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The disease profile of poverty: morbidity and mortality in northern Uganda in the context of war, population displacement and HIV/AIDS

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This manuscript is dedicated to Dr Matthew Lukwiya, Medical Superintendent of Lacor Hospital, who died of Ebola in December 2000 and who substantially contributed to the development of the hospital-based system for data collection, analysis and dissemination, in the continuous effort to find new ways of helping his people of north Uganda.

KEYWORDS
Disease burden;
Poverty;
War;
Population displacement;
Epidemics;
Uganda

Summary The population of Gulu District (northern Uganda) has been severely incapacitated by war, epidemics and social disruption. This study is aimed at describing disease patterns and trends in this area through a retrospective analysis of discharge records for 155 205 in-patients of Lacor Hospital in the period 1992—2002. The burden of infectious diseases in childhood is overwhelming, with malaria accounting for the steepest increase in admissions. Admissions for war-related injuries and malnutrition fluctuated with the intensity of the war and the severity of famine. Emerging and re-emerging infections, such as HIV/AIDS, tuberculosis and Ebola, accounted for a heavy disease burden; however, there has been a trend for admissions related to HIV/AIDS and tuberculosis to decrease since the implementation of community-based services. Vulnerable groups (infants, children and women) accounted for 79.8% of admissions. Long-term war, population displacement, the collapse of social structures and the breakdown of the health system place people at a much greater risk of persistent, emerging and re-emerging infectious diseases, malnutrition and war-related injuries, shaping the 'disease profile of poverty'. Most of the disease burden results from infectious diseases of childhood, whose occurrence could be dramatically reduced by low-cost and effective preventive and curative interventions.

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1. Introduction

In African countries with high mortality, there is important heterogeneity among diseases in terms of their association with poverty, with the highest poor–rich mortality ratio reported for complications of pregnancy and for infectious/parasitic diseases (Gwatkin, 2001). In areas of sub-Saharan Africa, these inequalities in health have been exacerbated by war and epidemics, and increasingly difficult choices need to be made among competing demands. To reduce inequalities in health, resources need to be mobilized, equitably distributed and efficiently used. To this end, and to define public health priorities, it is necessary to have reliable information on the profile of diseases (Graham, 2001). However, most of the available data have been provided by scattered surveys and incomplete reporting systems, so that there are major information gaps (Dualeh and Shears, 2002). In this context, readily available data collected using standardized procedures, such as the data that are routinely recorded on hospital discharge records, are extremely important, in that they can provide useful indications of the health situation in a given area and can be obtained at a low cost and in a long-term, sustainable manner.

The objective of the present study was to use hospital discharge records to describe disease patterns and trends in Gulu District, an area of northern Uganda where the population has been severely incapacitated by war, epidemics and social disruption. We also discuss the relationship among social and environmental factors, disease burden, the provision of healthcare and health outcomes, in an attempt to describe what we refer to as the 'disease profile of poverty'.

2. Materials and methods

We reviewed all the discharge records in the period 1992–2002 for in-patients of St. Mary's Hospital Lacor (referred to as Lacor Hospital) (Gulu District, northern Uganda). The analyses were limited to the principal cause of hospital admission recorded on the discharge record and to those records that included all demographic and clinical data: 154 870 (99.8%) of the total 155 205 records, including 12 293 (99.4%) of the 12 365 records for patients who died in the hospital. For the mortality analysis, the principal cause of hospital admission was considered as the cause of death. The principal cause of admission on the discharge records is coded according to the reporting system of the Ugandan Ministry of Health, which is based on the International Classification of Diseases (10th revision; ICD-10) (WHO, 1994). The diagnoses are entered into a computerized database. During the study period, the procedures for collecting and storing data did not change.

Lacor Hospital is a private, non-profit facility located in northern Uganda, 6 km from the town of Gulu, on the road to Sudan. It is divided into four wards: medical, surgery, paediatrics and obstetrics-gynaecology. During the study period, the number of beds increased, from 356 in 1992 to 446 in 1993–1997 to 460 in 1998. Although the number of beds has remained stable since 1998, the distribution has changed, with increases in the paediatric ward (from 88 to 157), the obstetrics-gynaecology ward (from 48 to 65), and the surgery ward (from 121 to 128). In the medical ward, the number of beds has been reduced from 203 in 1999 to 110 in 2002, with a decrease from 90 to 30 beds in the ward's tuberculosis (TB) unit in 2001, following the implementation of community-based directly observed therapy short-course (DOTS) and the closure of the cancer unit (33 beds) in 2000 because of the creation of the national referral centre for cancer treatment in the capital city, Kampala.

The hospital has a full range of diagnostic services, including microbiology, serology, and histology laboratories, as well as endoscopy and ultrasound services. The hospital has a policy of giving priority to economically and socially disadvantaged individuals in terms of access to services, which are provided at subsidized prices with flat rate fees. The user fees at Lacor Hospital are currently less than one-third of the sector average, covering only 20% of its expenditure (Giusti, 2002); therefore, the hospital is largely dependent on external aid, which has been declining over recent years (Driwale and Adaktar, 2002). With the contribution from Ugandan government and bilateral aid accounting for 15% and 5% of the hospital income respectively, the main sources of funding are diversified private sources (charities, foundations and non-governmental organizations), which are poorly predictable beyond the short term.

According to the 2002 census, Gulu District has a population of 468 407 (Uganda Bureau of Statistics, unpublished report). Since 1986, the district has been affected by civil war, and after the 1996–1997 escalation of insurgents' activities, approximately 70% of the population was internally displaced and is currently living in protected camps in rural areas (UNOCHA, 2002). Years of civil strife and neglect have resulted in dilapidated infrastructures and a collapse of the health referral system. According to data from Lacor Hospital's antenatal clinic,

which acts as an official sentinel HIV surveillance site in Uganda, the HIV prevalence among pregnant women in Gulu District is currently much higher than the national average, although it decreased from 27.1% in 1993 to 11.9% in 2002 (STD/AIDS Control Programme, 2003). From October 2000 to February 2001, Gulu District was hit by an Ebola outbreak involving 393 persons, half of whom were admitted to Lacor Hospital; 203 deaths occurred (Lamunu et al., 2004), and the hospital paid a very high price for the dedication of its staff, with 12 staff members dying, including the Hospital's medical superintendent, Dr Matthew Lukwiya.

3. Results

During the study period, the number of hospital admissions per year doubled, from 12 702 in 1992 to 25 348 in 2002, with the paediatric ward accounting for most of this increase (from 5266 in 1992 to 15 425 in 2002). In the same period, there was a decrease in the average length of stay (ALOS), from 17.4 to 7.7 days, and an increase in the bed turnover rate, from 24.7 to 55.4 admissions per bed, with the bed occupancy rate remaining at over 100% for most of the study period.

Table 1 shows the number of admissions and bed-days and the ALOS for the ten leading causes of admission. Malaria was the leading cause (26.1% of total admissions), and during the study period it showed the greatest increase in the number of admissions (from 1643 in 1992 to 8625 in 2002, representing a five-fold increase) (Figure 1). Pneumonia was the second leading cause (6.4% of the total), with a four-fold increase in admissions (from 451 in 1992 to 1833 in 2002). There was also a trend of increase for admissions related to injuries (mostly war-related), with a sharp increase after the civil conflict escalated (744 admissions in 1997), followed by a period of fluctuation and then another increase in 2002. The number of admissions for malnutrition also peaked at the time of the escalation in the civil conflict (778 admissions in 1997); a second peak was observed in 2002 (875 admissions). The number of admissions for measles peaked in 1996 (956 admissions); it then decreased, reaching about 50 admissions per year in 2001 and 2002.

The greatest number of bed-days was observed for patients with TB, accounting for about one-fifth (20.8%) of the total, although there was a sharp decrease following the implementation of DOTS in 2001. Malaria, although the most frequent cause of admission, only accounted for 9.5% of the total bed-days, given the short ALOS. However, it showed the highest increase in the percentage of bed-days, from 4.4% in 1992 to 19.5% in 2002.

Concerning the profile of users of hospital services, population groups considered to be vulnerable (i.e. children aged 0—4 years and women) accounted for 79.8% of admissions, with a consistent increase over time, from 75.5% in 1992 to 84.6% in 2002. In particular, children aged 0—4 years accounted for 50.7% of the admissions, although they only represented 16.3% of Gulu District's population (Ministry of Finance and Economic Planning, Uganda, 1994).

Of the 12 293 deaths considered in this analysis, 60.4% occurred among children aged 0—4 years. The overall in-hospital mortality rate was 7.9%. The number of deaths, proportional mortality rate (PMR), and case fatality rate (CFR) for the ten leading causes of in-hospital death are shown in Table 2.

The PMR for the ten leading causes of death and other selected diseases, by age group, is shown in Figure 2. The PMR for malaria, which accounted for

Table 1 Number of admissions and bed-days and average length of stay for the ten leading causes of admission, Lacor Hospital, northern Uganda, 1992—2002

Cause	No. of admissions	%	No. of bed-days	%	ALOS[a] (days)
Malaria	40 488	26.1	173 764	9.5	4.3
Pneumonia	9983	6.4	72 120	3.9	7.2
Delivery	8982	5.8	29 050	1.6	3.2
Tuberculosis	7498	4.8	379 508	20.8	50.6
Malnutrition	6707	4.3	128 433	7.0	19.2
Diarrhoea	5709	3.7	32 435	1.8	5.7
Measles	4211	2.7	31 925	1.7	7.6
Injuries	3886	2.5	77 708	4.3	20.0
Septicaemia	3380	2.2	23 783	1.3	7.0
Upper respiratory tract diseases	3303	2.1	21 244	1.2	6.4
Other diseases	60 723	39.2	857 696	46.9	14.1
Total	154 870	100.0	1 827 666	100.0	11.8

[a] ALOS, average length of stay.

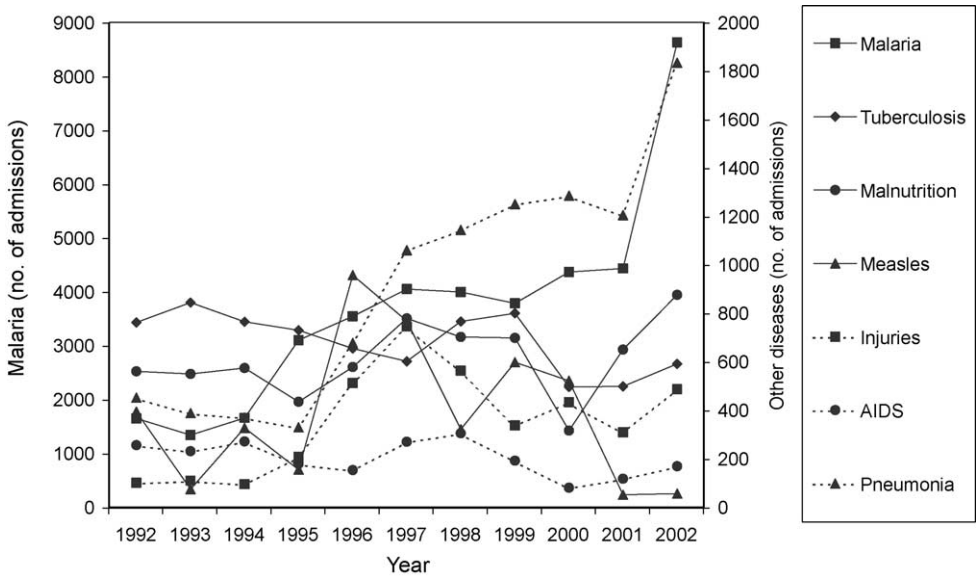

Figure 1 Trend of admissions for selected diseases, Lacor Hospital, northern Uganda, 1992—2002.

13.5% deaths overall, was quite high for infants (<1 year of age) (20.6%) and children aged 1—4 years (19.0%); it decreased in older age groups. Pneumonia and diarrhoea were among the most important causes of death among children and adults/older persons. HIV/AIDS and TB were consistently the leading causes of death in the age groups between 15 and 54 years, with the highest PMR found for the 35—44 years age group (PMR of 18.7% for AIDS and 17.9% for TB). The PMR for cancer was highest in the older age groups (PMR of 11.7% in the 55—64 years age group and 13.5% in persons over 65 years of age).

Of the conditions with at least 20 admissions, the highest CFRs were observed for tetanus, other severe communicable diseases, neoplasms and stroke, a finding that is consistent with the severity of these conditions. An overall decrease in the CFR was observed for most conditions, including malaria, pneumonia and malnutrition. In particular, the CFR for malaria consistently decreased, from 5.0% in 1992 to 3.0% in 2002, with an overall CFR of 4.1% in the study period (4.2% in the paediatric ward and 3.8% in the medical ward); these rates are lower than the national average for children aged 0—4 years (CFR = 7.0%) (Ministry of Health, Uganda, 2002) and are presumably lower than the national average for all age groups, although no data are available. Tuberculosis was the only condition with an increased CFR in 2001—2002 (following the implementation of DOTS, only the most severe cases of TB have been admitted).

Table 2 In-hospital mortality, proportional mortality rate and case fatality rate for the ten leading causes of hospital death, Lacor Hospital, northern Uganda, 1992—2002

Cause	No. of deaths	Proportional mortality rate (%)	Case fatality rate (%)
Malaria	1655	13.5	4.1
Malnutrition	1410	11.5	21.0
Pneumonia	1118	9.1	11.2
Meningitis	842	6.8	26.7
Diarrhoea	806	6.6	14.1
Tuberculosis	777	6.3	10.4
Measles	690	5.6	16.4
AIDS	668	5.4	30.2
Septicaemia	482	3.9	14.3
Anaemia	445	3.6	14.7
Other diseases	3400	27.7	5.0
Total	12 293	100.0	7.9

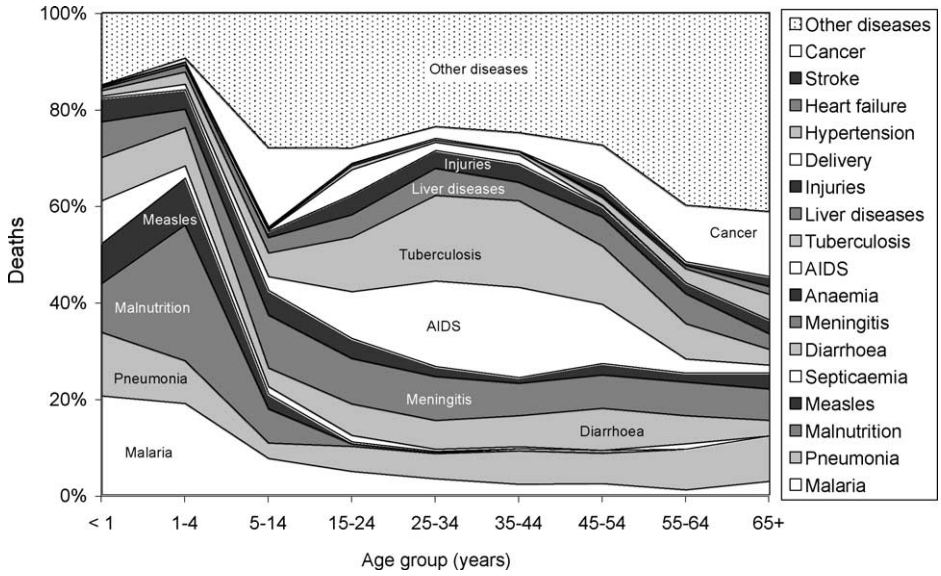

Figure 2 Proportional mortality rate for the ten leading causes of death and other selected diseases by age group among in-patients, Lacor Hospital, northern Uganda, 1992—2002.

4. Discussion

Hospital discharge records are an important source of data, in that they are readily available and are useful not only for planning and evaluating hospital services but also for conducting epidemiological surveillance. Nonetheless, there are limitations to their use: they are not designed for research purposes and may be incomplete, illegible or missing, and given that hospital-based studies are prone to selection bias (Berkelman et al., 2002), no community-wide inferences should be made (Steinwachs, 1998). However, these data may be acceptable for monitoring trends if their low sensitivity remains consistent over time and across the spectrum of diseases (Buehler, 1998).

Despite these limitations, the patterns in morbidity and mortality derived from Lacor Hospital's discharge records are important for describing the disease profile in Gulu District. This hospital can also be considered as a suitable environment for evaluating the 'disease profile of poverty', given that it mostly serves a poor population, facilitating the access to services by applying low flat-rate fees. In fact, the cost to the patient and cost-recovery mechanisms in large part determine where health care is available and who has access to it (Whitehead et al., 2001), affecting not only equity but also the degree to which the users' profile and disease patterns derived from hospital statistics reflect the demographic and epidemiological profile of the population.

To describe the disease profile of poverty, it is necessary to consider both the direct and indirect impact of war and famine (Holdstock, 2001). The direct impact is reflected in the disproportionately high burden represented by war-related injuries and malnutrition. Regarding the indirect impact, although in times of conflict deaths among civilians do occur as a direct result of military operations, the increased mortality among civilians usually results from a combination of social disruption, poor environmental conditions, psychosocial distress, reduced access to health services and increased risk of communicable diseases. The latter stems from decreased immunisation coverage, population movement, overcrowding in refugee camps, greater exposure to vectors and environmental hazards (such as polluted water), and the lack of access to healthcare services (WHO, 2002). Most victims are infants or children: in the mid-1980s, the infant mortality in areas of Uganda that were affected by conflict was estimated to have increased to over 600 per 1000 (Dodge, 1990).

The user-profile analysis provides some insight into hospital-service supply and demand and into whether or not target populations are being reached. In sub-Saharan Africa, adults and the elderly represent a disproportionately high percentage of users (an estimated 70% of admissions in Uganda (Over et al., 1992) and elsewhere (Barnum and Kutzin, 1993)), as do economically advantaged individuals (Castro-Leal et al., 2000). Furthermore, hospitals, which are generally located in urban areas, tend to serve a disproportionately urban

clientele, even when meant to serve a broad geographical population base. Given that urban populations generally have higher incomes than rural populations, the tendency to serve an urban clientele has implications in terms of income equity. In sub-Saharan Africa, it has been estimated that the financial benefits provided by the overall government expenditure for health services are twice as high for the richest 20% of the population compared to the poorest 20%, with a particularly marked difference in hospital services (Castro-Leal et al., 2000). This is an example of the so-called 'inverse care law', in which those persons with the greatest overall need for healthcare (i.e. socially and economically deprived persons) are the least able to obtain it (Hart, 1971). In this light, Lacor Hospital is unique: it is located in a rural area and serves a largely poor population, incapacitated by insurgency and disease. That over four-fifths of admissions are represented by infants, children, and women is indicative of the hospital's orientation towards the poor (Wadsworth, 1999), in that the disease burden at childbirth or at an early age is particularly high among poor populations (Gwatkin, 2001).

Long-term war and population displacement, sudden destitution, the collapse of social structures and the breakdown of the health system all contribute to increasing the risk of HIV, TB, emerging infectious diseases, malnutrition and war-related injuries, shaping the 'disease profile of poverty'. In particular, not only are death rates higher among the poor, compared to the rich, but the poor–rich difference among young persons is also considerably greater for those with communicable diseases, compared to young persons with non-communicable diseases (Gwatkin, 2000). Most of this burden results from diseases whose occurrence could be dramatically reduced by low-cost preventative and curative measures, such as malaria, measles, diarrhoea and respiratory infections. In other words, the marginal social and economic returns from investments in health are highest in avoiding these premature deaths (World Bank, 1994). Since communicable diseases in childhood are, in general, more amenable to broad-based primary prevention efforts than are non-communicable diseases, their heavy burden reflects the collapse of the primary health care system in northern Uganda and the subsequent failure in disease prevention and control.

In Lacor Hospital, malaria is the leading cause of morbidity and mortality and has shown the highest increase in admissions and hospital deaths, which may be the result of several factors, including poor living conditions, population displacement, the disruption of the health system (Accorsi et al., 2001), the increase in drug resistance (Kamya, 2001), and climatic and ecological factors (Talisuna et al., 2001), such as the 1997 El Niño phenomenon (Didas, 2002). These patterns are consistent with those observed in other hospitals in sub-Saharan Africa (Campbell et al., 2004; Petit and van Ginneken, 1995), where malaria accounts for at least a quarter of all hospital admissions (WHO and UNICEF, 2003). Emerging and re-emerging infections, such as HIV/AIDS, TB, and Ebola, have also constituted a heavy disease burden. However, the trend in admissions and in-hospital deaths related to HIV/AIDS was quite stable, or even showed a decrease, which may have been the result of several factors, including the decrease in HIV prevalence in Gulu District (STD/AIDS Control Programme, 2003), the shift from in-patient to out-patient care, the availability of alternative community-based services, and the healthcare-seeking behaviour of the affected population. In particular, to cope with the HIV/AIDS epidemic, an integrated approach has been adopted, including in-patient, out-patient, and outreach home care, providing a continuum of care to AIDS patients. This has been effective in relieving the pressure for admissions: in Lacor Hospital, unlike other African hospitals (Armstrong, 1995; World Bank, 1997), HIV-negative patients have apparently not been displaced from admission by AIDS patients and the availability of hospital beds for non-HIV-related diseases has not decreased (Fabiani et al., 2003). Concerning the continuum of care for TB patients, the implementation of DOTS in 2001 can explain the decrease in the number of admissions and bed-days and in the ALOS, as well as the increase in CFR. The example of TB illustrates the importance, from a public health point of view, of curative services and the relationship between prevention and treatment. In fact, the best way to prevent TB is to provide effective treatment to patients with open pulmonary TB, so as to interrupt the chain of transmission; good treatment programmes are the best prevention programmes (Harries and Maher, 1996).

The overall disease profile reflects the complex interplay among war, socio-economic disruption, food shortage, the dynamics of epidemics, and humanitarian crises, with social inequalities often determining both the distribution of diseases and the clinical outcomes among the afflicted (Farmer, 1998). In this difficult context, Lacor Hospital has attempted to cope with the increasing demand for healthcare by overstretching its limited resources (e.g. reducing the length of stay, increasing the bed turnover rate, and maintaining a high bed occupancy rate) and by targeting the most vulner-

able groups in order to ensure equity of access. Of note is the fact that the reduction in ALOS has been achieved without compromising the outcomes of hospital care, and has even enhanced them, as shown by the high level of user satisfaction (Angura, 2002) and by the decrease in the CFR for most conditions. However, what can be referred to as a 'two-fold burden of disease' is emerging, with a mix of persistent, new, and re-emerging infectious diseases and increasing chronic conditions and injuries. This will lead to fundamental changes in the volume and composition of the demand for healthcare, with a more complex case mix and a more costly management of hospital services. In this perspective, monitoring disease patterns and trends is essential, and the cost of obtaining health information has to be weighed against its use. Using readily available data may ensure the sustainability of the information system and support evidence-based health initiatives for reducing inequalities in health.

Conflicts of interest statement
The authors have no conflicts of interest concerning the work reported in this paper.

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