may be an economic way to obtain some useful epidemiological information.

The Gambia

The government health services of The Gambia are organized in a pyramidal system, with two general hospitals at the apex functioning as major referral centres but also providing outpatient clinics. Below this level, and apart from certain specialist units, there is a network of health centres, dispensaries, subdispensaries, and health posts. The health centre is the main health institution in the rural areas, providing MCH/EPI services, curative outpatient care, and

environmental health education, and staffed by qualified medical personnel, mostly nurses. Dispensaries primarily run basic outpatient care facilities and are staffed by nurse-dispensers, whereas MCH/EPI services are provided by visiting mobile teams. At the base of the pyramid of fixed health facilities are the health posts staffed by village health workers. Next is the subdispensary, which may have a resident community health nurse, but, in her absence, they are lock-up units, visited regularly from the nearest health centre. The implementation of PHC in The Gambia, which was scheduled for national coverage in 1986, is based on the establishment of village health services in villages with more than 400 inhabitants, staffed by village health workers (VHWs) and traditional birth attendants (TBAs) who are supervised by community health nurses (CHNs) located in key PHC villages (Gambia 1985). In addition to the above governmental health services, there are a number of private facilities providing inpatient and outpatient care (see Gambia 1981:8).

A major component of the health information system is the Health Statistics and Epidemiology Unit, referred to earlier in the review, which receives data from health facilities. The unit was set up in 1979 with the objectives of providing for the collection and feedback of morbidity and mortality data, and maintaining disease surveillance and control nationally. The basis of the reporting system is monthly returns provided by all levels of the health service. In the two major inpatient facilities in the country, there are records departments staffed by clerks with specific responsibility for maintaining both patient records and aggregate returns. This contrasts with the management of data at all other units, which depends on personnel whose principal task is not seen as health reporting and who often regard such an activity as an undue added burden.

At the level of the PHC villages, reporting of health and mortality information is carried out by the CHNs, VHWs, and TBAs using tally forms, as shown in the Appendix. Similarly, at health centres, dispensaries, and hospital outpatient clinics, a tally sheet is used to report a range of 29 conditions, including reportable diseases, divided into cases aged under and over 5 years (see Appendix). At the end of each month, these various tally sheets are used to produce totals for forwarding to the central office in that region, and from here the information is passed to the Health Statistics and Epidemiology Unit in Banjul. The monthly return for the PHC villages is completed by the supervising CHN, with separate outpatient and reportable diseases returns being made by the other health facilities (Appendix).

In addition to the reporting system mentioned in the foregoing, two levels of information are available through the activities of the maternal and child welfare clinics. First, there are monthly returns (see Appendix) based on child welfare, antenatal care, and EPI services. The material for these returns is derived from registers kept at the health centre or dispensary, including a birth register. The second level of information refers to records held individually, specifically child welfare cards and antenatal cards. The situation in The Gambia is quite exceptional by African standards with regard to the high degree of contact between MCH/EPI services and the population of children under the age of 5 years and pregnant women. A review of the PHC system (Gambia 1985) revealed that almost all women are examined at least once during their pregnancy and issued with

antenatal cards. Equally, there is a high degree of contact with TBAs, who deliver well over three-quarters of all babies in The Gambia and who see a slightly smaller fraction of mothers at least three times antenatally. For the under 5 years of age population, in 1982, it was found that infant welfare card possession and retention was over 90%, and this can be tied in with the unusually high immunization coverage rates in The Gambia. In 1984, the national coverage rates for DPT3, Polio 3, measles, and BCG were 82, 87, 79, and 98%, respectively. Infant welfare and antenatal cards represent a rich source of information that is sadly underused both at the individual level and for building up an aggregate picture. Moreover, it should be possible to obtain from both cards the information on the survival of the preceding child. This could be of practical use in the identification of "at risk" children and mothers and for the calculation of mortality rates using the adaptation of the technique described earlier for Mali (Aguirre and Hill 1987a, b).

In seeking to use the health and mortality data available from the health services in The Gambia, the problems of selectivity in the recorded population are further complicated by the difficulty of establishing the catchment of each reporting unit. The latter is a difficulty arising partly out of the development of parallel health facilities that may overlap in terms of the population within access but that are not necessarily linked in any formal way with regard to reporting information. Thus, for example, there is potential for some conditions and events to be recorded both by a VHW or CHN, and through, say, a health centre. At the same time, there appear to be gaps in the reporting system as, for example, with the monthly returns submitted from health centres and dispensaries that do not provide the same information, especially with regard to deaths, as that given by the PHC workers. Moreover the latter information system does not operate in the area of Greater Banjul, although there are plans to introduce urban PHC. In The Gambia, the opportunity for vital registration to be facilitated through VHWs and TBAs, who are already recording some births and deaths, does seem to be wasted at present.

Sierra Leone

Health and medical services in Sierra Leone are mainly provided by the government, but with additional facilities available in some localities from missions, mining companies, and private organizations. As with the health structure in The Gambia, the services are arranged in a hierarchy, headed by hospitals at provincial and district levels and with the main referral centres found in Freetown. At the chiefdom level, there are three principal alternative levels of services: health centres, dispensaries, and treatment centres, with staff including nurses, dispensers, MCH aides or endemic disease control assistants (EDCAs). These services are unevenly distributed throughout the country, with 14 out of the 147 chiefdoms without any health facilities and an estimated 70% of the population without access to hospital services. Transport problems and seasonal inaccessibility contribute to these inequalities.

A PHC program began in Sierra Leone in 1978, operating through a number of pilot projects primarily in three districts of the country and expanded further in 1986. The PHC delivery system that has been adopted is similar to that described for The Gambia and is based on village health services provided by VHWs and TBAs serving populations

of around 500 and supervised by Community Health Officers and MCH aides located at fixed units at the chiefdom level.

Information gathered at the various levels of the health services is intended to be collected centrally by the Medical Statistics Unit of the Ministry of Health located in Freetown. In practice, it is estimated that at least a quarter of the health units do not submit returns and the reports that are received are often long overdue and clearly incomplete. The monthly returns expected from hospitals are extremely detailed and provide inpatient and outpatient statistics, coded to the International Classification of Diseases (eighth revision) without an age breakdown but including births and deaths. The completion of these forms (which are often in short supply) is the responsibility of the records department in the hospital where registers of admissions and discharges are also maintained. In terms of published statistics derived from hospital returns, those most readily accessible are for the units in Freetown and are usually presented as the number of cases by diagnosis without any age breakdown or attempt to calculate rates.

At the lower order health units, the monthly reporting system is based on forms completed by one of the senior health personnel, which are forwarded to Freetown (see Appendix). MCH/EPI services are provided at fixed centres and through mobile teams, with MCH aides collecting information on births from TBAs who deliver an estimated 70% of all births (Sierra Leone 1981). There is also a reporting network for immunizations delivered and for cases and deaths attributable to notifiable diseases (Appendix), which in theory passes information to the EPI Co-ordinating Office in Freetown. A recent UNICEF (1985) report indicated that this network had essentially collapsed, with complete immunization of only 5.3% of the total target population of those under 2 years of age.

In those parts of the country where PHC programs are under way, there are additional systems for reporting of health and mortality information. The most highly developed of these seems to be in the Bo Pujehun PHC project (Sierra Leone and Federal Republic of Germany 1985), where a central monitoring and evaluation unit has been set up to coordinate the data collection activities and to aggregate results. The system is based on individually held records and on registers and monthly summary sheets maintained by 29 peripheral health units (PHU), including health centres and treatment centres. Child welfare and antenatal records, similar to those used in The Gambia, are issued during the initial contact with the MCH/EPI clinic at the peripheral health unit. Duplicate records are kept of any further consultations, with one copy being issued to the mother for retention. Each month, summary sheets of the activities at the PHU are prepared (see Appendix). The births and deaths include those notified to the PHU through TBAs or VHWs in the villages falling within a 3-mile radius that is felt to reflect the catchment area. Although this monthly reporting system has been in operation since October 1983, the procedures for routinely aggregating the data to produce a district-level picture are not yet firmly established. Moreover, although the identification of catchment areas provides the potential for calculating certain morbidity and mortality rates, this is undermined by the presence of certain health services not integrated into the PHC reporting network, a problem that was noted earlier for The Gambia.

SURVEY DATA

Various methods based on sample surveys have been employed over the past 30 years to collect basic mortality data in countries lacking a continuous vital registration system. By comparison, the collection of morbidity information, often in combination with mortality data, by means of household surveys has a more recent history (Kroeger 1983; WHO 1985). The possibility of government statistical services mounting frequent surveys to collect a wide variety of data, including health information, has received particular support under the United Nations National Household Survey Capability Program (Carlson 1985). Moreover, the growing interest in establishing the health impact of particular programs and interventions has encouraged the use of surveys to provide both baseline and postintervention data. These new initiatives have raised many questions relating to design and measurement including, for example, the selection of sensitive and specific indicators of health, optimum sampling schedules and sizes, and appropriate morbidity recall periods. The sharing of experience from different countries and surveys can be expected to contribute to answering some of these questions, although the assessment of program impact is virtually impossible using data only from single-round, cross-sectional surveys (such as the USAID/Westinghouse Demographic and Health Surveys).

Mali

The set of surveys of the Niger river delta zone of central Mali conducted by the 1956-58 Mission Socio-économique du Soudan, remains the most comprehensive source of information on the demography and related subjects for this area of Mali (Mali 1963). In 1960-61, however, a demographic survey was conducted that is still the only source providing anything like a nationally representative picture of mortality and fertility in Mali (Mali 1965). Because neither mortality nor fertility appears to be changing very much (Hill et al. 1982; 1983), and the Census omitted several of the key questions for the measurement of child mortality, the 1960-61 survey results are still used as a basis for estimating current levels. The only other nationally representative survey with a demographic component is the multipurpose household survey conducted as part of the United Nations household survey capability program (PADEM in French). Unfortunately, these data are not yet available. The USAID/Westinghouse Demographic and Health Survey was a national survey with fieldwork in 1986-87. All the other demographic surveys have only covered a small part of the national population. The surveys in the Kaarta, the Delta, and the Gourma by the London School of Hygiene and Tropical Medicine have produced detailed demographic results for particular ethnic groups in

these regions, which provide a clue to overall levels of fertility in the centre and north of the country but almost nothing is known about conditions in the southern part of Mali. The Sahel Institute's multiround, follow-up survey of children born in maternity clinics in Bamako (detailed later) and the maternity clinic pilot study (Hill et al. 1986) provide some information on child mortality among a selected subset of the capital's population. The 1985 survey of Mopti-Sevaré by the Sahel Institute, the Direction Nationale de la Statistique, and the London School of Hygiene and Tropical Medicine, is the only one that provides any information on fertility and mortality in the medium-sized towns of Mali. Some characteristics of these studies are summarized in Table 5.

Table 5. Data sources for mortality estimation in Mali and Senegal.

Survey or census	Date of fieldwork	Size (N)	Coverage	Mortality of: Children	Mortality of: Adults
Mali					
Mission Socio-économique	1957-58	214.2	Niger flood zone	A,B	A
Enquête	vi.1960 iii.1961	104.6	National	A	A
Census	xii.1979	5967.2	National	A	A
Bambara survey	1981	10.1	Kaarta,Ségou	B,C	D
Delta Tamasheq	1982	6.1	Niger Delta	B,C	D
Seno Fulani	1983	6.2	Seno-Mango	B,C	D
Delta Fulani	1983	6.4	Niger	B,C	D
PADEM	1984-85		National	A	A
EMIS	iv.1982 iii.1983	13.4	Bamako	E	E
EMIS Enquête complémentaire	1984	50	Bamako	B,C	A
Enquête dans les maternités	1985	6.1	Bamako five clinics	B	-
Enquête ménage sur la santé	1985	15.1	Mopti and Sevaré towns	B,C	D

(continued)

Table 5. Concluded

Survey or census	Date of fieldwork	Size (N)	Coverage	Mortality of: Children	Mortality of: Adults
Senegal					
Vallée du Sénégal	iv-vi.1957	341	Senegal river basin	A,B	A,B
Siné-Saloum	x.1962 x.1966	50.468	Niakhar and Paos-Koto	B,C,E	E
Fakao	1965-66	2.205	One village	A,B,C,E	
Enquête démographique national	v.1970-xi.1970-xi.1971	167.734	National	-	-
Census	iv.1976		National	A	A
WFS	1978	193.032	National	B,C	-

Note: A, Household births and deaths; B, Children ever born/children surviving; C, Maternity histories; D, Orphanhood, widowhood; E, Multiround.

In addition to these larger surveys, there are a number of smaller studies conducted by aid agencies, NGOs, or government departments that contain some useful information on mortality and morbidity. The health surveys conducted as part of World Bank projects at Selingué or around Kayes or Kolikoro have a wide scope but their sample sizes and overall design are inadequate for detailed analysis (see École Nationale de Médecine et de Pharmacie 1981; Dougnon 1984; Nafo 1984, for example). A good deal of village-level detail on particular illnesses is contained in the dissertations produced at the Ecole de Médecine. Some of the surveys under way under the auspices of the Institut National pour la Recherche en Santé Publique are also large enough to have some interest. The difficulty with all these studies, apart from their size, is the huge variety of approaches adopted. To assemble and utilize the results from a collection of studies incorporating diverse survey approaches and different questionnaires is an almost impossible task. The staff at UNICEF in Bamako are trying to maintain a register of the surveys that are relevant to child mortality. Clearly, a necessary second step would be to assist in the development of a more standardized approach to child mortality measurement using survey questionnaires.

Senegal

Although it is frequently assumed that survey data for Senegal are plentiful, in fact there are only three nationally representative surveys for the study of child mortality; a fourth source is the 1986 USAID/Westinghouse DHS, but the results are not yet published. The

first, the retrospective survey of 1960-61, was similar to the series of demographic surveys conducted about that time in 14 francophone African countries. The second national demographic survey, a multiround study, took place in 1970-71 (Sénégal 1971). Finally, the Senegal World Fertility Survey with its well-known questionnaire design went into the field in 1978. Results from the national household survey program (PADEM) are as yet unavailable. This is a multiround survey that includes one more detailed round. These data have been analyzed carefully by Cantrelle et al. (1986) in a study that illustrates how information from different sources can be integrated to provide a reasonably complete overall picture. Although skillfully managed, the partial coverage of many of the survey sources makes interpretation of real trends difficult. As stressed later, complete coverage of a few well-studied sample areas may be of more value than a very sketchy coverage of the whole national population.

The Gambia

The Gambia, more so than most other West African countries, has undertaken several reviews of the performance and effectiveness of its health services, for example, evaluations of the EPI program (see Hill et al. 1983; Robertson et al. 1985). There are two recent surveys, conducted by The Gambian government, covering a nationally representative sample of the population that will be mentioned here. Although neither of these were designed as studies solely of morbidity or mortality, they do provide some relevant insights. This introduces a general and important point, namely that questions related to health are often incorporated in surveys covering a much wider range of topics and objectives. The first study was undertaken as part of The Gambian government's PHC review (Gambia 1985) and covered 588 randomly selected households. The survey was conducted in one round, between September and October 1984, the rainy season, and involved interviews with mothers on the health of index children - defined as under 5-year-olds. The data from this survey have recently been subject to further detailed analysis in collaboration with the London School of Hygiene and Tropical Medicine. The second study is referred to as the Mass Media for Infant Health Project, involving a number of component projects conducted between 1981 and 1984. This included a survey of 800 randomly selected mothers and their children in 20 villages.

Sierra Leone

In Sierra Leone, there have been six studies conducted in the 1970s and 1980s, which can be used here to illustrate some of the design and measurement issues arising from the use of sample surveys to gather health and mortality information. Considering first the question of sample design and size, it is apparent that the absence of a readily available sampling frame, together with logistical problems, such as communications, have encouraged the use of either a multistage cluster sampling scheme, as in the National Nutrition Survey of 1978 and the Bo-Pujehun 1983 baseline survey, or a mixed random and purposive design, as in the Ministry of Health and WHO (Sierra Leone and WHO 1980) 1973-75 study. The size of sample is obviously also influenced by logistical factors as well as costs and by the overall objectives and design of the project. Thus, for example, a retrospective survey of early age mortality usually requires a smaller

sample size than a prospective study to attain the same level of sampling error. Moreover, if mortality is to be studied through the collection of birth histories, as in the Kandeh and Dow (1985) surveys of 1980, the sample size calculations may be based on number of births rather than women. In the case of baseline health surveys, the sample size is usually set by the desire to detect a predicted degree of change in an outcome measure, which is one of the targets of a health program. For instance, in the Bo-Pujehun PHC project, the target was a 30% reduction in infant mortality, and the size of the baseline health survey was set accordingly using the standard formula for independent proportions, with allowance for the loss of efficiency because of the use of cluster sampling.

The majority of the surveys in Sierra Leone have tended to be singleround and have, therefore, used an indirect retrospective methodology for mortality estimation (see, for instance, Thomas 1987). Kandeh and Dow (1985), for example, used a retrospective design and calculated mortality rates based both on questions on children ever born and children surviving and on birth histories, noting an overall difference of 10% in the proportions of dead children between the two approaches. The overall lower costs of a singleround compared with a multiround survey may permit more intense measurements to be made of a subsample of the surveyed population as was the case in the National Nutrition Survey (NNS) (Sierra Leone and USAID 1978). The relative advantages and disadvantages of retrospective, singleround as opposed to prospective, multiround surveys have been discussed in two papers in a recent volume (Arretx 1984; Tabutin 1984). The Ministry of Health and WHO (Sierra Leone and WHO 1980) 1973-75 study in fact combined several different approaches to obtaining information on infant and child mortality and morbidity, including both retrospective and prospective methods. The retrospective data about survival of births over the preceding 5 years were obtained from 5052 women. An estimate of infant mortality of 148/1000 was obtained. This compares with a figure of 154 for the period of 1974-75 from the complete follow-up of 748 mothers. Of 1345 pregnancies reported during the 2-year period of the prospective study, only 748 were followed for a full 12 months. Although an overall population of 11,836 was covered, only 129 infant and child deaths were detected, which limits the study of cause-specific mortality (Ntitebirageza 1984).

The selection of a singleround as opposed to multiround survey design has a number of important implications for the timing of the fieldwork, especially where there are marked seasonal variations in the pattern and levels of mortality and morbidity. Thus, for example, the National Malariometric Surveys (WHO 1982) conducted between 1976 and 1979 took place in the months toward the end of the dry season, January to March, concluding that, nationally, in the region of 40% of deaths in the under 5 years of age population can be attributed to malaria. The NNS (Sierra Leone and USAID 1978) was carried out at a similar time of year throughout the country except in Freetown and is quick to point out the problems of a cross-sectional study because parasite loads often change rapidly in areas where malaria is endemic. This study also notes that the likely impact of the timing of the survey on the estimates of the proportion of children 3-59 months who were acutely undernourished (3%) and on the prevalence of intestinal parasites. The importance of season in the timing of a survey is often also related to logistical factors, such as ease of

interviewing at particular times related to the agricultural calendar, especially where transportation is a problem.

Thus, Theis (1985) notes that, although malnutrition and nutritionally related diseases are expected to be most severe during the rainy season in Sierra Leone, and especially from May to August, there are no detailed data to confirm this owing to the extreme difficulty of conducting surveys in the rural areas at this time of the year. Timing may, by comparison, be less of a constraining factor in urban-based, cross-sectional studies. Even in multiround surveys, which have tended to be used precisely to overcome and investigate seasonal variations, there are critical questions related to the frequency and periodicity of the different rounds with implications for the data collection instrument. The Ministry of Health and WHO study (Sierra Leone and WHO 1980), for instance, primarily involved eight rounds of household surveys in which conditions and events occurring in the sampled households were recorded at intervals of 3 months, together with more detailed investigations of deaths and follow-up of pregnant women and children under 5 during the period between rounds.

The principal means of obtaining data during the health and mortality surveys in Sierra Leone has been a questionnaire schedule, although in the NNS, Malariometric, and Ministry of Health and WHO studies this was backed up by clinical investigations, such as analysis of blood and stool samples, or by reference to individually held records, including vaccination cards. The design of appropriate health-interview schedules has been the subject of several recent publications (including Kroeger 1983; Ross and Vaughan 1984; WHO 1985), focusing attention on the relative advantages and disadvantages of the use of open and closed questions, the use of flowcharts or algorithms to aid diagnosis (Essex 1980) and optimum morbidity recall periods. In the Kandeh and Dow (1985) surveys of 1980, open questions were used and mothers interviewed were requested to report the causes for the deaths of any of their children, whereas morbidity occurring during the 12 months preceding the interview was solicited from all household members. Experience seems to suggest that a morbidity recall period of 14 days is best, as used in the Ministry of Health and WHO study, although for estimates of diarrheal prevalence, a 24-hour call is sometimes used. Naturally, the design and content of the questionnaire schedule and, ultimately, the quality of the data obtained, will be partly governed by the skills and level of training of the interviewers. Surveys conducted under the overall auspices of the Ministry of Health tend to command the services of qualified health personnel for interviewing, compared with those studies falling under, say, the Central Statistics Office.

The quality of diagnostic data provided by the interviewers may be considerably improved where training is focused on the identification of a small number of priority diseases. In the Bo-Pujehan baseline health survey (1983), for example, the 10 priority health problems that the PHC program is attempting to address formed the essential core of the questionnaire schedule. Related to this issue is the question of the distinctions between symptoms and diagnoses. Naturally, the ascertainment of symptoms is of most direct use in the context of health services where treatment may be offered. Unless the symptom can be translated into a more precise diagnosis, for example, "fever" being equated with "malaria," this sort of information is of

limited value when collected during surveys, especially for mortality research. Thus, for example, in the Kandeh and Dow (1985) surveys, symptoms such as "stomach ache" or "pain/headache" as causes of infant and child deaths are difficult to interpret when found among clinical diagnoses such as "tetanus" or "measles." Further research is needed on improving diagnoses made in the interview situation, perhaps by reference to individually held records, the use of flowcharts, or locally relevant knowledge on the presentation of symptoms and final diagnosis.

SMALL-SCALE LONGITUDINAL STUDIES

The final source of information on health and mortality to be discussed in this review might be described as the "population laboratories approach" (D'Souza 1984) in which a comparatively small geographical area is systematically covered by periodic surveys and censuses and by continuous registration of vital events over a protracted period of time. Perhaps one of the best known examples of this is the Demographic Surveillance System run by the International Centre for Diarrhoeal Diseases Research in the Matlab Thana of Bangladesh (Chowdhury et al. 1981). However, under the heading of longitudinal studies used here, it is important to also include examples on a somewhat smaller, less ambitious, and costly scale, but that include an intensity of observation that provides an extremely fertile source of data for understanding mortality and health processes. Of the four West African countries, only Senegal and The Gambia have continuous projects of this nature, but some additional small-scale, intensive studies in Mali are also worth mentioning briefly.

Mali

Unfortunately, the two fairly large multiround studies conducted in Mali in recent years, namely the follow-up of children born in the Bamako maternity clinics and the multipurpose household survey, have not been linked with any parallel collection of clinical measures on mortality and morbidity. Neither of the two studies would serve as suitable baselines for the creation of a population laboratory. There is some interest in the detailed study of the health of the pastoral groups and the Gourma that the researchers at the Institut National pour la Recherche en Santé Publique would undertake. Although they are undoubtedly the best-placed group in the country to begin such a study, especially as they already have a small clinic in the Gourma, the mobility of the population in that area will be a serious problem if serial measures on individuals is a requirement of the research.

Some data on morbidity and nutrition factors, related to clinical mortality, collected on a prospective basis from three ethnic groups in central Mali are published in Hill (1985). Although the groups were followed for up to 2 years, the principal aims of the project were not primarily demographic.

Senegal

The follow-up surveys in Sinê-Saloum are particularly well known because of the high mortality among children aged 1-4 identified in the two study zones, Niakhar and Paos-Koto. Starting from the initial census in January 1963, the inquiry continued with three follow-up visits during 1963, an end of year census, and two subsequent censuses in January 1965 and 1966 (Cantrelle 1969). The study at this time covered 34,300 people in Niakhar and 11,900 in Paos Koto. After 1967, the scale of the study was reduced to two smaller zones centred on the villages of Ngayopheme (Sinê) and Ndemene (Saloum) (Garenne 1981). Thus, every year from December 1962 enumerators have visited these two zones.

More recently, Garenne has broadened the scope of the inquiry with additional forms for collecting infant and child deaths, the morbidity of adults and children, as well as statistics on pregnancies and on deaths during the 1st month of life. It was these early child deaths, together with miscarriages, which were being omitted in the earlier research based on 1 visit/year. The whole record system has been computerized since 1983. The completed forms are still held in bound volumes in the ORSTOM office in Dakar, one of the few examples of good record keeping in the region. Further plans for the development of this surveillance system include the introduction of some specific health interventions with an attempt to assess their impact on child mortality and morbidity. The existence of good baseline information means that complex relationships can be examined over a reasonably long period of time.

A rather similar "population laboratory" approach has been adopted by Pison working in eastern Senegal. Beginning again with an initial census in 1975 of some 3500 Peul-Bandê near Kêdougou, Pison has revisited the area every year to update the register and to record the vital events in the intervening period. The stress has been on the processes of demographic changes with special stress on polygamy rather than on child mortality. Nonetheless, the study has produced some important data on levels and trends in mortality, particularly regarding the effects of measles epidemics on age patterns of death (Pison 1982; Pison and Langaney 1985).

An older and original approach to the study of child mortality in Senegal was that of Lacombe (1970) who used parish registers to estimate the vital rates in a small coastal area where a Catholic mission had been active. It seems unlikely that this approach could be widely applied because the essential registers are rarely maintained in good enough order for analysis.

A fuller list of the host of smaller studies in restricted areas of Senegal is available in Ouaidou (1984) but the main conclusions from this intensive work may be summarized here. First, it is clear that the results from smaller studies are difficult to compare or aggregate because of differences in definitions, methodology, and analytical approach. To make some progress in demographic research, it would seem more productive to pool the resources for research in one site. Second, whether the analysis concerns one or more small studies, the ultimate aim is to produce an overall framework or "map"

of child mortality. The only way this can be provided is through alternative and complementary large-scale, information-gathering mechanisms, such as the census or national demographic surveys.

The Gambia

In The Gambia, the British Medical Research Council (MRC) have been involved in biomedical research for more than three decades. Until recently, activities were primarily concentrated at two sites, Fajara and Keneba, but they have now expanded to include two new field stations at Basse and Farafenni. Although the emphasis in much of the earlier work of the MRC was on clinical- and laboratory-based studies, the research at Keneba has yielded some valuable health and mortality data and a stronger demographic and epidemiological input is now being made at Farafenni. Cooperation and collaboration with the Ministry of Health and with government health services are clearly critical to the MRC's current program of activities (Gambia 1985).

The work at Keneba since the early 1950s has been described in numerous publications (McGregor 1964; Rowland 1980; Billewicz and McGregor 1981, 1982) but will be referred to briefly as it helps to illustrate some of the advantages and disadvantages of a population-laboratory approach to health and mortality research. Central to the continuous collection of high-quality data was the presence in the village of at least one qualified medical practitioner, indicating the need for considerable inputs of time and money, which are clearly not reproducible on a country-wide scale. This very presence will have had an impact, or a "Hawthorne effect," on health in the village and, thus, the findings cannot easily be extrapolated to obtain a national picture. On the other hand, any attempts to avoid "interference" or "impact" clearly raise important ethical questions. The idea of being able to select one site to produce anything other than a local image is obviously unrealistic, although, in a country the size of The Gambia, this may not represent the most important disadvantage of such an approach.

The size of the study population is worth noting. In Keneba, the residential population numbered 710 in 1951, compared with 927 in 1975 (McGregor et al. 1979). The investigation of age- and sex-specific mortality is somewhat restricted with such a base population. Thus, over a 25-year period, there were only 245 infant deaths and 269 deaths aged 1-4 years, with respective death rates for 1971-75 of 175 and 109/1000. However, it can be argued that the quality of the diagnoses for both morbid conditions and mortality offsets some of the drawbacks of small numbers.

Although there are many other past and present projects in The Gambia supported by the MRC that could be described here, it is the research in Farafenni that, in addition to the Keneba study, could best be described as a "population laboratory" approach. The work at the Farafenni field station started principally in 1981. It is based on a study area made up of 41 villages or hamlets between 10 and 30 km from Farafenni, the lower limit being set in an attempt to remove the direct influence of the clinic health services provided both by the MRC and by the government. In a census of the area conducted in February 1981, a population of 12,313 was recorded. Since then, a number of different projects have been carried out, many of them being

used to provide baseline information before the introduction of PHC in August 1983 to those villages with populations of more than 400 and to provide an indication of the impact of PHC. Data have been gathered in a series of prospective surveys of selected subgroups of the population and, in particular, under 7 year olds and pregnant women. For example, between April 1982 and March 1983, a follow-up study was carried out on a one in five random sample of the under 7 population using a morbidity questionnaire administered every month. Over the same period, all deaths of children under 7 years within the study area were investigated to ascertain causes. The morbidity and mortality surveys have recently been repeated for the period April 1984 to March 1985. Other studies, completed or in progress, have looked at seasonal variations in malaria and the impact of chemoprophylaxis and the use of bed nets on incidence and prevalence. The regular rounds of surveys carried out in conjunction with these particular studies also provide the opportunity to continuously update the information collected during the initial 1981 census with regard to births, deaths, and pregnancies.

The approach to data collection in the Farafenni studies has tended to involve complementing information from direct interviewing with clinical measurements and existing records. This not only improves the reliability of data but also provides a means of comparing different sources of data. Thus, for example, the mortality survey involved personal interviews with the mother of the deceased child conducted by a qualified doctor, the use of information from the child's welfare card and other medical records where available, and the verification of the doctor's diagnosis by three independent assessors. Moreover, the insights gained from these community-based studies on the degree of contact with the government health services, for example, through the possession of antenatal and "Road to Health" cards, may be used to assess the influence of selectivity on the health services data described earlier in the review. The results of the studies conducted at Farafenni are currently being written up for publication.

CONCLUSIONS AND RECOMMENDATIONS

This review of the sources of health and mortality information in four West African countries has indicated a wide diversity of statistics, coupled with serious inadequacies in terms of their reliability, periodicity, and representativeness. This diversity is also characteristic of the "statistically developed" countries. Indeed, it would be misguided to discourage any developing nation from trying to maintain a range of data-collection activities. It is, however, important to question whether the full panoply of records maintained in the developed countries is necessary and appropriate in other, poorer parts of the world. A related point worth emphasizing here is the common problem of locating forms, written records, archives, and descriptions of past experience with census-taking and other data-collection activities. Every country needs to be able to refer readily to these experiences to benefit from them; it seems to us that a simple, centralized documentation service would be comparatively cheap to run but enormously valuable in promoting the sharing of skills.

One of the aims of this review has been to try to demonstrate that a more complete picture of health and mortality in West Africa can be built up by bringing together albeit inadequate but diverse sources of information than if these sources were used independently. This is also, in fact, the underlying motive for linking health-related information at the level of the individual. The comparatively few large-scale medical record linkage schemes, all in developed countries, have amply illustrated both the value of building up personal medical histories from individual episodes - for the patient and for epidemiological research - and the complexity of the linkage process (Baldwin et al. 1986). Although it is not easy to foresee, or appropriate to suggest, the application of such schemes in developing countries, the idea of using a more systematic approach to drawing together health and mortality information from different sources does deserve serious consideration. Obviously, such an approach still requires an appreciation of the inadequacies of each source, and these are summarized for the four West African countries in the following.

Censuses

In all four countries, there is no detectable change in the governments' commitment to undertake regular housing and population censuses or in the assessment of the importance of census results. However, it is disappointing that more originality of approach has not been adopted using, for example, a combination of a simple enumeration followed by more detailed inquiries on a sample basis. The absence of

the retrospective questions on children ever born and children surviving in the francophone countries is a grave oversight. Moreover, the long delays between the fieldwork and the publication of results undermines the value of some of the figures. The lack of standardization of methods and definitions in the West African censuses makes comparison difficult. Perhaps the most disturbing aspect of census taking in the region, however, is that many countries cannot afford to carry out regular censuses and the levels of financial support from bodies such as UNFPA appear to be less generous than in the 1960s and 1970s.

Vital Registration

The vital registration data in the four West African countries are far from satisfactory. Even in the more developed urbanized parts, the coverage is poor and in some areas is becoming worse. The vital registration system, closely interwoven with the civil status administration in French-speaking countries, is the source of mortality data in which major reforms are most needed. In general, some reassessment must be made of the value of maintaining two overlapping systems, both concerned with the same vital events but for different reasons. This point is discussed further in the following. In addition to the problems of incompleteness and inaccuracy of the population registers, there are important gaps in the flow of information from the local to the provincial or national level. Moreover, the lack of tight controls and standard practices for death registration, and especially for the ascertainment of cause of death, makes interpretation of differentials and trends very difficult.

Health Service Information

A huge variety of sources of information are grouped under this heading, ranging from individual record cards held by hospitals, clinics, doctors, or the individuals themselves, to monthly reports by the different branches of health services. One of the most striking features is the amount of time and effort being expended in the completion of records and reports at all levels. It appears that only a small fraction of the information recorded is ever systematically reexamined or forwarded to a central statistics unit for analysis. Inevitably, a major difficulty with such data is assessing the effect of selection and the difficulty of estimating with any confidence the catchment population. Nevertheless, the health services represent an area that would benefit from the introduction of some improved, simplified, and more standardized reporting procedures. For example, in lieu of reporting symptoms at the time of death it may be possible to devise simple grouped categories of underlying causes. Similarly, more comprehensive disease surveillance could perhaps be carried out through the EPI system, identifying noninfectious diseases as well as those formally "reportable." Recent work in maternity clinics in Bamako, Mali, has shown how small changes in the record completed at the time of a birth can produce a good deal of valuable information on risk factors related to child survival. Some small experiments might also be undertaken to demonstrate how information from individually held records may be aggregated to produce a community-level picture of morbidity. Small field trials are needed to evaluate the potential of

portable microcomputers for field-data entry, improving data quality and reducing the delays between collection and the availability of results.

Survey Data

The importance of large demographic surveys as one of the only reliable sources on child mortality and morbidity in West Africa is well established. The WFS series of surveys demonstrated the value of the singleround survey in the collection of both maternity histories and household information. These surveys are becoming increasingly expensive luxuries affordable only when external sources are available as, for example, with the USAID/Westinghouse round of demographic and health surveys.

Many other essentially nondemographic surveys collect data on child mortality and several have produced valuable results on factors such as nutritional status and health care affecting mortality. Generally, the sample size used is too small for the measurement of mortality, even when the retrospective questions are employed. This is frequently the problem in multiround panel surveys when the number of individuals who can be successfully followed is limited by practical difficulties. An additional problem with survey data is that the sample drawn is rarely able to provide a representative picture of subsets of the population. Many government departments initiate surveys of different kinds and there is frequently little coordination both between these surveys and with the central statistical organization. Lack of standardization of terms and questions means that the results from the many small surveys cannot be aggregated to give a more comprehensive and representative view of child mortality and its correlates.

Small-Scale Longitudinal Studies

The longitudinal studies in The Gambia and Senegal, some of which began 20 or more years ago, have contributed enormously both to basic medical research and to our understanding about the health care of communities in tropical Africa. They are, however, expensive undertakings with long-time scales and clearly cannot be replicated in many sites. Probably their most valuable results come from situations that are essentially experimental, for example, when a new intervention is being tested. If national health monitoring systems were improved, it might be possible to obtain useful results without the huge overhead costs of these types of surveillance studies. One or two additional sites outside the Sene-Gambian zone would, however, be useful for the intensive study of child mortality in a different physical environment (e.g., the Sahel, equatorial Africa).

The five sources of health and mortality information considered in this review are clearly complementary. No single source is totally adequate and they all have their advantages and disadvantages. This strengthens the argument for integrating them with regard both to data collection and to analysis and interpretation. Advocating integration is certainly not a new idea and is clearly expressed in the current emphasis on the development of health information "systems" (Fernandez Perez de Talens et al. 1982). More specific recommendations can be

made if it is assumed that, within each country, there is a commitment to meet most of the preconditions mentioned in the introduction to this review that are necessary for the maintenance of an effective system. Thus, for example, a strong demand together with the obvious use of the health information are both crucial. Clearly, the precise nature of the demand and the uses varies from country to country. This does not, however, remove a need felt by all four countries and one that would greatly benefit from closer links and shared experience within the West African region, namely, the development of a basic minimal data set (Murnaghan 1978; Graham 1986).

The need to identify a small (i.e., 10-12) selection of variables or health indicators for collection and use by developing countries has received considerable support in recent years. This has been stimulated in part by the efforts to monitor progress toward the goal of "Health for All by the Year 2000" (WHO 1981). The World Health Organization, as the major proponent of this goal, has actively promoted the development and use of indicators for evaluating the operational performance and the individual health effectiveness and joint impact of health programs on specific diseases and overall health status (WHO 1986a, b). Indicators may also be useful in planning, setting priorities, and managing health programs and, therefore, the emphasis has been placed on identifying those that can serve multiple purposes. This requirement is tempered by the basic statistical qualities desired of an indicator that include validity, sensitivity, and reliability. To these must be added the need for the indicator to be simple, practical, and low cost with regard to both collection and use.

The selection of a basic data set obviously depends on many factors, including the country's health priorities, and demands a critical review of the sources and materials already available. This country variability in terms of needs and capabilities highlights the difficulty of envisaging the development of a universally applicable and relevant set of health status indicators, using common operational definitions and procedures (Graham 1986). It stresses the importance of countries identifying and adapting indicators to meet their own requirements, both at the national and at the subnational levels. In the context of the four West African countries reviewed in this report, the recommendation to focus on selected items of information stems from two particular findings. First, there is clearly a need for less rather than more data to be collected in the future. There needs to be a shift from the uncoordinated gathering of a huge variety of information of poor or, at best, unknown quality, to the rational collection of a few priority items of a usable quality. Second, and following on from earlier, it is apparent that there has been an overemphasis on data collection at the expense of the ability to analyze and to use the information. Although there is clearly ample scope for improving the methods for gathering a basic minimal data set, this is pointless unless more effort and money is devoted to developing appropriate guidelines for, say, aggregation and tabulation, displaying results and feeding the information back to the level in the system at which it may be acted upon, be this the village health worker or the Minister of Health.

The long-term development of an information system on health and mortality, in the light of the experience of the four countries, appears to lie in a reordering of the priority given to the existing

sources. It is recommended here that the collection and use of this information is based primarily on the health services, including primary health care and therefore, providing both service- and community-based data. It should be clear from earlier in the discussion that this suggestion does not necessarily imply burdening health workers with yet more responsibilities, because they are already spending considerable time and effort gathering information. In the case of Sierra Leone and The Gambia, for instance, village health workers and traditional birth attendants are recording births and deaths in addition to collecting morbidity data. It is at this level in the system that rationalization of the information gathered is especially relevant. However, perhaps one of the most important reasons for recommending greater emphasis on the health services is that this source is able to meet the two basic levels of demand for information, namely, for individual patient management and for aggregated statistics for planning, monitoring, and evaluation. This dual purpose not only makes a shift in emphasis cost effective, but also because information from the health services has the potential to feed back into the system and demonstrate its worth, the quality and quantity of reporting is likely to improve.

Clearly, the recommendation that the health services provide the key source of mortality and morbidity data does not obviate the need for other complementary sources. It does, however, strengthen the argument for a major change in ministerial responsibilities, with the Ministry of Health taking on the principal role in developing and coordinating the collection and analysis of health and mortality data. Moreover, as long as "Health for All" remains an unfulfilled goal, there will still be a need to supplement information from the health services. Thus, the census will continue to be an important source for building up a national picture of mortality and for studying broad trends and regional differentials as well as providing population denominators for the calculation of rates. Equally, periodic surveys are still needed for identifying the selection factors and biases introduced by using service-based statistics and for establishing catchment populations. Moreover, surveys will remain particularly important in those regions where fixed health facilities or primary health care are still lacking. Small-scale longitudinal studies will continue to provide a valuable source of reliable information on morbidity and on the principal causes of death. These studies can provide important checks on, for instance, the quality of diagnostic information being collected by health services, on a community's understanding and knowledge of various conditions, and on the identification of underlying causes from stated symptoms. In regard to vital registration, the recommendation to concentrate more on the health services for mortality statistics does have wide-reaching implications. Although it is not proposed that the former system is abandoned, the review does suggest the need for serious rethinking on the overall purposes of vital registration, given the potential for birth and death notification by means of health workers. Clearly, these sorts of recommendations refer to the long-term development of a health information system and are not intended to be implemented by sudden, radical changes. It is hoped, however, that they will contribute to the ultimate aim - reliable and usable health and mortality data.

REFERENCES

Aguirre, A., Hill, A.G. 1987a. Child mortality estimated by the preceding birth technique: further developments. United Nations Children's Fund (UNICEF), Nairobi, Kenya. Social Statistics Bulletin.

——— 1987b. Childhood mortality estimates using the preceding birth technique: some applications and extensions. CPS, London School of Hygiene and Tropical Medicine, London, U.K. CPS Research Paper, 87-2.

Akoto, E.M. 1985. Mortalité infantile et juvénile en Afrique. CIACO, Louvain-la-Neuve, Belgium.

Arretx, C. 1984. Comparison between prospective and retrospective demographic surveys to estimate levels and differentials of mortality: the experience of CELADE. In Vallin, J., Pollard, J.H., Heligman, L., ed. Methodologies for the collection and analysis of mortality data. International Union for the Scientific Study of Population, Ordina.

Baldwin, J.A., Acheson, E.D., Graham, W.J., ed. 1986. Textbook of medical record linkage. Oxford University Press, Oxford, U.K.

Billewicz, W.Z. and McGregor, I.A. 1981. Demography of two West African (Gambian) villages, 1951-75. Journal of Biosocial Science, 13, 251.

——— 1982. A birth to maturity study of heights and weights in two West African (Gambian) villages, 1951-75. Annals of Human Biology, 9(4), 309-320.

Blacker, J.C.G., Dow, T.E., Makanah, T.J. 1980. A note on fertility and mortality in Sierra Leone. Jimilar Mutare.

Caldwell, J.C., Thompson, B. 1975. Gambia (chapter 24). In Caldwell, J., ed., Population growth and socio-economic change in West Africa. The Population Council and Columbia University Press, New York, NY, USA.

Cantrelle, P. 1969. Étude démographique dans la région du Siné-Saloum, Sénégal. Office of Overseas Scientific and Technical Research (ORSTOM), Paris, France. Travaux et documents de l'ORSTOM, 1.

Cantrelle, P., Diop, I.L., Garenne, M., Gueye, M., Sadir, A. 1986. The profile of mortality and its determinants in Senegal 1960-80 (chapter 4). In Determinants of mortality change and differentials in developing countries. UN, New York, NY, USA. Population Studies 94 (ST/ESA/Ser.A/94).

Carlson, B. 1985. The potential of national household survey programmes for monitoring and evaluating primary health care. World Health Statistics Quarterly, 38(1), 38-64.

Chambers, R., Longhurst, R., Pacey, A. 1981. Seasonal dimensions to rural poverty. Frances Pinter, London, U.K.

Chen, L.C. 1986. Primary health care in developing countries: overcoming operational, technical and social barriers. Lancet, 29 November, 1260-1265.

Chowdhury, K.M.A., Aziz, K.M.A., Sheikh, K. 1981. Demographic studies in Bangladesh May 1969-April 1979. International Centre for Diarrhoeal Disease Research - Bangladesh, Dhaka, Bangladesh. ICDDR-B Working Paper.

Cox, P. 1984. Epidemiology and research at low cost. British Medical Journal, 288, 1814.

Diesfeld, H.J. 1979. Definition of hospital catchment area population as denominator for morbidity indicators derived from hospital data in developing countries. In Holland, W., et al., ed., Measurement of levels of health. Oxford University Press, Oxford, U.K.

Dougnon, D. 1984. La situation de l'enfant au Mali. United Nations Childrens Fund (UNICEF), Bamako, Mali.

D'Souza, S. 1984. Population laboratories for studying disease processes and mortality: the demographic surveillance system, Matlab. In Vallin, J., Pollard, J.H., Heligman, L., ed., Methodologies for the collection and analysis of mortality data. International Union for the Scientific Study of Population (IUSSP), Ordina.

École Nationale de Médecine et de Pharmacie. 1981. Evaluation sanitaire des cercles de Keneba, Bafoulaba et Kita (Kayes). International Development Agency/World Bank, Bamako, Mali.

Essex, B. 1980. Diagnostic pathways in clinical medicine (2nd ed.). Churchill Livingstone, Edinburgh, U.K.

Fernandez Perez de Talens, A., et al., ed. 1982. Health informatics in developing countries. North Holland Publishing, Amsterdam, The Netherlands.

Gambia, Medical and Health Department. 1981. Annual report. Banjul, The Gambia.

Gambia, Ministry of Health, Labour and Social Welfare (MHL&SW). 1985. Primary health care review. Banjul, The Gambia.

Garenne, M. 1981. The age pattern of infant and child mortality in Ngayokheme (rural West Africa). Population Studies Center, University of Pennsylvania, Philadelphia, PA, USA. Working Paper 9.

——— 1982. Variations in the age pattern of mortality in infancy and childhood with special reference to a case study in rural Senegal. University of Pennsylvania, Philadelphia, PA, USA. PhD thesis.

Garenne, M., Cantrelle, P., Diop, I. 1985. Le Sénégal. In Vallin, J., Lopez, A., ed., La lutte contre la mort. Institut national d'études démographiques (INED), Paris, France. Cahiers de l'INED 108.

Garenne, M., Vimard, P. 1984. Un cadre pour l'analyse des facteurs de la mortalité des enfants. Office of Overseas Scientific and Technical Research (ORSTOM), Paris, France. Cahier de l'ORSTOM (Série Sciences Humaines), 20(2), 305-310.

Girard, R. 1953. La situation sanitaire et démographique dans l'Union française. Paper presented at the Congrès mondial des Médecins pour l'étude des conditions actuelles de la vie, Vienna, Austria.

Graham, W.J. 1986. Health status indicators in developing countries: a selective review. Report prepared for the Commonwealth Secretariat, London, U.K.

Gueye, M., Sarr, I. 1985. La mortalité infanto-juvénile. In Nuptialité et fécondité au Sénégal. Presses Universitaires de France, Paris, France. Travaux et documents de l'Institut national d'études démographiques, Cahier 112.

Hailey, Lord. 1957. An African survey: revised 1956. Oxford University Press, Oxford, U.K.

Hill, A.G., ed. 1985. Population, health and nutrition in the Sahel. Kegan Paul International, London, U.K.

Hill, A.G., Macrae, S. 1985. Measuring childhood mortality levels: a new approach. United Nations Children's Fund (UNICEF), Nairobi, Kenya. Social and Economic Statistics Bulletin.

Hill, A.G., Randall, S.C., Sullivan, O. 1982. The mortality and fertility of farmers and pastoralists in Central Mali 1950-1981. CPS, London School of Hygiene and Tropical Medicine, London, U.K. CPS Research Paper 82-4.

Hill, A.G., Randall, S.C., van den Eerenbeemt, M.-L. 1983. Infant and child mortality in rural Mali. CPS, London School of Hygiene and Tropical Medicine, London, U.K. CPS Research Paper 83-5.

Hill, A.G., Traoré, S., Cluzeau, F., Thiam, A. 1986. L'enquête pilote sur la mortalité aux jeunes âges dans cinq maternités de Bamako. In Estimation de la mortalité du jeune enfant pour guider les actions de santé dans les pays en développement. Centre international de l'enfance/Institut national de la santé et de la recherche médicale (INSERM)/Office of Overseas Scientific and Technical Research/Institut national d'études démographiques, Paris, France. INSERM, 145, 107-129.

Hull, H.F., Williams, P.J., Oldfield, F. 1983. Measles mortality and vaccine efficacy in rural West Africa. Lancet, 30 April, 972-975.

IDRC (International Development Research Centre). 1986a. Les actes du séminaire sur le plan d'analyse des enquêtes EMIS. IDRC, Ottawa, Ont., Canada. IDRC-MR125f (INSAH 5), 212 p.

——— 1986b. Les actes du séminaire méthodologique sur les interrelations population, santé et développement: Études et travaux de l'USED nº 6. IDRC, Ottawa, Ont., Canada. IDRC-MR141f (INSAH 6), 210 p.

Kandeh, H.B.S., Dow, T. 1985. Levels and determinants of infant and child mortality in Sierra Leone: patterns and policy implications. Project report submitted to the Ford/Rockefeller Population and Development Policy Research Program, New York, NY, USA.

Kannisto, V., Mehta, D.C., McWilliam, J. 1984. Report on the evaluation of UNFPA [United Nations Fund for Population Activites] assistance to strengthening of the civil registration and vital statistics system in Sierra Leone. Project SIL/79/P03.

Kroeger, A. 1983. Health interview surveys in developing countries: a review of methods and results. International Journal of Epidemiology, 12(4), 463.

Lacombe, B. 1970. Fakao-Sénégal. Office of Overseas Scientific and Technical Research (ORSTOM), Paris, France. Travaux et Documents de l'ORSTOM 7.

Lefèvre, D. 1986. Étude de la nutrition au Mali et perspectives: bibliographie. Save the Children Fund, Bamako, Mali. Mimeo.

Mali. 1963. Enquête démographique dans le Delta Central nigérien (2 vols). Mission Socio-économique du Soudan 1956-8, Institut national de la statistique et des études économiques et Ministère de la Coopération, Paris, France.

——— 1965. Enquête démographique au Mali 1960-1. Institut national de la statistique et des études économiques et Ministère des Affaires Etrangères, Paris, France.

Mali, DNSI. 1985. Analyse du recensement de 1976: caractéristiques démographiques (Tome 3). Ministère du Plan, Bamako, Mali.

Masuy-Stroobant, G. 1983. Les déterminants de la mortalité infantile. CIACO, Louvain-la-Neuve, Belgium.

McGregor, I.A. 1964. Measles and child mortality in The Gambia. West African Medical Journal, 13, 251.

McGregor, I.A., Williams, K., Billewicz, W.Z., Holliday, R. 1979. Mortality in a rural West African village (Keneba) with special reference to deaths occurring in the first five years of life. Medical Research Council Laboratories, The Gambia.

Mosley, W.H. 1983. Will primary health care reduce infant and child mortality? Paper presented at the Seminar on Social Policy, Health Policy and Mortality Prospects. Institut national d'études démographiques, Paris, France.

Mosley, W.H., Chen, L.C. 1984. Child survival: strategies for research. Cambridge University Press, Cambridge, U.K.

Murnaghan, J. 1978. Uniform basic data sets for health statistical systems. International Journal of Epidemiology, 7(3), 263-269.

——— 1981. Health indicators and information systems for the year 2000. Annual Review of Public Health, 2, 299-361.

Musgrove, P. 1984. Welfare indicators and health: the selection and use of socio-economic indicators for monitoring and evaluation. Bulletin of the Pan American Health Organization, 18, 1.

Nafo, F. 1984. L'état de la santé des enfants âgés de moins de 10 ans dans le cercle de Kolokani: à propos d'une enquête prospective longitudinale. École de Médecine, Bamako, Mali. Thèse de l'année 1984.

Ntitebirageza, E. 1984. Multi-round surveys of infant and child mortality. In Vallin, J., Pollard, J.H., Heligman, L., ed., Methodologies for the collection and analysis of mortality data. International Union for the Scientific Study of Population, Ordina.

Okoye, C.S. 1980. Mortality levels and differentials in Sierra Leone: an analysis of the mortality data from the 1974 population census of Sierra Leone. Central Statistics Office, Freetown, Sierra Leone. Census Analysis 2.

ORSTOM (Office of Overseas Scientific and Technical Research). 1984. La mortalité des enfants dans les pays en développement. Cahiers de l'ORSTOM (Série Sciences Humaines), 20(2).

Ouaidou, N. 1984. Situation démographique des états membres de CILSS. Unité socio-économique et de démographie, Institut du Sahel, Bamako, Mali. Études et Travaux 1.

Pison, G. 1982. Dynamique d'une population traditionelle: les Peul Bandé (Sénégal oriental). Institut national d'études démographiques (INED), Paris, France. Travaux et Documents, Cahier de l'INED 99.

Pison, G., Langaney, A. 1985. The level and age pattern of mortality in Bandafassi (Eastern Senegal): results from a small-scale and multi-round survey. Population Studies, 39(3), 387-405.

Rifkin, S.B., Walt, G. 1986. Why health improves: defining the issues concerning 'comprehensive primary health care' and 'selective primary health care.' Social Science and Medicine, 23(6).

Robertson, R.L., Foster, S.O., Hull, H.F., Williams, P.J. 1985. Cost-effectiveness of immunization in The Gambia. Journal of Tropical Medicine and Hygiene, 88, 343-351.

Ross, D.A., Vaughan, J.P. 1984. Health interview surveys in developing countries. Evaluation and Planning Centre, London School of Hygiene and Tropical Medicine, London, U.K.

Rowland, M.G.M. 1980. Weaning and diarrhoea in The Gambia. British Medical Journal, ii, 1119.

Sénégal, Direction de la Statistique. 1971. Enquête démographique nationale 1970-1: résultats provisoires du 1er passage. Direction de la Statistique, Dakar, Senegal.

Sénégal, Ministère de la Santé Publique. 1984. Situation sanitaire et démographique 1983. Ministère de la Santé Publique, Dakar, Senegal.

——— 1985. Statistiques sanitaires et démographiques du Sénégal: années 1981-2. Ministère de la Santé Publique, Dakar, Senegal.

Sierra Leone, Ministry of Health. 1981. The health services of Sierra Leone. Freetown, Sierra Leone. Report 66.

Sierra Leone, National Population Commission. 1985. Demographic profile. Freetown, Sierra Leone.

Sierra Leone and Federal Republic of Germany. 1985. Bo-Pujehun Rural Development Project: Health and Nutrition Programme -- plan of operation. Freetown, Sierra Leone.

Sierra Leone and USAID (United States Agency for International Development). 1978. Sierra Leone: National Nutrition Survey. Freetown, Sierra Leone.

Sierra Leone and WHO (World Health Organization). 1980. Infant and early childhood mortality in relation to fertility patterns: report on an ad hoc survey in Greater Freetown, the Western Area and Matieri in Northern Province, Sierra Leone, 1973-75. Ministry of Health, Freetown, Sierra Leone.

Snell, P. 1984. Writing it down. British Medical Journal, 289(December), 1674.

Tabutin, D. 1984. Comparison of single and multi-round surveys for measuring mortality in developing countries. In Vallin, J., Pollard, J.H., Heligman, L., ed., Methodologies for the collection and analysis of mortality data. International Union for the Scientific Study of Population, Ordina.

Theis, W. 1985. Bo-Pujehun Rural Development Project: Nutrition Programme -- plan of operations. Freetown, Sierra Leone.

Thomas, A.C. 1983. The population of Sierra Leone: an analysis of population census data. Demographic Research and Training Unit, Fourah Bay College, Freetown, Sierra Leone.

——— 1987. Levels and causes of infant and child mortality in Sierra Leone. CPS, London School of Hygiene and Tropical Medicine, London, U.K. PhD thesis.

UNFPA (United Nations Fund for Population Activities). 1984. Sierra Leone: report of mission on needs assessment for population assistance. UNFPA, New York, NY, USA. Report 66.

UNICEF (United Nations Children's Fund). 1985. Sierra Leone: annual report. UNICEF, New York, NY, USA.

United Nations (forthcoming). Infant and child mortality: world estimates and projections 1950-2025 -- Final report by the Population Division on a UNICEF project entitled "Estimation and projections of infant and child mortality rates for all countries of the world." UN, New York, NY, USA.

van den Eerenbeemt, M.-L. 1985. A demographic profile of the Fulani of central Mali with special emphasis on infant and child mortality. In Hill, A.G., ed., Population, health and nutrition in the Sahel. Kegan Paul International, London, U.K.

van Norren, B., van Vianen, H.A.W. 1986. The malnutrition-infections syndrome and its demographic outcome in developing countries. PCDO/Programming Committee for Demographic Research, The Hague, The Netherlands. Publication 4.

World Bank. 1986. Population growth and policies in sub-Saharan Africa. World Bank, Washington, DC, USA.

WHO (World Health Organization). 1981. Development of indicators for monitoring progress towards "Health for All" by the year 2000. WHO, Geneva, Switzerland. Health For All Series 4.

——— 1982. Malaria control profile in Sierra Leone. WHO, Freetown, Sierra Leone.

——— 1985. Health surveys. World Health Statistics Quarterly, 38(1).

——— 1986a. Indicators for "Health for All" strategies. World Health Statistics Quarterly, 39(4).

——— 1986b. Indicators and methods for evaluating the effectiveness of health interventions: an initial review prepared by the Health Situation and Trend Assessment Programme, September 1986. WHO, Geneva, Switzerland. Report WHO/HST/86.2

Wurie, F. 1979. Analysis of mortality by cause of death for the Western Area in Sierra Leone 1972-75. London School of Hygiene and Tropical Medicine, London, U.K. MSc thesis.

APPENDIX

CERTIFICATE OF BURIAL

THIS IS TO CERTIFY that the death of _____ late of _____ aged _____deceased, who died at _____ m. on the _____ day of _____ 19 __ at _____ has been duly registered by me or has been duly notified to me (or that I am credibly informed that a _____ child of _____ of _____ and _____ his wife born on the _____ day of _____ 19 __ was stillborn) and I hereby give permission for interment of the body at _____ cemetery

WITNESS my hand this _____ day of _____ 19 __

Registrar of Births and Deaths for the District of _____

CERTIFICATE OF BURIAL

TO THE OVERSEER _____ VILLAGE CEMETERY

THIS IS TO CERTIFY that the Death or Stillbirth

of _____

of _____ Village, aged _____ has been duly registered by me or has been duly notified to me and I hereby give permission for interment of the body at _____ Cemetery.

Dated this _____ day of _____ 19____

_____

Register of Births and Deaths.

_____ *District*

MEDICAL CERTIFICATE OF CAUSE OF DEATH

I HEREBY CERTIFY that I have medically attended

of*

who was *(a)* apparently or stated to be aged years, that I

last saw on the 19

that was then suffering from

that

died as I am aware, *(b)* informed, on the day of

, 19 at *(c)*

and that the cause of death was to the best of my knowledge and belief as herein stated, viz:-

Primary cause:

Secondary cause:

(d) and that the disease had continued

WITNESS my hand this day of ,19

Signature.....

Medical Qualification.....

Address.....

---

*State address.
(a) Omit "apparently" or "stated to be" as the case may be.
(b) Omit "aware" when hour of death is known from report.
(c) State the time.
(d) State the duration of illness if possible.
Note that "primary cause of death" meant disease present at the time of death, which initiated the train of events leading thereto, and not mere secondary, contributory, or immediate cause or a terminal condition or mode of death.

Nationality.....

Place of Birth.....

Occupation.....

Place of Death.....

Causes of Death

Name ..... Nationality .....

Address ..... Place of Birth .....

*Sex ..... Date of Death ..... Hour .....

Age ..... Occupation .....

Name of person giving the information and his relationship to deceased (husband, wife, son, etc.)

.....

Duration of illness .....

CHIEF SYMPTOMS COMPLAINED OF:

Fatigue? ..... Breathlessness on slight exertion? .....

Cough? ..... Painful? ..... Pain in chest? .....

Quickened breathing? ..... Sputum? .....

If so, what colour? .....Coughing of blood? .....

Fever? ..... Sweating? ..... Shivering? .....

Headache? ..... Jaundice? .....

Vomiting? ..... Colour ..... Blood in the Vomit? .....

Constipation? ..... How long? .....

Pain in abdomen ..... Strangulated hernia? .....

*In the case of deaths of females of 15 to 45 years of age, the informants should *invariably* be required to state whether the deceased was *pregnant* at the time of her death or had had an abortion or given birth to a normal or premature child *within three months* of the date of her death. You should state the number of days or weeks before her death of such an occurence.

Swelling of abdomen, legs, or any other part?.....

Swelling or puffiness of the eyelids? .....

Signs of paralysis? ..... If so, in what region? .....

Dizziness? ..... Convulsions? .....

Convulsions associated with pregnancy or childbirth? .....

Wasting of body? (inspect the body) .....

Diarrhoea ..... Blood-stained stools? .....

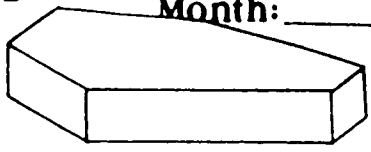
Blood or puss or mucus in the stools? ..... Worms in the stools? .....

Blood in the urine? .....

DEATHS

R·2

Month: _____



	M	F
I	□□□ □□	□□□ □□
C	□□□ □□	□□□ □□
S	□□□ □□	□□□ □□
A	□□□ □□	□□□ □□

VILLAGE: _____

Chiefdom: _____

Section: _____

BIRTHS

3

Month: _____

VILLAGE: _____

M	F
□□□□	□□□□
□□□□	□□□□
□□□□	□□□□

Chiefdom: _____

Section: _____

PHC VILLAGE HEALTH WORKERS RECORDING FORM
(The Gambia)

NAME _____ VILLAGE _____ DATE _____

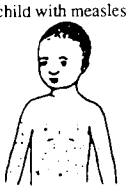
Outpatients seen

malnourished child

child with tetanus

child with whooping cough

child with measles



eye infection

chest infection in child

child with diarrhoea

child with malaria

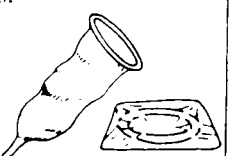
Pregnant woman with malaria

Adult with malaria

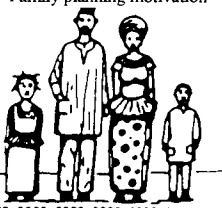
chest infection in adult

Deaths

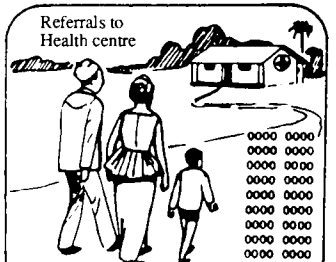
Use of Contraceptives CONDOM



Family planning motivation



Referrals to Health centre

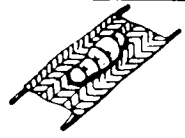
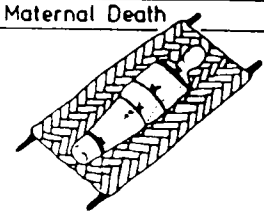


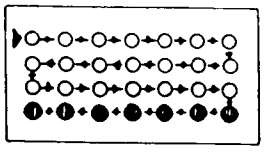
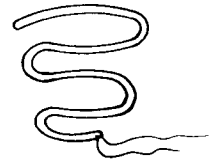
Compound visits

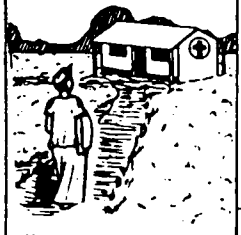
TRADITIONAL BIRTH ATTENDANT RECORDING FORM (The Gambia) PHC

NAME _____ VILLAGE _____ DATE _____

Antenatal Care	Births	Neonatal Tetanus
		
00000 00000 00000 00000 00000 00000 00000 00000	00000 00000 00000 00000 00000 00000 00000 00000	00000 00000 00000 00000

Stillborn	Infant Death	Maternal Death
		
00000 00000 00000 00000	00000 00000 00000 00000	00000 00000 00000 00000

Pills	Depo Provera Injections	I. U. D.
		
00000 00000 00000 00000 00000 00000 00000 00000	00000 00000 00000 00000 00000 00000 00000 00000	00000 00000 00000 00000 00000 00000 00000 00000

Referrals	Family Planning Motivation	Postnatal Care
		
00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000

OUT-PATIENT TALLY SHEET USED BY HEALTH CENTRES,
STATION _____ DISPENSARIES AND HOSPITALS (THE GAMBIA) MONTH/YEAR _____ 19 ___

		CONDITIONS	5 years and above	CASES SEEN	Under 5 years
HEAD	1.	Eye disorders	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	2.	Ear,nose, throat disorders	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	3.	Mouth, teeth, gum disorders	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
CHEST	4.	Upper respiratory tract infections	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	5.	Pneumonia bronchitis	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	6.	Hypertension	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	7.	Heart disorders	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
ABDOMEN	8.	Diarrhoea, dysentry	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	9.	Peptic ulcer, other abdominal pain	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	10.	Worms, other intestinal parasites	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	11.	Urinary tract disorders	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	12.	Hernia, hydrcoele, haemorrhoids	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
OBSTETRIC-GYNAECOLOGIC	13.	Normal delivery	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	14.	Complicated delivery	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	15.	Abortion	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	16.	Pre-eclampsia, eclampsia	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	17.	Other gynaecologic/obstetric disorders*	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
CONNECTIVE TISSUE	18.	Muscle and joint pains and disorders	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	19.	Trauma: fractures, wounds, burns, etc.	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
SKIN	20.	Skin disorders	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
NERVOUS SYSTEM	21.	Epilepsy, other neurologic conditions	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	22.	Mental disorders	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
GENERAL AND OTHER	23.	Reportable diseases**	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	24.	Malaris, clinical	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	25.	Anaemia	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	26.	Malnutrition	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	27.	Dehydration (moderate to severe)	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	28.	Other known conditions*	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	29.	No pathology	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
TOTAL NEW CASES					
	30.	Reattendances	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	31.	Admissions	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		
	32.	Refferals	00000 00000 00000 00000 00000 00000 00000 00000 00000 00000		

*Other conditions may be recorded on the reverse side of this form.
**Details to be reported on the Reportable Diseases Form.

KEY VILLAGE _____ PRIMARY HEALTH CARE DISTRICT _____

NAME OF CHN _____ COMMUNITY HEALTH NURSE MONTHLY REPORT FORM MONTH _____ 198__

			KEY VILLAGE	OTHER VILLAGES					TOTALS
NAME OF VILLAGE									
VITAL STATISTICS	LIVE BIRTHS								
	STILL BIRTHS								
	DEATHS DETAILS P.2	UNDER ONE YR.							
		OVER ONE YR.							
		MATERNAL							
	CONDITIONS		REPORTED						
CHILDREN	MALARIA								
	DIARRHOEA								
	CHEST INFECTIONS								
	MALNOURISHMENT								
	TETANUS								
	REPORTABLE DISEASES	MEASLES							
		WHOOPING COUGH							
		NEONATAL TETNUS							
ADULTS	MALARIA	PREGNANT WOMEN							
		OTHER ADULTS							
	CHEST INFECTIONS								
GENERAL	EYE INFECTIONS								
	FEVER REFERRALS								
TOTALS	OUTPATIENTS								
	REFERRALS								

DETAILED REPORT ON DEATHS

VILLAGE	NAME	SEX	AGE	CAUSE OF DEATH	DID DEATH OCCUR AT HEALTH CENTRE OR HOSPITAL (STATE WHICH)

PREVENTIVE HEALTH ACTIVITIES

		KEY VILLAGE	OTHER VILLAGES					
NAME OF VILLAGE								
COMPOUND VISITS								
WELLS IMPROVED/CONSTRUCTED								
WASTE DISPOSAL IMPROVED/CONSTRUCTED								
LATRINES IMPROVED/CONSTRUCTED								
FAMILY PLANNING MOTIVATION								
ANTENATAL CARE								
POSTNATAL CARE								
CONTRACEPTIVE USE	CONDOMS							
	PILLS							
	I.U.D.							
	DEPO PROVERA							

STATION _____

OUT-PATIENT RETURN USED BY HEALTH CENTRES, DISPENSAIRIES, AND HOSPITALS (THE GAMBIA)

MONTH/YEAR _____ 19 ___

		CONDITIONS	UNDER FIVE			FIVE AND ABOVE			TOTAL
			IWC	OPD	TOTAL	ANC	OPD	TOTAL	
HEAD	1.	Eye disorders							
	2.	Ear, nose, throat disorders							
	3.	Mouth, teeth, gum disorders							
CHEST	4.	Upper respiratory tract infections							
	5.	Pneumonia, bronchitis							
	6.	Hypertension							
	7.	Heart disorders							
ABDOMEN	8.	Diarrhoea, Dysentry							
	9.	Peptic ulcer, other abdominal pain							
	10.	Worms, other intestinal parasites							
	11.	Urinary tract disorders							
	12.	Hernia, hydrocoele, haemorrhoids							
OBSTETRIC-GYNAECOLOGIC	13.	Normal delivery							
	14.	Complicated delivery							
	15.	Abortion							
	16.	Pre-eclampsia, eclampsia							
	17.	Other gynaecologic/obstetric disorders*							
CONNECTIVE TISSUE	18.	Muscle and joint pains and disorders							
	19.	Trama: fractures, wounds, burns etc.							
SKIN	20.	Skin disorders							
NERVOUS SYSTEM	21.	Epilepsy and other neurologic conditions							
	22.	Mental disorders							
GENERAL AND OTHER	23.	Communicable diseases**							
	24.	Malaria, clinical							
	25.	Anaemia							
	26.	Malnutrition							
	27.	Dehydration (moderate to severe)							
	28.	Other known conditions*							
	29.	No pathology							
TOTAL NEW CASES									
	30.	Reattendances							
	31.	Admissions							
	32.	Referrals							

* Other known conditions may be recorded on the reverse side of this form.
** Details of most communicable diseases must be reported on the Reportable Diseases Form.

Officer in charge of station _____ Checked by RMO _____

Reportable diseases monthly reporting form used by health centres, dispensairies, and hospitals (The Gambia)

STATION _____ REPORTABLE DISEASES, MONTHLY RETURN MONTH _____ 19 ___

Date	Disease	Name	Village/District	DOB or age	Sex	Vaccination status* No	Yes: date(s)	Contacts traced**	Referred to	Date death	Comments

* Vaccination status should be noted for measles, pertussis, polio, tetanus (mother's status for neonatal tetanus), and menigoccal meningitis.

** Contacts should be traced for meninitis, gonorrhoea, syphilis, yaws, TB, leprosy.

Officer in charge of station _____ Checked by RMO _____

Epidemiology Unit
Medical and Health Department
Banjul.

REPORTABLE DISEASES

The following diseases should be reported as fully as possible on the Reportable Diseases monthly report form:

- Anthrax
- Cholera
- Diphtheria
- Dracontiasis (Guinea worm)
- Gonorrhoea
- Hepatitis
- Leishmaniasis
- Leprosy
- Measles (Rubeola)
- Meningococcal meningitis
- Onchocerciasis
- Pertussis (Whooping cough)
- Plague
- Poliomyelitis
- Rabies
- Relapsing fever
- Rebella
- Schistosomiasis
- Syphilis
- Tetanus
- Trachoma
- Trypanosomiasis
- Tuberculosis
- Typhoid fever (Enteric fever)
- Typhus, epidemic louse-borne
- Yaws
- Yellow fever

Such detailed reporting is not required for the following communicable diseases:

- Chicken pox - tally as a communicable disease without details
- Influenza - tally with upper respiratory tract infections
- Malaria - tally as "malaria, clinical"
- Mumps - tally as a communicable disease without details

MCH TEAM _____ MCH MONTHLY RETURN (THE GAMBIA) MONTH _____

INFANT WELFARE CLINICS

Vaccinations given:

BCG _____

DPT 1 _____

DPT 2 _____ _____

DPT 3 _____

DPT B _____

Polio 1 _____

Polio 2 _____ _____

Polio 3 _____

Polio B _____

Measles _____

Y. fever _____

Number of 'at risk' children weighed _____

Number of home Visits made _____

Number of referrals _____

ATENATAL CLINICS

Vaccinations given:

TT 1 _____

TT 2 _____ _____

TT 3/B _____

Deliveries:

At the centre

Live _____

Stillbirths _____

Outside the centre

Live _____

Stillbirths _____

Number of referrals _____

VACCINE INVENTORY

Vaccine	Balance at 1st of month	Received during month	Balance at end of month
BCG	____ doses	____ doses	____ doses
DPT	____ doses	____ doses	____ doses
Polio	____ doses	____ doses	____ doses
Measles	____ doses	____ doses	____ doses
Y. fever	____ doses	____ doses	____ doses
Tet. Tox.	____ doses	____ doses	____ doses

COLD CHAIN

Number of days temperature was recorded: _____

Number of days temperature exceeded 10°C: _____

KEROSENE: Gallons in drum at end of month _____ gas

CLINICS SCHEDULED

Place	Dates*	Attendances IWC Old	IWC New	ANC Old	ANC New	Comments

* Circle date if clinic not held and explain reason under "Comments"

Date submitted _____

SIGNATURE:

Date received RHT _____

Date received MCH _____

Health Centres
Maternity Centres
Nursing Homes
Dispensaries and
Treatment Centres

Ministry of Health,
Medical Statistics Office,
Freetown

MSO FORM 2

Checked by

STATISTICS OF PATIENTS FOR THE MONTH

(To be forwarded to the Medical Statistics Office before the 5th day of next month)

I GENERAL INFORMATION

1 Name of Institution _____
(H.C.M.H.N.H.D.T.C.)

2. Postal Address _____

Cheildom _____ District _____

II PATIENTS

Cases treated during the month

Type	Total	Male	Female
(a) New cases			
(b) Subsequent attendances			
(c) Total attendences			

2 Number of U.F.C. Patients treated during the month

Type	Total	Male	Female
(a) New cases			
(b) Subsequent attendances			
(c) Total attendences			

3. Number of maternity patients during the month

Type	Total	Antenatal - Postnatal Patients	
(a) New case			
(b) Subsequent attendances			
(c) Total attendances			

III DELIVERIES AND BIRTHS

Number of deliveries during the month

Type	Number
(a) Total no. of deliveries	
(b) Normal deliveries	
(c) Forceps deliveries	
(d) Casarean section	

2 Births which occured during the month

Birth weight of Infant	Live Births		Stillbirths	
	Male	Female	Male	Female
(a) Under 5 1/2 lbs				
(b) 5 1/2 lbs and over				
(c) Unknown				
(d) Total				

3 Multiple births which occured during the month

Type	Sets	Male	Female
(a) Twins			
(b) Triplets			
(c) Others (state kind)			

IV DEATHS

Number of deaths which occurred during the month

Deaths	Total	Male	Female
1 Total number			
2 Deaths of Adult			
3 Which Maternal deaths			
4 Deaths of infants under 1 year of age			
5 Deaths of children 1 to 5 years of age			
6 Deaths of children 5 to 15 years of age			

V HOSPITALISED PATIENTS

Number of patients referred to hospital during the month

Type	Total	Adults	Children under 15 yrs
Total No. of Patients			

V PRINCIPAL CAUSES OF ATTENDANCE (OTHER THAN PREGNANCY) DURING THE MONTH

CAUSE	New Cases	Subseq attend.	CAUSE	New Cases	Subseq attend
1 Malaria			17 Dysentery		
2 Yaws			18 Pneumonia		
3 Syphilis			19 Tuberculosis		
4 Gonorrhoea			20 Chickenpox		
5 Diarrhoea			21 Smallpox		
6 Respiratory diseases			22 Measles		
7 Helminth infections			23 Whooping cough		
8 Other digestive system condition			24 Leprosy		
9 Skin diseases			25 C.S meningitis		
10 Ulcers			26 Mumps		
11 Accidents, poisonings, and violence			27 Tetanus of (a) Newborn (b) Others		
12 Diseases of the Nervous System			28 Human rabies		
13 Eye diseases			29 Sleeping sickness		
14 Bilharziasis			30 Fever of unknown		
15 Onchocerciasis			31		
16 Malnutrition			32 Anemia		

VI CERTIFICATION

I certify that the above information is correct and covers the whole month of _____

Name (Block letters) _____

Signature _____

Official Designation _____

Date _____

EXPANDED PROGRAMME ON IMMUNIZATION (MONTHLY RETURN)
MINISTRY OF HEALTH, SIERRA LEONE.

MONTHLY REPORT FOR MONTH OF _____ YEAR _____

BY _____ DESIGNATION: _____

UNIT: _____ TOWN/VILLAGE _____ CHIEFDOM: _____ DISTRICT: _____

NAME OF VILLAGE	AGE	B.C.G	MEASLES	DPT			POLIOMYELITIS			T. TOXOID 15-44		T. TOXOID EXPEC. MOTHERS			OTHERS (SPECIFY)
				1	2	3	1	2	3	1st dose	2nd dose	1	2	BOOSTER	
	<1														
	1+														
	<1														
	1+														
	<1														
	1+														

COMMODITY	AMOUNT AT START OF MONTH	AMOUNT AT END OF MONTH	REMARKS/EXPIRY DATE
BCG VACCINES			
MEASLES VACCINES			
DPT VACCINES			
T. TOXOID VACCINES			
POLIO VACCINES			
UNDER-FIVE CARDS			
ANTE NATAL CARDS			

MINISTRY OF HEALTH, SIERRA LEONE
EXPANDED PROGRAMME ON IMMUNIZATION
(E.P.I.)

MONTHLY EPI DISEASES REPORT FOR THE MONTH OF _____

YEAR _____

BY _____ DESIGNATION _____ DISTRICT: _____

NAME OF UNIT REPORTING	TUBERCULOSIS				DIPTH-THERIA		PER-TUSSIS		MEASLES		POLIO-MYELITIS		TETANUS							
	MENIGITIS		OTHER T.B.										CHILD UNDER 5 YRS		NEONATAL		PREGNANT MOTHERS		DIARRHOEA	
	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D

PHU MONTHLY SUMMARY SHEET:BIRTHS, DEATHS, COMMUNITY ACTIVITIES

PHU: _____ CHIEFDOM: _____ MONTH: _____

Target Village	Births Reported				Deaths Reported				Community Activities				
	Live births		Stillbirths		< 7days	8-28 days	29 days-1Yr	1-5Yrs	#Village Dev. Com. Mtgs.	#Home Visits	#Teaching Sessions TBAs	#Teaching Sessions Schools	Other
	PHU	Other	PHU	Other									

PHU MONTHLY SUMMARY SHEET: CHILDREN U-5 YEARS

PHU_____ CHIEFDOM: _____ MONTH: _____

Target Village	NUTRITIONAL STATUS							IMMUNIZATION							
	New	Old	Wgt Gain	Static Wgt/or Wgt Lose	Arm Circum			BCG	DPT 1	DPT 2	DPT 3	Polio 1	Polio 2	Polio 3	Measles
					Well-nourished	Borderline	Under								

PHU MONTHLY SUMMARY SHEET: CHILDREN U-5 YEARS (NUMBER OF NEW CASES)

PHU: _____ CHIEFDOM: _____

Target Village	Tetanus		Measles	Whooping Cough	Polio	D & V	Malaria	Pneumonia	Sever Pallor/ Anemia	TB		#of Referrals Hospital
	NNT	U-5s								New	Old	

PHU MONTHLY SUMMARY SHEET: ANTENATALS, REFERRALS, TETANUS TOXOID

PHU: _____ CHIEFDOM: _____ MONTH: _____

Target Village	Antenatals				Total # Referrals to Hospital			Tetanus Toxoid						
	New	Old	Number at Risk (see register)	Severe Pallor or Anaemia	Pregnant	In Labour	Post-Partum	Antenatals			Non-Pregnant 15-45 Yrs			
								1	2	B	1	2	B	

PHU MONTHLY SUMMARY SHEET: GENERAL REGISTER 5 YEARS AND ABOVE

PHU: _____ CHIEFDOM: _____ MONTH: _____

Target Village	Total # of new and old cases				Number of new cases								
	Males		Females		D & V	Malaria	Pneumania	Severe/ Pallor Anaemia	Tetanus		TB		Total # of Referrals to Hospital
	5-14 Yrs	15 Yrs	5-14 Yrs	15 Yrs					M	F	New	Old	


INTERNATIONAL DEVELOPMENT RESEARCH CENTRE
CENTRE DE RECHERCHES POUR LE DÉVELOPPEMENT INTERNATIONAL
CANADA