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The utilization of chart survey to explain the study of disease transmission of sickness in the Mbingo leprosarium of Cameroon

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Abstract

The WHO introduced MDT for the treatment of leprosy in 1982 because dapsone monotherapy was life long and resistant. "The objective of this study was to determine the impact of MDT on leprosy control and its epidemiology in Mbingo leprosarium'. Patients who attended the Mbingo leprosarium from 1961 to 1998 were identified through a thorough manual review of hospital records in 2002. A structured data collection form containing information on sex, age, type of disease, province of origin, date of admission and whether it was a new case, transferred, relapsed, readmission, discharged, absconded or defaulted. Patients with incomplete data Were dropped from the investigation. The review was carried out before and after the introduction of MDT in 1982. 1045 case files comprised of 271 for the period 1961 to 1967 and 774 for 1982 to 1998 were reviewed. The epidemiological trend of leprosy showed peak values in 1964,1984,1986 and 1991 and a decrease in 1967, 1982 and 1998. In the pre-MDT period, admissions increased from 4(0.4%) in 1961 to 70 (10.9%) in 1964and decreased to zero in 1982. Since MDT implementation, admissions increased to 39 (6.1 %) in 1986 and a continuous gradual drop till 1998. Immediately after MDT) T implementation many patients were cleared *from* the registers with peak values in 1984, 1986, 1991 and 1993. 283 (27.1%) new admissions, 60 (5.7%) transfers, 10 (1.0%) readmissions, 20 (1.9%) relapses, 15 (1.4%) defaulters, 14 (1.3%) deaths and 373 (35.7%) discharges were reported from 1992 to 1998.

Keywords: Leprosy, multi-drug therapy, Mbingo, leprosarium, epidemiology, Cameroon

INTRODUCTION

The drug of choice for leprosy treatment was dapsone but because of widespread resistance and life-long

treatment, patients became discouraged (WHO, 1982). The WHO introduced multi-drug therapy (MDT), a combination of three drugs (dapsone, rifampicin and clofazimine) for multi-bacillary leprosy and two drugs (dapsone and rifampicin) for pauci-bacillary cases (WHO, 1982; Anonymous, 1992). MDT enjoys a high degree of patient acceptability, absence of treatment failure, very low relapse rates following completion of treatment; compliance is high because of the fixed and relatively short duration of treatment, low frequencies of side-effects, cost effective and it cures the patient (Noordeen, 1995; The Star, 1997; WHO, 1995; ILEP, 1998). Based on the MDT strategy, the WHO targeted to eliminate leprosy as a public health problem from endemic countries by 2000 (WHO, 1991).

The leprosy prevalence in Cameroon in 2002 was 1.35/10000 and pauci-bacillary defaulter rate was 22.2% and detection of new cases was decreasing (Diallo et al., 2002) but 574 new cases were detected with 79 child cases giving a prevalence of 0.45/10000 and detection rate of 3.71% in 2004 (AFRO, 2004). Leprosy has been integrated into the primary health care system in Cameroon (Daumerie et al., 1991). In the enclave Essimbiland in Menchum division of northwestern Cameroon, leprosy is still a public health problem of primary importance after the year 2000 with case-detection among children on the increase (Nsagha, 2002; Provincial Delegation of Public Health, 2008). Work by Nsagha and colleagues in Cameroon indicated that social stigma (Nsagha et al, 2011a) and rehabilitation (Nsagha et al, 2011b) are major epidemiological determinants of leprosy elimination because of high prevalence in Boyo and Menchum divisions (3.4/10,000 and 4.5/10,000 respectively) (Diallo et al, 2002; AFRO, 2004; Provincial Delegation of Public Health, 2008). These divisions still have high leprosy prevalence (1.7/10,000 for Menchum and 2/10,000 for Boyo) in the North West Region of Cameroon (Provincial Delegation of Public Health, 2008). All leprosy cases in this locality are treated at the Mbingo leprosarium, hence, this study was undertaken to determine the impact of MDT on leprosy control and the epidemiology of the disease.

METHODS

Study area

The Mbingo leprosarium was established in 1954 by missionaries of the Cameroon Baptist Convention church. The leprosarium has a general health care service headed by a doctor and two nurses, a technical section for the manufacture of prosthesis and many vocational rehabilitation activities. The leprosarium is surrounded by many smaller villages but since its creation, more than 1500 leprosy patients have been discharged but because of the high social stigma, about 400 of these discharged patients could not return to their villages of origin; they live in different villages around the leprosarium such as Mbingo II, Mejang and Baingo. Within the premises of the leprosarium, there are discharged patients living in Dr. Jones' quarter and NewHope village. This study was conducted from June to August 2000.

Review method

Patients who attended the Mbingo Baptist leprosarium from 1961 to 1998 were identified after a thorough manual review of hospital records. A structured data collection form containing relevant items of information was used for this purpose. Information was extracted from different medical records and arranged in a logical sequence. The search was carried out manually. This exercise took place over a period of three months and covered the number of patients admitted and discharged during 1961 to 1998. The information collected was in two parts. The first section focused on the characteristics of patients on admissions and data collected included the sex, age, type of disease, province of origin and date of admission and whether the admission was a new case, transferred case from another clinic, a relapsed case or a readmission. The second section was based on discharged cases. The same parameters mentioned above were studied but it was investigated whether the cases were officially discharged, or they absconded or defaulted and if they were transferred out or dead. Patients who had incomplete data in this survey were dropped from the investigation. The registers were reviewed year by year.

The classification (WHO, 1982; International Leprosy Congress, 1948; Ridley and Jopling, 1966) of the patients was based on provisional clinical diagnosis by the leprosy control supervisor or the medical officer and upon laboratory results. Readmissions were cases that were treated in the leprosy colony of Mbingo or elsewhere but who came back for either reversal (type I) or erythema nodosurn leprosum (type 2) leprosy reactions. Patients who were discharged but who constantly consulted the hospital for other illness or the sequelae of leprosy such as ulcer care were not considered as readmissions. The chart review in the Mbingo leprosarium was carried out before and after the introduction of MDT in 1982. The records were not kept in the pre-MDT periods (1968 to 1981), hence only records from 1961 to 1967 and 1982 to 1998 were reviewed. Patients with incomplete data were excluded from the study. The authorization to carry out the work was obtained from the Cameroonian Ministry of Public Health (Nº D76/A/MSP/SESP/SG/DRH/SDGP/SFS).

Data management and analysis

The structured data collection forms were checked for incomplete forms and edited for the use of correct codes, including range and consistency errors. The data were analyzed using Epi-Info after a double entry by two data clerks. Data summaries such as proportions and percentages and testing of the working hypothesis (MDT had no impact on leprosy control) were also carried out using the chi-square and Fisher exact tests.

RESULTS

A total of 1045 files comprised of 271 for the period 1961 to 1967 and 774 for 1982 to 1998 were reviewed. Record keeping on leprosy in the study area was generally poor as important demographic variables on religion, occupation, educational, marital status, laboratory diagnosis, type of rehabilitation activities, presence or absence of deformities, disabilities and types were lacking.

Yearly pattern of leprosy admissions and discharges (1961 to 1998)

For the period 1961 to 1998, 1045 leprosy patients

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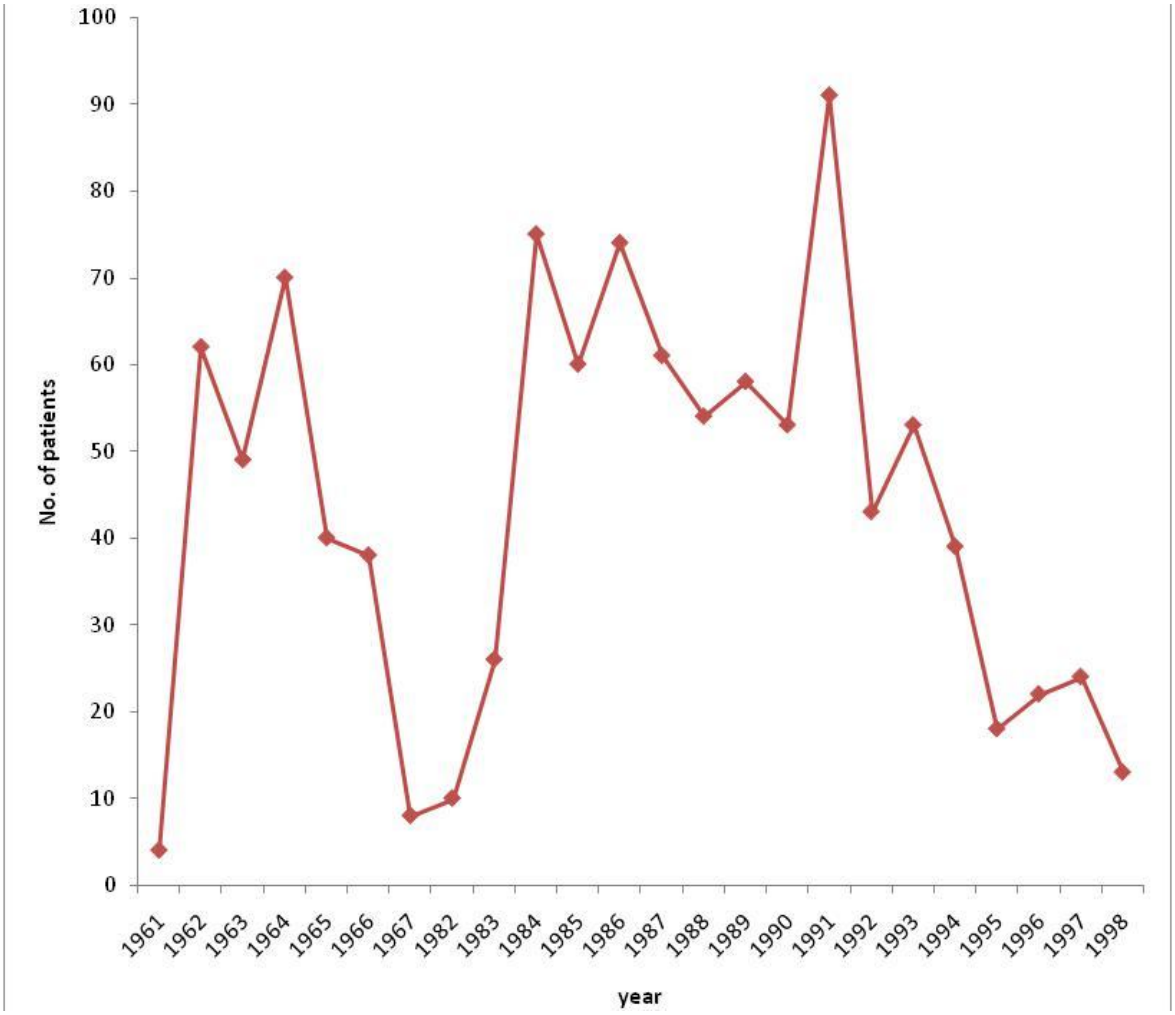

Figure 1. Yearly distribution of all leprosy patients between 1961-1998 in the Mbingo leprosarium.

consisting of 644 (61.6%) admissions and 401 (38.4%) discharges were registered in the leprosarium. The highest number of admissions was 70 (6.7%) in 1964 in the pre-MDT era and 39 (3.7%) in 1986 in the post-MDT period. The mean age of the 1045 leprosy patients was 26.48±10.68 years. The epidemiological trend of leprosy over the years showed peak values in 1964, 1984, 1986 and 1991 (Figure 1). There were marked decrease in the number of leprosy patients in 1967, 1982 and 1998. But the deepest trough was observed in 1967. In the pre-MDT period, the number of leprosy admissions increased from 4 (0.4%) in 1961 to a peak of 70 (10.9%) in 1964 and decreased to zero in 1982 immediately after the introduction of MDT. Since MDT implementation in 1982 in the Mbingo leprosarium, admissions increased to 39 (6.l%) in 1986 and maintained a continuous gradual drop till 1998 (Figure 2). There were no leprosy discharges from 1961 to 1967 during the pre-MDT era for which data was available. Immediately after MDT implementation many leprosy patients were cleared from the registers with peak values of discharges occurring in 1984, 1986, 1991 and 1993 (Figure 2).

Distribution of leprosy from 1961-1998 according to gender, type of leprosy, new admissions, transfers, readmissions, relapses, deaths and defaulters

Women were slightly in the majority with a sex ratio of 92 males to every 100 females. In the seven-year period of the pre-MDT era for which data was available, there was a male preponderance constituting 51.3% of the total admissions. The situation was reversed post-MDT with males accounting for only 46.6% of the total admissions and discharges during this period. The distribution of patients by sex appears uniform in each year of study.

During the pre-MDT period (1961 to 1967), the most common type of leprosy was tuberculoid (TT) with 175 (16.7%) cases. The highest registered number of leprosy was 70 (6.7%) in 1964 and TT constituted the most

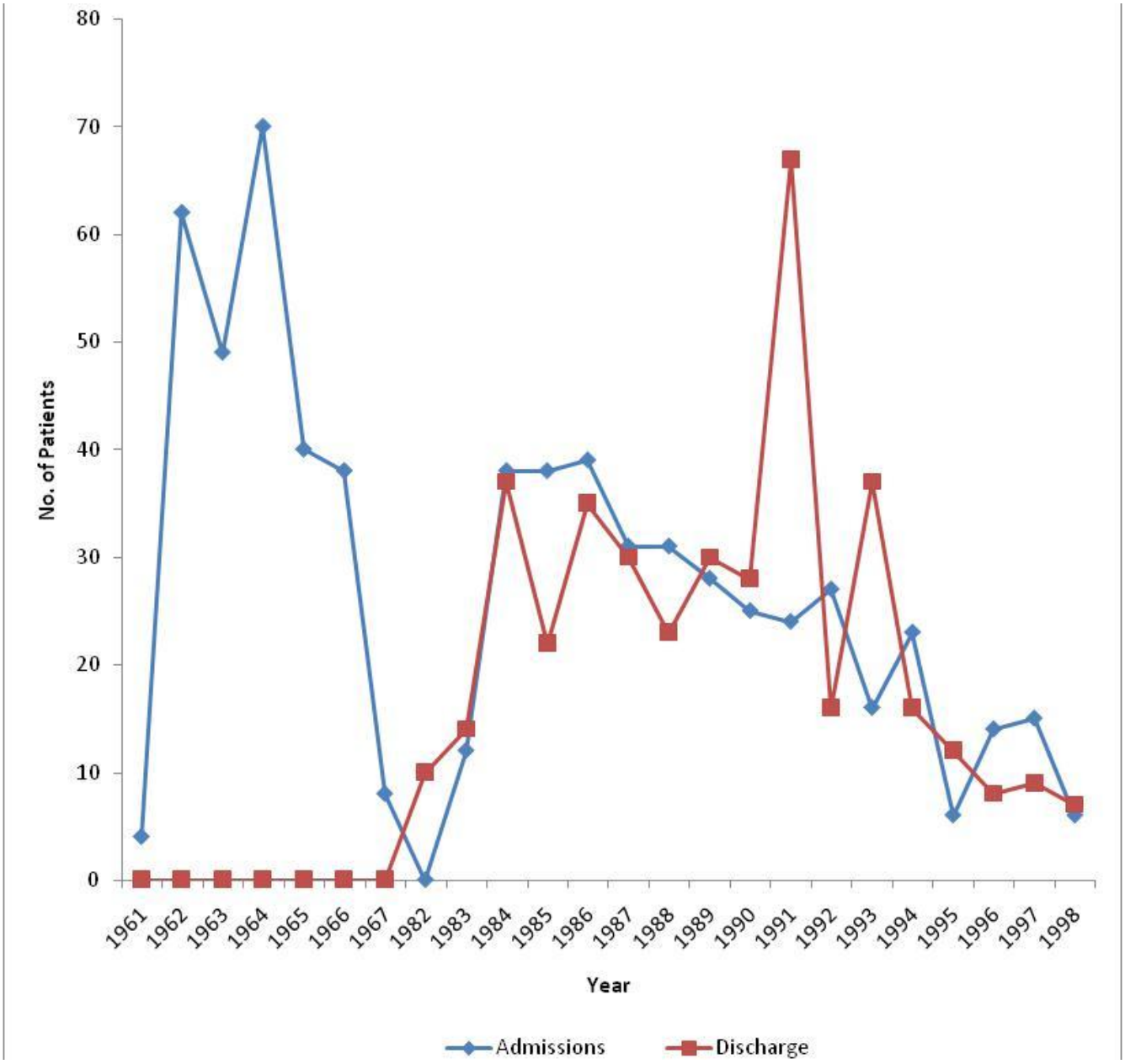

Figure 2. Yearly pattern of leprosy admissions and discharges in the Mbingo leprosarium from 1961 to 1998.

frequent type with 52 (5.0%) cases. The commonest types of leprosy in the post-MDT period (1982-1998) were borderline tuberculoid (BT) 264 (25.2%), borderline borderline (BB) 158 (5.0%) and lepromatous (LL) 193 (18.5%) cases.

For the period 1961 to 1967, 180 (17.2%) new admissions, 61 (15.7%) transfers, 20 (2.2%) readmissions and 8 (0.8%) relapsed cases of leprosy were registered in the leprosarium. No default, death and discharged cases were recorded during this period. 283 (27.1%) new admissions, 60 (5.7%) transfers, 10 (1.0%) readmissions, 20 (1.9%) relapses. 15 (1.4%) defaulters, 14 (1.3%) deaths and 373 (35.7%) discharged cases were reported from 1992 to 1998. There was significant variation over the years in the different types of admissions and discharges ($p<0.05$). There were no records of absconders, discharges and deaths in the pre-MDT period.

Distribution of leprosy patients according to nationality and province (1961 to 1998)

The highest number of leprosy patients was from

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Table 1. Age and sex distribution of leprosy patients by division and period in the Mbingo leprosarium (1961 to 1998)

Period	Age group (Years)	Division										
		Mezam		Menchum		Boyo		Bamboutous		Others		Total
		M	F	M	F	M	F	M	F	M	F	
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Pre-MDT (1961 to 1967)	<20	15 (1.4)	8 (0.8)	7 (0.7)	6 (0.6)	0	0	0	0	42 (4.0)	14 (1.4)	92 (8.8)
	20+	19 (1.8)	32 (3.0)	25 (2.4)	33 (3.2)	1 (0.09)	0	0	0	30 (2.9)	39 (3.7)	179 (17.1)
	Sub Total	34 (3.3)	40 (3.8)	32 (3.0)	39 (3.7)	1 (0.09)	0	0	0	72 (6.9)	53 (5.0)	271 (25.9)
Post-MDT (1982 to 1998)	<20	5 (0.5)	4 (0.4)	24 (2.3)	16 (1.5)	0	0	2 (2.0)	20 (0.2)	10 (1.0)	5 (5.0)	68 (6.5)
	20+	43 (4.1)	79 (7.6)	97 (9.3)	116 (11.1)	4 (0.4)	4 (0.4)	66 (6.3)	115 (11.0)	110 (10.5)	72 (6.9)	706 (67.6)
	Sub Total	48 (4.6)	83 (7.9)	121 (11.6)	132 (17.6)	4 (0.4)	4 (0.4)	68 (6.5)	117 (11.2)	120 (11.5)	77 (7.4)	774(74.1)
Pre-and Post-MDT (1961 to 1998)	<20	20 (1.9)	12 (1.2)	31 (3.0)	22 (2.1)	0	0	2 (0.2)	2 (2.0)	52 (5.0)	19 (1.9)	160 (15.3)
	20+	62 (5.9)	111 (10.6)	122 (11.7)	149 (14.3)	5 (0.5)	4 (0.4)	66 (6.3)	115 (11.0)	140 (13.4)	111 (10.6)	885 (84.7)
	Total	82 (7.8)	123 (11.8)	153 (14.7)	171 (16.4)	5 (0.5)	4 (0.4)	68 (6.5)	117 (11.2)	192 (18.4)	130 (12.5)	1045 (100)

M = Male; F = Female; MDT = Multi-drug theory

the North West Province was 785 (75.1%) followed by the West Province 209 (20.0%) of Cameroon. The proportion of cases from the North West Province during the post MDT period (69.5%) was lower than that in the pre-MDT period (96.1%). There were only 5 (0.5%) foreigners including 4 (0.4%) Nigerians and 1 (0.1%) American. Results showed that 80% of these foreigners were admitted in the post-MDT period.

Distribution of leprosy patients by division, age and sex from 1961-1998

The records revealed that the highest number of leprosy patients were from Menchurn division with 324 (31.0%) cases in the post-MDT period with only 21.9% in the pre-MDT period followed by Mezam 205 (19.6%) cases and Boyo 9 (0.9%) cases. During the pre-MDT era, Menchum, Mezam and Boyo divisions had 71 (6.8%), 74 (7.1 %) and 1 (0.09%) cases respectively but from 1982 to 1998, Menchum, Mezam and Boyo divisions had 253 (24.2%), 131 (12.5%) and 8 (0.08%) cases respectively. Bamboutous division registered 185 (17.70/0) cases from 1982 to 1998. Details of age and sex distribution of the leprosy patients shown in Table 1 indicate that there was a statistically significant difference between the divisions ($p<0.05$). For both the pre-MDT and post-MDT periods, more females than males had leprosy. But from Table 1, it was found that there was male preponderance in each of the divisions for patients less than 20 years of' age. The age and sex distribution of leprosy patients was statistically significant in Mezam ($p = 0.00$) and Bamboutous ($p = 0.01$) divisions.

Classification of leprosy patients according to age and type of disease

The Havana classification (indeterminate (I), tuberculoid (TT), lepromatous (LL)) of leprosy (1948) was used for cases reported between 1961 to 1967. The Ridley/Jopling classification (1966) (TT, BT (borderline tuberculoid), borderline borderline (BB), borderline lepromatous (BL)), LL was used from 1982 to 1998. The commonest type of leprosy in the study area before the implementation of MDT was TT with 175 (16.7%) cases. During the post-MDT era, the commonest types of leprosy were BT 264 (25.2%) and LL 193(18.5%) cases. For the period of 1961 to 1998, leprosy was more common among those above 20 years than the young ones; 179 (17.1%) from 1961 to 1967 and 706(67.5%) from1982 to 1998 (Table 2).

Epidemiological trend of incident leprosy in the leprosarium (1961 to 1998)

The secular trend of incident leprosy shows three humps: 1962, 1964 and 1985 as demonstrated in. After the sudden peak, the incidence of

Table 2. Distribution of types of leprosy by age in the study area (1961-1998).

Period	Age Group (Years)	Types of Leprosy						
		I	TT	BT	BB	BL	LL	Total
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Pre-MDT (1961 to 1967)	<20	5 (0.5)	65 (6.2)	0	0	0	22 (2.1)	92 (8.8)
	20+	21(2.0)	110 (10.5)	0	0	0	48 (4.6)	179 (17.1)
	Sub Total	26 (2.5)	175 (16.7)	0	0	0	70 (6.7)	271 (25.9)
Post-MDT (1982 to 1998)	<20	0	9 (0.9)	23 (2.2)	18 (1.7)	8 (0.8)	10 (1.0)	68 (6.5)
	20+	0	81 (7.8)	241 (23.0)	140 (13.4)	61 (5.8)	183 (17.5)	706 (67.6)
	Sub Total	0	90 (8.6)	264 (25.2)	158 (15.1)	69 (6.6)	193 (18.5)	774 (74.1)
Pre and Post-MDT (1961 to 1998)	<20	5 (0.5)	74 (7.1)	23 (2.2)	18 (1.7)	8 (0.8)	32 (3.1)	160 (15.3)
	20+	21 (2.0)	181 (18.3)	241 (23.0)	140 (13.4)	61 (5.8)	231 (22.1)	885 (84.7)
	Total	26 (2.5)	255 (25.4)	264 (25.2)	158 (15.1)	69 (6.6)	263 (25.2)	1045 (100)

I=Indeterminate leprosy, TT=tuberculoid leprosy, BT=borderline tuberculoid leprosy, BB=borderline borderline leprosy, BL=bord erline lepromatous leprosy, LL= lepromatous leprosy

leprosy cases recorded increased in 1962 with 50 (10.8 %) cases and 1964 with 48 (10.4%) cases. It decreased to zero level in 1982. However, these numbers began to increase in 1983 sharply reaching a peak in 1985. Thereafter, admissions gradually slowed down Figure 3.

Distribution of incident leprosy in the leprosarium by division (1961 to 1998)

Among the 180 (38.9%) incident cases in the leprosarium before the implementation of MDT (1961 to 1967) in 1982, 50 (10.6%) cases were from Menchum, 48 (10.4%) from Mezam and 1 (0.2%) from Boyo (p=0.45). From 1982 to 1998, the number of incident cases increased from zero to 283(61.1%) with 95(20.5%) cases from Menchum, 37 (8.0%) from Mezam and 2 (0.4%) from Boyo ($p < 0.05$). For the period 1961 to 1998, therefore, the highest number of incident cases admitted was from Menchum division with 145 (31.3%) cases followed by Bamboutous division with 76 (16.4%) cases during the post-MDT period.

Age, sex and type of incident leprosy cases in the study area (1961 to 1968)

Of the 180 (38.9%) incident cases from 1961 to 1967, 135 (75.0%) were above 20 years and 45 (25%) were below 20 years compared to 247 (87.3%) and 36 (12.7%) respectively for 1982 to 1998. The differences in the distribution of incident leprosy with age during the pre and post-MDT periods were statistically significant ($p<0.05$). From 1961 to 1998, there were more females with new leprosy 257 (55.5%) versus 201 (44.5%) respectively. The sex difference and types of new leprosy cases was not statistically significant (p=0.17). A distribution of types of new cases of leprosy with age showed that people older than 20 years were more than the younger ones; 380 (82.1%) versus 83 (17.9%) respectively but this was not statistically significant (p=0.11). The commonest types of new leprosy cases were TT: 126 (27.2%) cases from 1961 to 1967 and BT: 86(18.6%) cases and BB: 80(17.3%) cases from 1982 to 1998. A statistically significant difference between age, sex and type of leprosy was observed for BT among new admissions ($p<0.05$).

DISCUSSION

Impact of MDT on leprosy transmission

MDT has been very effective in the treatment of leprosy coupled with its cost effectiveness, low side effects, low relapse rates and high compliance (WHO, 1995). According to Meima (2002) the reasons for declining trends in the transmission and incidence of leprosy may be related to several factors: the period during which *Mycobacterium leprae* is transmitted, which can

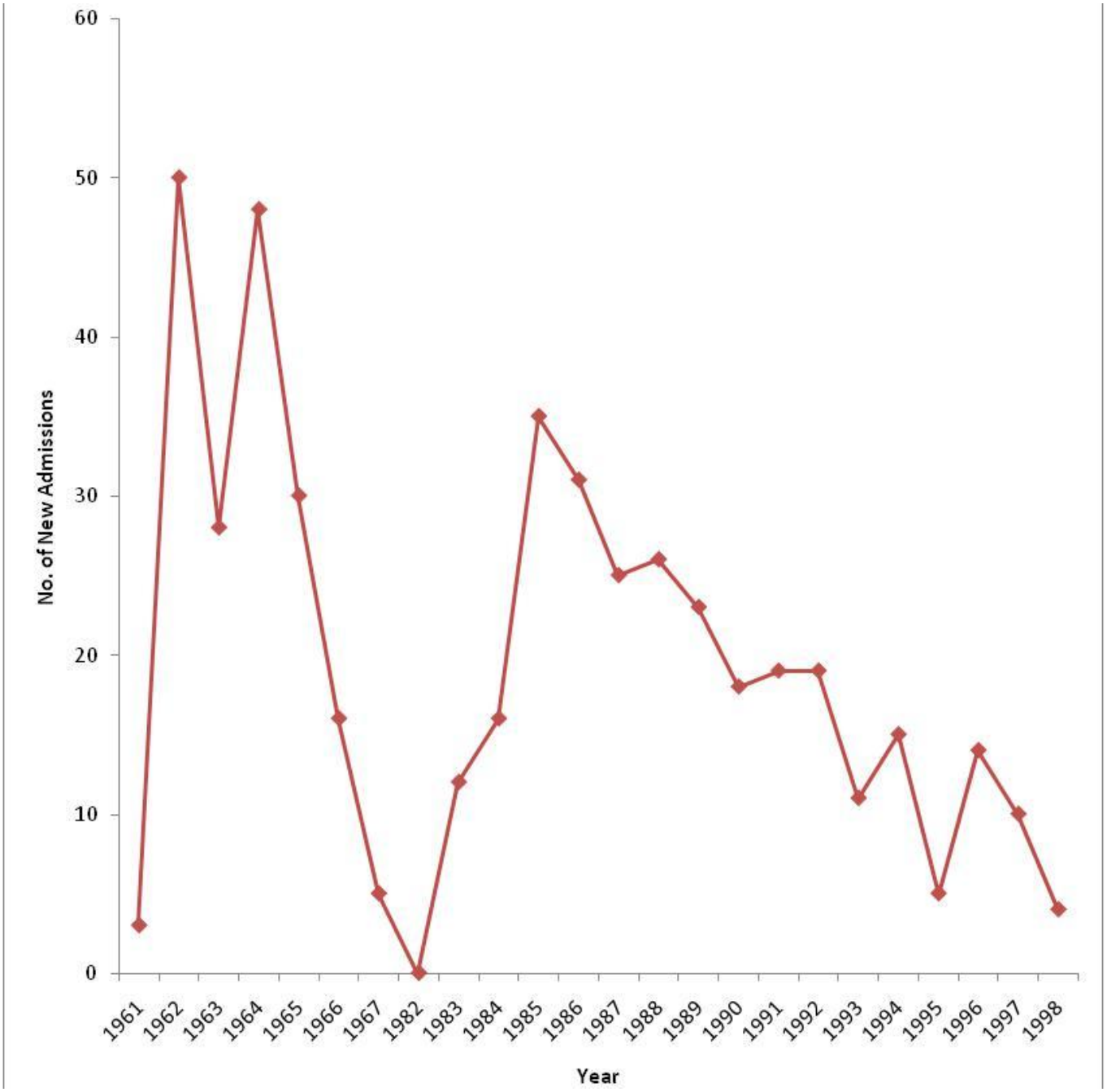

Figure 3. Secular trend of new admissions of leprosy in the study area from 1961 to 1998.

be reduced by early case detection and chemotherapy, BCG vaccination, which is widely administered as a preventive measure against tuberculosis but appears to afford more protection against leprosy than tuberculosis (Fine and Smith, 1996) and socioeconomic conditions, which are thought to play an important role in leprosy (International Leprosy Association Technical Forum, 2002). Economic improvement may result in a decline in incidence such as housing conditions, number of persons per household per room, family size and nutritional factors. Possible protection of tuberculosis against leprosy (Fine, 1982), either by immunization or by competing risk can also reduce the incidence of leprosy.

A further problem is the delay between onset of disease and detection. For instance, in the ALERT control programme in Ethiopia, the average detection delay exceeded two years. The ease of transmission of leprosy is not known. The group at risk of developing leprosy might be small, possibly due to genetic factors (leprosy infection is suggested to be more common than

leprosy disease (Fine, 1982; Noordeen, 1985) or because close contact is important. Close contact household and family, neighbours, social and business contact has been suggested to play a key role in transmission (van Beers et al., 1999). It is well possible that close contacts of a leprosy patient become infected rapidly. If close contact is indeed important, this may lead to a rapid decrease in the patient's opportunities to transmit *M. leprae*. Thus, "early" detection may still be too late to prevent much of transmission by subsequent treatment. Other factors which could limit the impact of leprosy control have also been suggested, including carriage of *M. leprae* in the nose, persistence of *M. leprae* in the soil, and animal reservoirs (Blake et al., 1987; Reich, 1987; Kazda et al., 1990; Klatser et al., 1993). Studies by Nsagha et al., (2009) have highlighted a number of operational barriers to MDT usage ranging from insufficient coverage, lack of comprehensive and continuous health care, MDT shortage, ignorance, insufficient use of resources and lack of confidence in leprosy treatment because of the occurrence of deformities among treated cases.

Epidemiological trend of leprosy in the Mbingo leprosarium

The increase in the number of discharged cases over the years may be due to the curative effect of MDT which encouraged self-reporting for treatment. The new admissions of leprosy in MBH followed a secular trend from 1985 to 1993 and periodic trends occurred between 1994 and 1997. The number of new cases of leprosy has been on the decrease in the leprosarium since the implementation of MDT in 1982. This secular trend could be partly due to the implementation of MDT in the leprosarium in 1982 (WHO, 1982; Provincial Delegation of Public Health, 1996). MDT is known to have reduced the number of leprosy cases in the world from 10 to 12 million in 1990 to 1.6 million in 1998 (WHO, 1998). The decrease in the secular trend could also be due to the integration of leprosy into the primary health care system in Cameroon in 1991 (Daumerie, 1991; Nsom, 1999) which enabled many health centers at the level of the districts to handle leprosy cases. The records revealed that leprosy was more common in the age group of people above 20 years. This agrees with the findings of Noordeen, (1985) and Berthe et al., (1990) who discovered that in endemic areas there is a clear peak of leprosy in the older age group.

Geographical distribution of leprosy cases in the leprosarium from 1961 to 1998 in the Mbingo leprosarium

The results clearly indicate that in the study area, Menchum division contributed to the bulk of leprosy in the leprosarium. The uneven distribution of leprosy in Boyo, Menchum and Mezam divisions is a common characteristic of leprosy because this uneven pattern has been reported by many leprosy workers (Noordeen, 1985; Brightmer, 1990). The factors contributing to the geographical variations are not quite clear except that they probably involve several factors such as opportunities for exposure (dressing habits, occupational hazards such as in farming) and genetic factors (Noordeen, 1985). Other factors such as the nutrition and social class rating of the subjects may also be considered. The Essimbi people of Menchum division live in small over-crowded one-room houses that could facilitate the transmission of leprosy if one household member is suffering from the disease (Nsagha, 2002). The proximity of Menchum division to the leprosarium may enhance the capacity of inhabitants to have a better knowledge of the disease, which encouraged self-reporting. The remote and enc1aved nature, bad roads and limited health facilities in Menchum division may also be contributing factors (Nsagha, 2002). Menchum division is one of the least populated divisions of the North West Province with a population of 119,921 (Provincial delegation of Public health, 1996) but the chart review showed that the bulk of leprosy patients in the province came from there even though the population is very scanty. This pattern corresponds with that of other researchers who have remarked on the apparent association in tropical Africa of areas of highest leprosy rates coinciding with areas of sparse population density (Brightmer, 1990; Hunter and Thomas, 1984).

An association noted in Ethiopia (Berthe et al., 1990) of high leprosy prevalence corresponding to the highland regions of the country does not occur in this study area of Cameroon because Menchum Division is not a plateau. The chart review has revealed that leprosy is generally on the decrease in the study area. The decline of leprosy may be due to the natural course of the disease and to changes in the socio-hygieno-economic conditions in these areas (Nsagha, 2002). As has occurred in other parts of Nigeria (Waaldijk, 1989) the decline in the prevalence of leprosy may be related to the increased activity of the leprosy supervision whereby many health centers in the districts take care of leprosy nowadays contrary to the years before 1991 when leprosy was handled only by vertical programmes of the leprosarium (Nsagha, 2002).

From the chart review, new cases of leprosy from Boyo division have always been the least. Taking into consideration that many of the patients in the leprosarium act as reservoirs of infection, genetic factors and environmental sanitation of inhabitants from this division need to be taken into account when interpreting these results. Inhabitants of Boyo division may have developed immunity to clinical leprosy.

The records from the Provincial Delegation of Public

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Health in the North West Province (Provincial Delegation of Public Health, 1996) showed that Boyo and Menchum divisions had prevalence above the WHO standard of elimination of leprosy as a public health problem. But chart review results in the Mbingo leprosarium from 1982 to 1998 showed very few cases from Boyo division. The high number reported by the provincial delegation may be due to the fact that Boyo division has a better health infrastructure for the treatment of leprosy (the leprosarium) and some cases in the surrounding divisions and regions prefer to seek medical care in the leprosarium, sometimes to escape the social stigma attached to the disease in their communities (Nsagha, 2002). This situation has been observed from Yemen (Al-Qubatic and Al-Dobai, 1999).

Bamboutous division is the most easily accessible division from the French speaking Cameroon with respect to the leprosarium (about 45 km). Inhabitants from this division could have a better awareness of the disease because of its proximity to the leprosarium and tend to self-reporting more than the other regions. The leprosarium, being a Baptist leprosy hospital, inhabitants from Bamboutous division could prefer to come there instead of going to government clinics because of the respect they will receive from the mission hospitals considering the high social stigma attached to leprosy. The high number of incident leprosy patients from Bamboutous division could also mean there are many cases of leprosy there. The backlog of patients from Menchum and Bamboutous will continue to provide the pool of leprosy infection in the study area, which can hinder the effective control of the disease. The Ministry of Public Health should initiate special action projects for the elimination of leprosy (SAPEL) and leprosy elimination campaigns (LEC) in these areas in collaboration with the WHO.

The commonest ethnic groups in the study area are Bekom, Essimbi and Mankon but 31.0% leprosy cases from 1961 to 1998 were from Essimbi land. The Ethnic variation could be geographical than ethnic (Noordeen, 1985). Leprosy is said to cluster in specific geographical locations (Ong, 1999). Danielsein and Boek (1848) made the astute epidemiological observation that 'leprosy tends to cling to specific families' and this has supported and propagated the idea that leprosy is hereditary and therefore genetic.

Sex distribution of leprosy in the Mbingo leprosarium

Among the 1045 leprosy patients from 1961 to 1998, there were more females (545) than males (500). Among 463 new cases of leprosy from 1961 to 1998, there were 257 females and 206 males. For the period, 1961 to 1967, results showed that more new cases of leprosy were among females than males, 97 (53.9%) versus 83 (46.1%) (P>0.05). For the period of 1982 to 1998, there were still more incident leprosy cases among females than males, 160(50.5%) versus 123(43.5%) (p= 0.00). In 1985, Noordeen reported that the male:female ratio of leprosy in Cameroon was 2:1. A similar ratio was reported from Yemen (Al-Qubatic and Al-Dobai, 1999).

The sex distribution of leprosy in Cameroon has changed with more females having leprosy than males. The occurrence of more cases among females than males from chart review in the leprosarium may be due to environmental factors. In the study area, farming is carried out mostly by women and during the hot seasons, they work partially bare body. The women therefore have increased exposure opportunities to infection because leprosy bacilli have been reported to be present in the soil in Norway (Kazda, 1990). Among the environmental factors, differing clothing habits are sometimes mentioned (Cochcrane, 1947). Even though women and men in many parts of Africa dress alike and thus cover their bodies to about the same extent (Noordeen, 1985), women in the study area, culturally don't wear trousers that could cover their legs. This may be a predisposing factor for leprosy infection. In the leprosarium, all the leprosy workers observed were men. It could mean that the examination of women in the area by these male workers is less' complete and satisfactory since culturally women do not undress in front of men and also women are always shy when examined by male health workers (Nsagha, 2002). This may explain why more infectious forms were discovered among males than females. Males in general are exposed to greater risks of infection as a result of their more exposed life style (Noordeen, 1985; Al-Qubatic and Al-Dobai, 1991) and may tend to have leprosy more than females.

Proportion of multi-bacillary and pauci-bacillary cases of leprosy in the Mbingo leprosarium

It was observed that among the admissions in the leprosarium from 1961 to 1967, there were 70 (23.8%) lepromatous cases of leprosy compared to 201 (74.2%) pauci-bacillary cases and from 1982 to 1998, there were 420 (54.3%) lepromatous cases compared with 354(45%) tuberculoid cases. In Africa, a low proportion of lepromatous cases has been reported (Cap, 1981). In this study, a significantly high prevalence of multi-bacillary forms of leprosy was observed, sufficient to make the distribution different from most parts of Africa (Nsagha, 2002). This discrepancy was also observed in Ethopia (Berthe et al., 1990). Noordeen (1985) noted that in areas where leprosy is dying out, the few cases that occur do have a predominance of lepromatous leprosy. This could be due to the fact that multi-bacillary leprosy takes a much longer time to be treated (two years) as against 6 months for the tuberculoid type using the current WHO MDT since the bacillary load is much.

Relapsed leprosy in the Mbingo leprosarium

From 1961 to 1967, there were 8 relapsed cases of leprosy with 3 (37.5%) occurring in 1962 and 2 (25:0%) in 1963 and 1966. Twenty relapsed cases of leprosy were recorded from 1982 to 1998. More females suffered relapsed leprosy from 1982 to 1998 than males (54.54% versus 45.46%). Even though MDT was introduced in the center in 1982, cases of relapses were documented after MDT implementation. In the leprosarium milieu, the increased bacillary load could lead to further disease progression or relapse (Kyriakis et al, 1994) because of the presence of many infectious forms. Relapses could have also been due to discharged cases from dapsone monotherapy or wrong classification. Relapsed leprosy can hinder the control of the disease since these cases can transmit the infection to other community members.

Leprosy readmissions in the Mbingo leprosarium

Readmissions for leprosy reactions were observed entirely with multi-bacillary leprosy (BB, BL, LL) even though the registers did not indicate whether readmissions were for type 1 (reversal reaction) or type 2 (erythema nodosum leprosum) leprosy reactions. The bacterial load is higher in multi-bacillary than pauci-bacillary leprosy, hence, readmissions were recorded only among patients with the former type of the disease. The decrease in number of readmissions from 1961 to 1998 could be due to the effectiveness of MDT in the treatment of leprosy.

Defaulters of leprosy treatment in the Mbingo leprosarium

Out of 173 discharged patients between 1982 to 1998 in the Mbingo leprosarium, 14 (1.3%) were defaulters but there were no defaulters from 1961 to 1967. Studies in Tanzania showed that 3% of patients indicated ignorance as a reason for default while 27% defaulted for unknown reasons (Hertroijs, 1974). Illiteracy and ignorance have also been reported as reasons for default from India (Bhgagoliwal et al, 1979). Deficient knowledge of leprosy determinants such as free treatment as well as the social stigma are some factors that need to be considered when interpreting why the patients defaulted.

Mortality of leprosy patients in the leprosarium

No deaths were reported from 1961 to 1967 compared to 14 deaths registered among the patients from 1982 to 1998 but the registers could not indicate whether the deaths were due to complications of leprosy or some other causes. It is note worthy that leprosy can disfigure and mutilate but it is not fatal. Leprosy is rarely an immediately cause of death but its psychosocial implications are enormous. In some communities in the world, because of the social stigma of leprosy, patients are killed or some decide to take away their life because of the frustration from the social stigma (Bryeceson and Pfaltzgraff, 1990).

CONCLUSION

The majority of the leprosy cases were from Menchum Division where Essimbiland is found. Since 1982, MDT has reduced the burden of leprosy in the leprosarium as many patients have been discharged. Record keeping on leprosy was generally poor as medical records from 1967 to 1982 were not available. Also, important demographic variables such as religion, occupation, educational, marital status, laboratory diagnosis, type of rehabilitation offered, presence or absence of deformities, disabilities and types were lacking.

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