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Leprosy Review

A journal contributing to the better understanding of leprosy and its control

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LEPRA

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Leprosy Review is published by the British Leprosy Relief Association (LEPRA) with the main objective of contributing towards the better understanding of leprosy and its control. Original papers on all aspects of leprosy, including research, are welcomed. In addition, *Leprosy Review* seeks to publish information of educational value which is of direct benefit to the control of leprosy under field conditions, and hence to the individual patient. The Journal aims to interpret what is being done in other disciplines, particularly for field workers.

From time to time the Editorial Board invites special articles or editorials from experts in various parts of the world, and gives consideration to the production of a supplement or special number devoted to a particular subject or theme of major importance.

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Editorial

IS THERE A DECLINE IN LEPROSY PUBLICATIONS AND RESEARCH?

Concern has been expressed recently that it is becoming more difficult to secure funds for leprosy research, particularly basic biomedical research as opposed to clinical or health services research. It is hard to say whether this is true or not as funding agencies will often turn the issue around and affirm that there are funds for good research suggesting that it is the researchers themselves who are turning to new areas. The background to this discussion is the success of the global MDT programme[1] and the question of the need for further basic research. There is evidence that chemotherapy research is still very active with new drugs and new regimens under investigation.[2]

One approach to addressing whether or not there has been a reduction in research is to review the leprosy publications in the literature. Electronic databases such as Medline make this task possible.[3] Medline is an electronic system covering the international literature on biomedicine, including the allied health fields and the biological and physical sciences, humanities, and information science as they relate to medicine and health care. Medline indexes information from approximately 3600 journals published worldwide including *Leprosy Review*, *International Journal of Leprosy*, *Indian Journal of leprosy*, *Acta Leprologica* and the *Japanese Journal of Leprosy*. It is produced by the National Library of Medicine and is updated monthly.

A count of the number of publications indexed based on the keyword 'leprosy' from 1980 to 1994 is shown in Figure 1. The pattern shown reveals a decline in the total number of leprosy publications (all languages) from 1991 to 1994, this was preceded by a rise from 1984 to 1988. There is no evidence of peaks of publications associated with the International Leprosy Congresses (1984, 1988, 1993) which might have been expected. The leprosy publications in English follow the same pattern as that of all languages, however the pattern of publications in the Abridged Index Medicus (AIM), which is a restricted set of 119 core clinical journals, shows a more sporadic pattern. The pattern of publications in tuberculosis, using the same method and over the same time period, shows an increasing trend from about 1984 (Figure 2).

This count of publications does tend to indicate a reduction in leprosy publications back to the levels of the mid-1980s, however, the current trend may yet continue downwards. Research publication numbers is not the same as research

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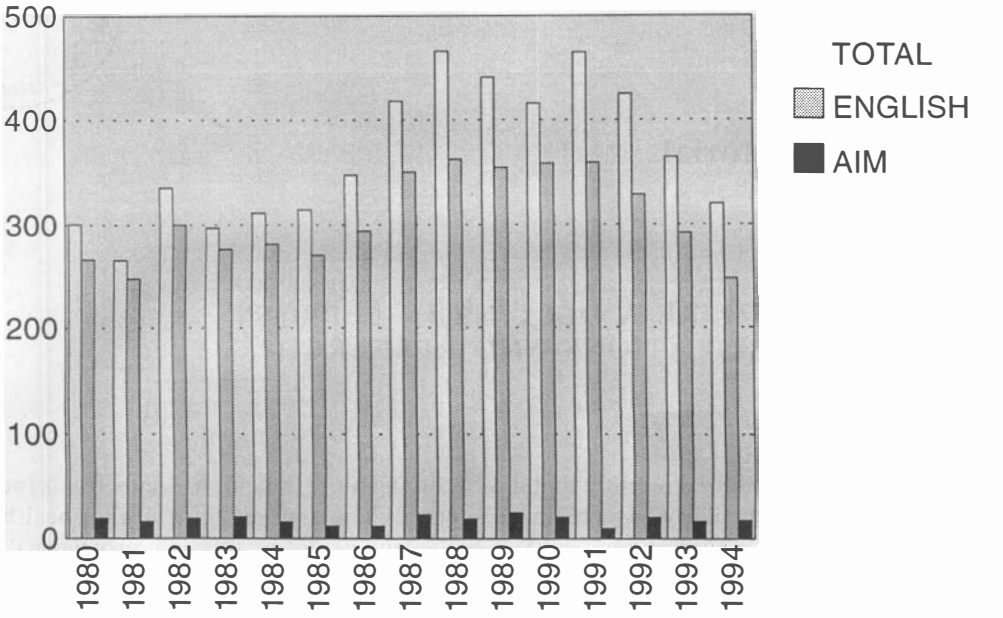

Figure 1. Leprosy publications, Medline 1980–94.

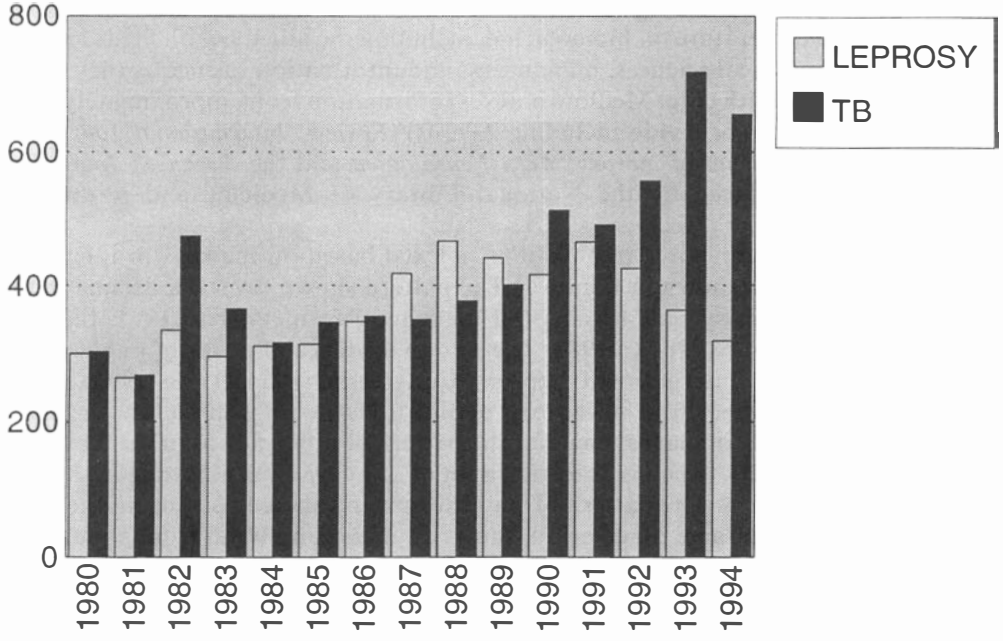

Figure 2. Leprosy and tuberculosis publications, Medline 1980–94.

funding and would follow sometime after research funding. The decline in numbers of publications may also reflect the trend towards quality rather than quantity in publications. More important than concern about levels of funding and research is the issue of identifying what are the key research questions in leprosy which need to be addressed. As the global leprosy situation changes new questions need to be addressed and new technologies applied to old questions. The many unresolved questions about transmission, early infection and the development of protective immunity become increasingly important in post-elimination considerations of moving to eradication. The pathogenesis and natural history of nerve damage as well as its early detection and effective treatment are still areas of need for research.

Clinical research and health services research are less demanding of financial resources and reduced workload in many programmes as a result of the implementation of MDT should give more time for programme staff to engage in research or to write up for publication work recently undertaken. Research is needed into the relationship between case detection and true incidence rates, into disability assessment and prevention, into the needs for and the most effective means of rehabilitation. I am sure editors would want to see more publications rather than less. Major progress in leprosy has been achieved in the last 10 years, research needs are changing but the work which still needs to be done should not be underestimated. Research should be paving the way to providing more effective treatment and rehabilitation for leprosy patients and for tackling the long-term sequelae of leprosy infection, as well as the possibility of leprosy eradication.

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Serological reactivity to a synthetic analog of phenolic glycolipid I and early detection of leprosy in an area of low endemicity

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Summary A total of 23,863 individuals living in an area of low endemicity for leprosy were tested by enzyme-linked immunosorbent assay with a semisynthetic analogue of the phenolic glycolipid I antigen of *Mycobacterium leprae*. The proportion found positive was 3·86% which was significantly higher than that in a sample of a population known to be free of leprosy. Clinical examinations as well as Mitsuda and skin smear tests were organized for those defined as seropositive. The proportion of individuals with lepromin reactions of less than 3 mm increased 18·9% per serological interval as antibodies rose though it was not statistically significant. As a result of the clinical and bacteriological examinations, 2 cases with clinical signs and heavy bacillary load were found, whereas acid-fast bacilli were demonstrated in 2 other individuals without clinical manifestations of leprosy. The usefulness of the system for control purposes is discussed.

Introduction

The development of immunological tests capable of identifying *Mycobacterium leprae*-infected individuals has been one of the principal goals of leprosy research since the beginning of this century.[1,2] Therefore, the isolation and chemical characterization of a *M. leprae* species specific antigen, the phenolic glycolipid I (PGI),[3] followed by the preparation of artificial antigens containing the species specific moiety of PGI[4] made possible their use in serological tests and gave rise to hope for the availability of a long sought serodiagnostic method for the early detection of clinical disease and for the identification of individuals with subclinical infection and, hence, at risk of contracting leprosy.

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After these antigens became available, numerous studies, mainly by an enzyme-linked immunosorbent assay (ELISA), have been conducted throughout the world in order to study the humoral response to *M. leprae* and to evaluate the usefulness of this tool for seroepidemiological surveys and control purpose. Most of the published studies have been cross-sectional, variously comparing antibody levels in panels of sera from patients of all leprosy types as well as from patients' contacts and healthy individuals from leprosy endemic and nonendemic areas. In a recent revision of the subject, Smith[5] noted that the results from the cross-sectional studies suggest that PGI antibodies provide a sensitive test for multibacillary (MB) leprosy but that it is much less useful for the detection of paucibacillary (PB) cases and pointed out, on the basis of this latter observation and of a reasonable statistical assumption, that it appears that the contribution that serodiagnostic methods can make over normal diagnostic procedures is rather limited at the present time; and that, to assess more rigorously the usefulness of PGI antibody levels in predicting who will develop clinical disease, it is necessary to conduct studies in which individuals are followed prospectively for signs of leprosy after sera have been collected from apparently healthy individuals.

In Cuba, previous studies[6,7] showed some evidence that a positive result of the serological test could lead to the detection of individuals without clinical signs but with acid-fast bacilli (AFB) demonstrable in their skin smears, as well as of cases with early clinical signs and others with more advanced disease who were shedding AFB and had not been detected through the normal activities of the control programme. These findings offered encouragement to undertake a wider seroepidemiological study since skin-smear positive cases are thought to make the greatest contribution to the spread of *M. leprae* infection.

Materials and Methods

STUDY AREA

The study area was the city of Trinidad and 3 other small neighbouring villages called Casilda, Condado and Caracusey. Trinidad, head of the municipality of the same name, is situated in the central part of Cuba near the southern shore. On 31 December 1992, 69 leprosy patients were registered in the municipality, all but one were living in the study area and were receiving or had completed multidrug therapy (MDT). In the area, as in the whole country, leprosy rates are low. In the 13-year period 1980–92, 42 patients were diagnosed ($X = 3{\cdot}2$). According to the Madrid classification, 12 of them were classified as tuberculoid, 10 as indeterminate, 2 as dimorphous and 18 as lepromatous. The local laboratory found 13 (31%) of these cases as skin-smear positive when detected. The total population of the study area was estimated to be 44,578 inhabitants (Table 1) at the beginning of the work (October 1992).

BLOOD COLLECTION

Since there is no leprosy in children in the study area, the eligible population considered was above the age of 9 years, and was estimated at 37,895 (Table 1). Blood was obtained by a finger-prick and absorbed onto a small piece of Whatman No. 4 Chr paper attached to a form for individual identification data. The papers were air-dried at ambient

temperature in the shadow, kept in sealed plastic bags under refrigeration for not more than 15 days in the field and sent to the Tropical Medicine Institute "Pedro Kouri" (JPK), Havana, where they were stored at - 20°C usually for not more than 1 month before testing. Known leprosy patients were excluded from the study. Approximately half of the samples were collected in October 1992 and the rest in January 1993.

Burgess *et al.*[8] stated that test specificity estimates have been based on sera from nonleprosy cases living in endemic areas or on sera for nonendemic areas. Neither of these is ideal in so far as control individuals from endemic areas might be infected with *M. leprae* and individuals from nonendemic areas are liable to lack exposure to other potentially cross-reacting infections, which will in fact determine specificity when the tests are applied in endemic areas. Trying to minimize this inconvenient fact, blood spots were collected from 430 individuals, aged above 9 years, living in a small village called Puerto Manati. This village is situated in the province of Las Tunas which is the Cuban province with the lowest leprosy rates, its mean annual detection rate is only 0·9 per 100,000 in the decade 1980–89 and, particularly, neither present nor former leprosy cases are registered in Puerto Maniti where the population is known to be very stable.

ELISA

The procedure was basically the same as that described by Cho *et al.*[9] with some modifications. The antigen used was ND-A-BSA prepared at the Havana University Faculty of Chemistry and obtained by courtesy of Dr V. Verez. This antigen had been previously tested in parallel with Gigg DISSACH, provided by WHO, with excellent results. Discs of 5–mm diameter, found to absorb about 5 μl blood, were punched from the blood-impregnated paper and eluted overnight at 4°C in 400 μl of phosphate-buffered saline (PBS) containing 2% skimmed milk to an equivalent serum dilution of 1/200. The antigen was dissolved in a carbonate–bicarbonate coating buffer (pH 9·6) to the concentration of 2 μl/ml, and added at the amount of 50 μl to wells of flexible PVC plates (Flow Laboratories) which were incubated at 37°C for 18 hr. Wells were washed 4 times with PBS, blocked by the addition of 100 μl of PBS containing 5% skimmed mild and incubated at 37°C for 1 hr in a moist chamber. The contents were aspirated and 50 μl of the eluted samples were added. Plates were incubated at 47°C for 1 hr, washed 6 times with PBS, followed by the addition of rabbit anti-human JgM-peroxidase conjugate reagent (DAKO-Immunoglobulins a/s, Denmark) diluted 1/1000 in PBS–2% skim milk. After a 1 hr incubation and 4 further washings, 50 μl of H_2O_2-O-phenylene diamine substrate-dye reagent in citrate phosphate buffer were added and incubated at 37°C for 10 min. Reactions were terminated with 2·5 N H_2SO_4 and the absorbance was read at 492 nm in a Titertak Multiskan MC reader. Pool of sera from untreated lepromatous patients adjusted to give an OD value of 1·000 and from healthy subjects were included as controls in each plate. In order to save time and materials, the samples were tested in two steps: first, each elution was added to only 1 antigen coated well and, second, those giving OD readings higher than 0·200 were tested again, this time using 2 antigen coated wells and 1 BSA coated well. The results were expressed as the mean OD of antigen duplicates minus the OD of the BSA well. A correction factor was applied to compensate for plate-to-plate variation in results recorded for the positive control pool. On the basis

of the results observed on the Puerto Manati samples, the criterion for positivity was an OD reading above 0·199.

CLINICAL AND BACTERIOLOGICAL EXAMINATION AND MITSUDA TEST

Clinical and bacteriological examination as well as Mitsuda tests were organized for those with a serological test result above the established cut-off value. The skin-smear test would be performed in individuals showing OD readings above 0·399 or when skin lesions could possibly be leprosy were found irrespective of the serological results. Clinical and bacteriological examinations were performed in May 1993 by 2 doctors trained in leprosy. The tissue pulp samples for the smears were taken from both earlobes, left elbow, left knee and skin lesions if found. The lepromin used was prepared at the IPK laboratory from *M. leprae* infected armadillo tissues kindly provided by WHO and adjusted to contain 4×10^7 AFB per millilitre.

Results

The number of individuals from the study area who were serologically tested was 23,863 that is 63·0% of the eligible population. Table 2 shows the frequency distribution of ELISA results from both the study population and the presumably *M. leprae* non-infected controls from Puerto Manati. None of the control samples showed an OD reading higher than 0·299 and only 2 in the interval 0·200–0·299. If the criterion for positivity is set at an OD value higher than 0·199, then the resulting test specificity is 99·5%. Thus, the overall positivity rate was 3·86% in the study population, significantly higher than in the Puerto Manati population (comparison of 2 proportions, $Z = 15{\cdot}32$, $P < 0{\cdot}0001$).

Not all the subjects found to be ELISA positive could be clinically examined and Mitsuda tested (Table 3). Table 4 shows the results of the lepromin tests according to the serological intervals. Although there is a linear relationship between the 2 variables ($\chi^2 = 10{\cdot}1118$ 6 df) with a slope (β) = 0·1891 (Model $P = \alpha + \beta xi$) which means that the proportion of individuals with lepromin reactions of less than 3 mm increases 18·91% per interval of PGI antibodies as these latter rise, this increase is not statistically significant ($\chi^2 = 1{\cdot}349$ 1 df) possibly due to the small number of individuals in the highest OD intervals.

Table 1. Estimated population of the study area

Area	Total	> 9 years
Trinidad	34,190	29,062
Casilda	4424	3763
Condado	2916	2479
Caracusey	3048	2591
Total	44,578	37,895

Table 2. Number (%) of test results according to serological intervals

Serological interval	Study area	Puerto Manati
< 0·200	22,958 (96·207)	428 (99·535)
0·200–0·299	542 (2·271)	2 (0·465)
0·300–0·399	217 (0·909)	0
0·400–0·499	94 (0·394)	0
0·500–0·599	36 (0·151)	0
0·600–0·699	10 (0·042)	0
0·700–0·799	3 (0·012)	0
0·800–0·899	2 (0·008)	0
0·900–0·999	1 (0·004)	0

As for the clinical examinations, 2 old men, 60 and 71 years old, presented with signs of leprosy. The first case showed with moderate infiltration of both earlobes, partial loss of the eyebrows laterally and scarce micronodules in the left upper limb, this man was a household contact (husband) of a registered and treated lepromatous patient and had refused previous examinations organized by the programme for patients' contacts. The second case also presented with some micronodules in the left upper limb and both lower limbs, no other clinical sign was noted in this case, who was a neighbour of the former case. Both were found to be skin-smear positive with a heavy bacillary load. A third case, a 43-year-old woman was found to be skin-smear positive with a Bacteriological Index (BI) of 2+ at all sampled skin sites but, remarkably, no clinical signs at all were noted when examined. This case was a nonhousehold contact (niece) of a registered and treated lepromatous patient. All 3 cases (Table 5) were promptly put on MDT as recommended by WHO for MB patients.[10] Yet, in the skin smears from a fourth case 1 AFB could be seen, the smears were then carefully scrutinized for more AFB but no further organisms were observed. The OD value for this case was 0·659, his clinical examination was negative, his lepromin reaction was 9 mm and no contact with leprosy was known. This case was administered the MDT regimen recommended by WHO for PB leprosy.[10] Apart from the cases already described, leprosy was diagnosed in a self-reporting

Table 3. Clinical examinations and Mitsuda tests performed on seropositive individuals

Serological interval	Number in interval	Mitsuda No. (%)	Clinical No. (%)
0·200–0·299	542	182 (33·6)	122 (22·5)
0·300–0·399	217	174 (80·1)	152 (70·0)
0·400–0·499	94	76 (80·8)	74 (78·7)
0·500–0·599	36	29 (80·5)	23 (63·8)
0·600–0·699	10	8 (80·0)	8 (80·0)
0·700–0·799	3	2 (66·6)	2 (66·6)
0·800–0·899	2	2 (100)	2 (100)
0·900–0·999	1	1 (100)	1 (100)
Total	905	474 (52·3)	384 (42·4)

Table 4. Results of the Mitsuda tests according to serological intervals

Serological interval	Mitsuda test 0–2 mm (%)	> 2 mm (%)	Total
0·200–0·299	37 (20·3)	145 (79·7)	182
0·300–0·399	24 (13·7)	150 (86·3)	174
0·400–0·499	15 (19·7)	61 (80·3)	76
0·500–0·599	7 (24·1)	22 (78·2)	29
0·600–0·699	1 (12·5)	7 (75·5)	8
0·700–0·799	1 (50·0)	1 (50·0)	2
0·800–0·899	1 (50·0)	1 (50·0)	1
0·900–0·999	1 (100)	0	2
Total	87 (18·3)	387 (81·7)	474

individual who was classified as tuberculoid and had been negative in the serological test and, hence, not included in the study. No other leprosy cases were detected in the study area in the year 1993.

Discussion

In spite of the very low morbidity rates for leprosy in the study area, the PGI seroreactivity characterized its population as different from that presumably free of the disease in Puerto Manati. The frequency distribution of OD values observed in this study and that reported for leprosy contacts by other workers[11–14] suggests that, on exposure to *M. leprae*, most individuals do not display a humoral response or do it at a low level, whereas the small proportion who do it at a high level diminishes as the PGI antibodies increase. This observation seems to correspond well with the fact that leprosy is a disease of low incidence. It also points to the risk of contracting MB disease for those with increased seroreactivity because the antibody response to PGI correlates directly to the increasing antigen load from the tuberculoid pole to the lepromatous pole of the leprosy spectrum.[1]

Little information is available on the relationship between PGI antibodies and the lepromin reaction in healthy people. This is interesting as it is believed that 10% of lepromin negative people living in close contact with lepromatous leprosy patients

Table 5. Cases detected in the present study

Case	ELISA (O.D)	Mitsuda test	BI	Clinical signs	Contact condition
1	0·244	0 mm	5+	Minimal	Household
2	0·593	0 mm	6+	Minimal	Non-household
3	0·448	0 mm	2+	None	Non-household
4	0·659	9 mm	1+	None	Unknown

eventually develop leprosy, mainly of the lepromatous type, and that considerably fewer lepromin positives with the same contact condition develop the disease, and then only tuberculoid leprosy.[2] Therefore, a parallel assessment of cell-mediated immunity by the Mitsuda test should help the prognostic evaluation of detectable PGI antibodies in healthy individuals. In New Caledonia, Desforges *et al.*[14] followed 17 contacts for PGI antibodies during 3 years and tested them for the Mitsuda reaction at the second sample. Of these, 11 had a positive lepromin test, 5 of them were seronegative at the first sample and 6 others were seropositive. None of these subjects developed overt leprosy during the study period. Of the 6 lepromin negative individuals, 4 were seropositive at the first sample, at the second sample 3 were still positive and 1 of them had developed an indeterminate form of leprosy. Among the 2 subjects who were initially seronegative, 1 remained seronegative and healthy, the second became strongly seropositive and developed BT leprosy. In Guadaloupe, Agis *et al.*[13] found none of the 48 bloodbank donors and 4% of 69 leprosy contacts to be seropositive in both tests. David *et al*[15] found that healthy Mitsuda reactors produced PGI antibodies upon exposure to *M. leprae* as often as healthy nonreactors among 534 young army recruits in Brazil, indicating that the probability of subclinical disease was the same in all individuals. In the present study, it was evident that even individuals with high OD values were capable of showing positive lepromin reactions. There is also a tendency though not significant, possibly because the numbers in the highest serological intervals are very small, for an increase in the proportion of lepromin negatives as the OD values rise and this also seems to correspond with the notion that only a small proportion of lepromin negative subjects, when exposed to infection, eventually develop lepromatous leprosy since this disease type is generally associated with high antibody levels.

The main objective of most published research works on PGI and its semisynthetic analogs has been to assess the usefulness of serological methods as a tool for control purposes. The ultimate goal of leprosy control is to interrupt the transmission of the causative agent and, eventually, the eradication of the disease. To achieve this it is necessary to detect and administer MDT as early as possible to as many '*M. leprae* transmitters' as possible. Therefore, while the very high sensitivity of the test is widely recognized for the highly bacilliferous untreated lepromatous cases, the matter of its usefulness as a control tool should be discussed further. In a previous study conducted by the authors[6] among 3366 contacts, the test results led to the detection of 3 early cases who were classified as indeterminate, 2 skin-smear positive cases with clinical signs and, yet, another case in whom not a single clinical sign was observed but whose skin smears were positive showing a BI of 3+. Four of these cases were lepromin negative. In another previous study[7] conducted among 1200 work-place contacts of 2 lepromatous patients, a positive OD value led to the detection of a contact whose only clinical sign was a moderate infiltration of one earlobe from which a skin smear showed a BI of 1+. This case was lepromin negative. In the present study, the 2 cases with clinical signs can be considered as early detected. Strikingly, in 1 of them the OD reading (0·244) was only slightly above the cut-off point. Though PGI antibody levels correlated directly with bacillary load, individual variation has been observed.[16] Again, a positive ELISA result led to the detection of a clinically healthy lepromin negative contact but skin-smear positive. With respect to the healthy lepromin positive individual with only 1 skin smear found to be AFB, the simplest explanation may be that it was a saprophytic organism contaminating the skin. But his OD reading was 0·659 and it is not known if he was

incubating PB leprosy or if it was a self-healing subclinical infection and, by pure chance, 1 of his few *M. leprae* were seen when using a microscopy.

In the study by Chanteau *et al.*[12] among a group of 1123 contacts in Polynesia followed up for periods of up to 6 years, only 1 of 10 individuals who developed leprosy was lepromatous and this case had shown a high PGI antibody level for 20 to 30 months before diagnoses. In The Philippines, Douglas *et al.*[17] found that leprosy developed in 3 of 36 contacts with elevated PGI antibody levels but only in 1 of 285 of those without elevated levels in a study of household contacts over a period of 2 years. But all 3 new seropositive patients were found by biopsy to have a BI of 4+ or higher and had been antibody positive 4, 6 and 18 months respectively before the clinical onset. In the study conducted by Ulrich *et al.*[18] among contacts in Venezuela, the test results for each individual serum sample were expressed as a proportion of the OD value of the positive control in each microtitre plate, using as the positive control a pool of sera from 6 patients with LL or BL leprosy with known high levels of antibodies to PGI. If a cut-off point had been set at 0·250 sample/positive control ratio, 14 (70%) of the 20 cases who subsequently developed leprosy had been considered as seropositive and only 6 indeterminate cases had been considered as seronegative. All 7 multibacillary cases (1 LL, 2 BL and 4 BB) were above that supposed cut-off point. Moreover, a strong association was found between the antibody level and the risk of leprosy. Those with high antibody levels were at over a 10-fold increased risk of leprosy compared to those in the lowest category and there was a gradient in risk with antibody level.[5]

A positive test result cannot display a high predictive value for overt disease since infection is far more common than is evidenced by clinically manifested cases.[19] Thus, the test should be useful for screening populations or groups of individuals at risk and would allow to detect the small proportion that are seropositive for clinical examination and Mitsuda test. Yet, the results of the Mitsuda test will restrict further the number of individuals to be followed up and so, the health care services would not be oversubscribed. Another problem is the feasibility of carrying out such a strategy as many endemic areas may lack the necessary infrastructure for performing the serological tests, however, solutions may also be found. Blood collection onto filter paper is so easy that community volunteers may be trained to do it. A very high productivity may be achieved by a central laboratory with a good work organization and, once the laboratory is equipped, at a satisfactorily low cost. Leprosy control by health education and administration of MDT to self-reporting cases, might not be as successful with respect to a foreseeable interruption of *M. leprae* transmission in areas of predominantly MB disease as it may be in areas of predominantly PB disease due to the relatively greater number of cases acting as sources of infection before the disease clinically manifested or not is diagnosed and treated. Therefore, in at least such former areas there may be a role for PGI serology in leprosy control.

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Management of leprosy on the basis of the epidemiology of disabilities

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Summary With the reduction on caseload due to the impact of multidrug therapy (MDT) in most parts of India, we believe that there is a need to understand the epidemiology of disabilities in leprosy which may not necessarily correlate with the distribution pattern of active disease. We present a methodology of data collection and verification taking the district as a unit to calculate the prevalence rate of disability as an exclusive entity in the district population, unrelated to the problems posed by the communicable component of leprosy. This study indicated that the prevalence rate of Grade II disabilities in 14 hyperendemic districts was 0·82/1000, whereas it was 0·22/1000 in low endemic districts. Limb disability data collected from three hyperendemic districts in Andhra Pradesh following task-oriented training enabled the paramedical worker to offer services to 5753 disabled patients after assessing the disability caseload per worker.

Introduction

The distribution pattern of disabilities in leprosy may not necessarily correlate with the disease distribution as a whole. For instituting an ideal field-based management programme exclusively for disabilities, a special strategy is called for. Multidrug therapy (MDT) has created a definite impact in reducing the 'caseload' represented by a declining active disease prevalence, as well as a declining 'disability rate' among new cases. However, the pool of disabilities among old monotherapy-cured cases, new cases detected with disabilities and relatively lesser numbers of cases developing disabilities during MDT and the surveillance period is left over as a post-MDT residual problem. We believe that unless we study the epidemiology of disability as an exclusive entity, unrelated to the problems posed by the communicable component of leprosy, we cannot do full justice to the management of leprosy as a whole. In this study we have taken the district as the unit for assessment of the prevalence rate of disabilities before launching a field-based disability care programme.

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Material and methods

In order to understand the epidemiology of disabilities at the district level, we made an attempt to collect data from:

hyperendemic MDT districts of the National Leprosy Eradication Programme (NLEP) in India supported by the Swedish International Development Authority (SIDA) using questionnaires during the recent evaluation (Table 1);
low endemic MDT districts in Gujarat through routinely available data in collaboration with the CIBA supported 'Comprehensive Leprosy Care Project' (Table 2); and
hyperendemic MDT district in Andhra Pradesh supported by the Norwegian International Development Authority (NORAD) through a specially designed survey proforma (see Appendix 1) in collaboration with the State Directorate of Health Services (Leprosy) (Table 3).

Results

These data have been collected from the available records since the establishment of leprosy control units till the end of December 1993. Therefore the period may not be even and comparable.

Tables 1 and 2 indicate the magnitude of the problem in relation to the population in hyperendemic districts and relatively less in low endemic districts. The data, however, do not suggest at field level the services that should be provided according to the needs of the patients. We, therefore, developed a new method of collecting data using a simple proforma (see Appendix) in two endemic districts in Andhra Pradesh during the operation of a special project on 'Early Rehabilitation and Disability Care Programme' supported by NORAD.

Table 1. Prevalence of leprosy disability in hyperendemic districts

Sr No	District	Population (1991 census)	Registered cases* (old + new)	Disabled cases† (old + new)	Disability %	Disability PR/1000
1	Krishna	3693179	54367	2616	4·81	0·71
2	Srikakulam	2321126	59703	1182	1·97	0·50
3	Vishakapat nam	3272110	40032	1055	2·63	0·32
4	Deogarh	918233	19380	3021	15·58	3·29
5	Baroda	3094692	28125	2287	8·13	0·72
6	Belgaum	3593606	26061	1720	6·59	0·48
7	Dharwar	3503150	32236	1752	5·43	0·50
8	Amaravati	2008568	41627	78	0·18	0·04
9	Wardha	1065589	41490	1173	2·82	1·19
10	Chandrapur	1768958	48981	320	0·65	0·18
11	Tanjavur	4526701	63741	5702	8·94	1·26
12	Chengal pattu	4620967	15538	6015	5·20	1·30
13	Purulia	2217423	83997	3771	4·48	1·70
14	Varanasi	4798729	47045	3041	6·46	0·63
		41493031	702323	33833	4·81	0·82

* Includes old monotherapy cases also.
† Only Grade II as per WHO disability grading (1988).

Table 2. Prevalence of leprosy disability in low endemic districts

Sl No	District	Population (1991 census)	Registered cases (old + new)	Disabled cases* (old + new)	Disability %	Disability PR/1000
1	Banaskatha	1667914	2501	186	7·43	0·11
2	Sabarkatha	1502284	3059	781†	25·53	0·51
3	Mehsana	2548787	1614	359	22·24	0·14
4	Gandhinagar	289088	205	34	16·58	0·11
		6008073	7379	1360	18·43	0·22

* Grade I and Grade II as per WHO disability grading (1988).
† Includes 300 disabled patients living in a leprosy home and not necessarily from the same district.

Table 3 shows the number of leprosy patients with different kinds of disabilities in relation to limbs.

The extent of the problems posed by each type of disability in relation to the population as revealed by such an analysis will be useful to plan the service delivery, because employment of paramedical workers is always based on the population in any given area.

Table 4 shows the types of services provided by paramedical staff according to needs of disabled leprosy patients after collecting data as shown in Table 3.

All the disabled patients of Prakasam and Kurnool districts were offered services through the existing leprosy staff following a task-oriented training on field deformity care. After a period of 3 years, the impact of the disability care programme could be assessed. This will form the subject of a future communication.

Table 3. Distribution of limb disabilities

		District					
Sl No	Limb disability	Prakasam (2750340)* Cases:	PR/1000	Kurnool (3183624)* Cases:	PR/1000	Cuddapah† (2259154)* Cases:	PR/1000
1	Total disabled cases	1725	0·63	2310	0·72	1718	0·76
2	Grade I	415	0·15	864	0·27	NA	—
	Grade II	1310	0·48	1456	0·46	NA	—
3	Upper limb						
	Anaesthesia	1070	0·39	1539	0·50	NA	—
	Claw hand	923	0·34	1358	0·43	844	0·37
	Wrist drop	30	0·01	40	0·01	23	0·07
	Finger absorption	581	0·21	344	0·11	162	0·07
4	Lower limb						
	Anaesthesia	1315	0·47	1131	0·36	652	0·29
	Plantar Ulcer	874	0·31	627	0·19	216	0·10
	Foot drop	170	0·06	273	0·20	208	0·09
	Claw toes	541	0·20	669	0·21	192	0·08
5	Face/eye						
	Anaesthesia	44	0·02	74	0·02	NA	—
	Lagophthal	87	0·03	136	0·04	67	0·03
	Depressed nose	139	0·05	162	0·05	148	0·07

* Population as per 1991 census.
† Data provided by Dr N. Sivarama Brahmachary, District Leprosy Officer, Cuddapah, Andhra Pradesh.
NA, not available.

Table 4. Services provided to disabled leprosy cases

Sl No	Service	District	
		Prakasam	Kurnool
1	Splints	867	954
2	Grip-aids	252	244
3	Mini POP	106	68
4	Dressing	432	160
5	MCR footwear	1315	514
6	Foot drop spring	27	Nil
7	Eye care	85	74
8	Care of limbs	1360	1062
9	Demonstrated exercises	614	728

Discussion

The prevalence rate of disabilities is an indicator of the caseload with disabilities. A knowledge of the trends on the distribution and types of deformity is, therefore, of great value in order to establish the epidemiological and operational aspects of disability care and prevention programme which would be an integral part of leprosy control programmes. It has been observed that a uniform methodology of assessing the disabilities practised in 2 hyperendemic NORAD supported districts enabled the leprosy staff to understand the type of disability, which have resulted in providing more effective disability care in the community.

Conclusion

We believe that in order to scientifically implement a disability care programme using available field technologies, an epidemiological database at the district level is needed. To provide specific services, limb and type of disability data are required, i.e. number of claw hands, foot drops, plantar ulcers etc. It is also necessary to know the distribution of such cases at village level to workout the disability caseload per worker.

The provision of field services in low-endemic areas is likely to be more challenging considering the sparse distribution of deformity cases in the general population.

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The secretarial assistance provided by Mr K. Sreedharan in preparing this article is acknowledged.

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Appendix

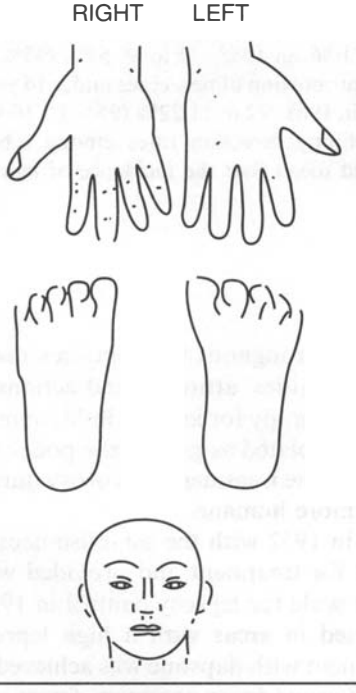
Disability Care & Survey Proforma

Name — Age / Sex :

Registration No. — Type :

Address — Date :

Disability Assessment



DISABILITY	KEY	SERVICES
ANAESTHESIA	▒	CARE OF HANDS
ABDUCTION	↔	ABDUCTOR BAND
MOBILE CLAW FINGER	Λ	FINGER LOOPS
FIXED CLAW FINGER	S	FINGER GUTTER
THUMB DEFORMITY	Z	OPPONENNS LOOP
INJURY OR ULCER	✗	DRESSING
ABSORBTION	■	GRIP - AIDS
ANAESTHESIA	▒	CARE OF FEET
FOOT DROP	↓	MCR WITH SPRING
CLAW TOES	Λ	MCR WITH MTB
ULCER	✗	CTD / POP
ABSORBTION	■	MOULDED FOOTWEAR
CORNEAL ANAESTHESIA	👁	CARE OF EYES
RED EYE	👁	EYE OINT / DROPS
LAGOPHTHALMOS	<	EYE PAD / GOGGLES
FACIAL PARALYSIS	→	HOT FORMT. / SLING

(USE TICK MARK ✓)	RIGHT	LEFT		RIGHT	LEFT
WRIST DROP	☐	☐	LOSS OF EYEBROW	☐	☐
BLURRING VISION	☐	☐	BLINDNESS	☐	☐
DEPRESSED NOSE	☐		GYNEOCOMASTIA	☐	☐

Proforma Designed by: BOMBAY LEPROSY PROJECT, BOMBAY

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Leprosy in Myanmar, epidemiological and operational changes, 1958–92

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Summary The registered caseload and prevalence of leprosy have declined in Myanmar from a peak of 86·2 per 10,000 population (95% CI 85·43–86·97) in 1973–77 to 26·82 (95% CI 18·46–35·18) in 1988–92. The new case detection rates have also declined from 7·41 per 10,000 (95% CI 6·3–8·52) in 1968–72 to 1·96 (95% CI 1·43–2·52) in 1988–92. The increase in the multibacillary proportion of new cases from 11·85% (95% CI 11·84–11·86) in 1968–72 to 40·54% (95% CI 37·2–43·88) in 1988–92 and the decline in proportion of new cases under 14 years of age from 26·81% (95% CI 26·8–26·82) in 1968–72 to 11·22% (95% CI 10·92–11·52), coupled with the finding of declining detection rates among school children and in mass village surveys could mean that the incidence of leprosy may be declining.

Introduction

Leprosy is a major health problem in Myanmar and throughout the centuries many social problems were created as a result of local communities' attitudes and actions in dealing with this disease. Before the discovery of chemotherapy for leprosy in Myanmar, as in most countries in the world, leprosy patients were isolated as part of the policy for control of leprosy. With the introduction of dapsone for the treatment of leprosy during the mid 1950s, the approach toward leprosy became more humane.

Myanmar started its leprosy control programme in 1952 with the establishment of special centres where leprosy patients were admitted for treatment and provided with food and housing. Dapsone was first used on a mass scale for leprosy control in 1958, when a domiciliary treatment programme was started in areas with a high leprosy prevalence. Nationwide coverage of domiciliary treatment with dapsone was achieved in 1969. From 1958 to 1969, as domiciliary treatment became more common, fewer and fewer patients were accepted into the special treatment centres and patients were

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encouraged to take treatment at home. This approach made treatment widely available to a large number of patients without disrupting their livelihood and family ties. Treatment of leprosy patients without isolation raised community awareness of the disease and forced development of strategies for dealing with leprosy as a public health problem. Depending on the endemicity of the disease and outlook of the community, these strategies ranged from total isolation and neglect to full acceptance of leprosy patients as active members of the community. As the leprosy control programme matured, and the treatment proved effective, community attitudes towards leprosy patients slowly changed and demands for isolation and acts of discrimination became less frequent.

In 1978, a major operational change was made in the leprosy control programme in Myanmar and involved integration of certain control activities into the primary health care programme of the basic health service. Specifically, case-finding and treatment activities were taken over by the basic health service. As a result, basic health service personnel became more aware of the needs of leprosy patients. However in the beginning, the integration was fraught with problems, including a reduced quality of care, increased noncompliance of patients and outright refusal by some of the basic health staff to treat leprosy patients. A strong political commitment to the integration and continuous training of the basic health service personnel have to a great extent alleviated these problems.

From 1958 to 1984, dapsone monotherapy was the standard regimen for treatment of leprosy. In 1984, a policy of administering rifampicin to lepromatous and borderline cases was implemented with the aim of reducing the bacillary load in these patients and thereby interrupting the chain of transmission. Supervised treatment with a monthly single dose of 1200 mg rifampicin for six consecutive months, together with daily 100 mg dose of dapsone, unsupervised, was followed by a 1500 mg dose of rifampicin once a year. This became the standard of treatment for lepromatous and borderline patients until 1987 in the high prevalence areas of Mandalay, Sagaing, Magway, Bago, Yangon, Ayeyarwady Divisions and the Shan State.

Another major change in the leprosy control programme occurred in 1988 when the WHO recommended multidrug therapy (MDT) regimen was first introduced in the six leprosy hyperendemic regions (Mandalay, Sagaing, Magway, Bago, Yangon and Ayeyarwady Divisions) which account for 90% of the registered cases in Myanmar. MDT was initially provided on a domiciliary treatment basis by the leprosy control programme and later MDT treatment was fully integrated into the primary health care programme in 1991.

This study was conducted to evaluate the epidemiologic outcome of operational changes that occurred in the leprosy control programme of Myanmar during the period 1958–92.

Method

This study represents a retrospective analysis of data on the occurrence of leprosy from the following sources: *Statistical Assessment on the Prevalence of Leprosy in Burma*, 1971; *Annual Returns to the Health Information Service*, 1958 to 1974; *Health Report of the Direector of Health services,* August 1971; *Health Information Report of the Health*

Information Service, 1975; and the *Annual Reports of the Leprosy Control Programme*, 1984 to 1992.

To compare types of reported leprosy cases over time, the present World Health Organization (WHO) classification of leprosy into paucibacillary (PB) and multibacillary (MB) forms was used.[1] Cases classified according to the Madrid system as indeterminate, tuberculoid and lepromatous in the routine reporting forms for leprosy during the period 1958–88 were reclassified by grouping indeterminate and tuberculoid into the PB category and the lepromatous (including borderline cases) into the MB category. Slit-skin smears are currently performed by staff of the leprosy control programme as part of their supervision of basic health services leprosy control work. The quality of the smear examinations has been more or less the same throughout the years but smear examinations are less often performed because of a reduction in supervision activities.

During the period under study (1958–92), the leprosy control programme used contact surveillance, examination of school children and mass surveys for active case-findings. A contact is defined as an individual living under the same roof with a leprosy patient who is taking treatment. Mass surveys were primarily conducted in villages, with priority given to villages with a high lepromatous proportion among the registered cases and villages not surveyed during the previous 5 years. School surveys were conducted mainly in primary and secondary schools.

In 1974 indeterminate and tuberculoid cases began to be released for control (RFC). With the introduction of MDT in 1988, MB cases were discharged from the register after completion of the WHO recommended treatment regimen. Fixed duration treatment was introduced in 1991. MB cases were regarded as cured and were discharged after receiving 24 doses within a period of 36 consecutive months. PB cases were discharged after receiving 6 doses within 9 consecutive months. Prior to the introduction of MDT, borderline and lepromatous cases were treated with dapsone monotherapy for life.

Relapse is defined as appearance of new lesion(s) in a patient who has been discharged (released from treatment). The diagnosis of relapse is based mainly on clinical grounds. Where laboratory services are reliable, transition from negative at the time of discharge to positive skin smear has been taken as a sign of relapse.

Yearly data from 1958 to 1992 were grouped into 5-year intervals and average values were calculated for prevalence, MB proportion and proportion under 14 years old. The last 5-year interval of 1988 to 1992 was the period when MDT was introduced in the country. Mantel–Haenzel tests for trend were performed and the 95% confidence intervals were calculated for the registered prevalence and new case detection for each time interval.

Results

Table 1 shows the registered cases and prevalence of leprosy in Myanmar for 5-year intervals from 1958–62 to 1988–92. The total number of registered cases increased during each consecutive time period until 1973–77 when the total number was 261,000 and then started to decline. With the start of the MDT programme in 1988, the registered caseload dropped markedly to 107,944 cases in 1988–92. The registered prevalence rate also followed a similar pattern. From 31·96 per 10,000 population (95% CI 25–39) in

Table 1. Registered prevalence (per 10,000), registered MB proportion (%) and registered under 14 years proportion (%)

Year	Reg:* cases	Reg:* Prev: (95% CI)	Reg: MB proportion (95% CI)	Reg: < 14 yr prop: (95% CI)
1958–1962	69,949	31·96 (24·71–39·21)	43·26 (38·2–48·32)	23·17 (22·91–23·43)
1963–1967	157,236	64·7 (59·49–69·91)	29·27 (27·08–31·46)	23·12 (20·95–25·29)
1968–1972	225,445	83·24 (80·18–86·3)	24·54 (23·51–25·57)	16·44 (14·95–17·93)
1973–1977	261,606	86·2 (85·43–86·97)	22·26 (22·1–22·42)	10·9 (9·75–12·05)
1978–1982	257,470	76·68 (73·92–79·44)	22·9 (22·41–23·39)	6·48 (5·71–7·25)
1983–1987	231,871	62·96 (57·7–68·22)	24·79 (23·57–26·01)	5·28 (5·04–5·52)
1988–1992	107,944	26·82 (18·46–35·18)	46·55 (39·78–53·32)	4·17 (3·91–4·43)

* Average registered cases and prevalence for the time interval.

1958–62, it increased until it reached a peak of 86·2 per 10,000 population (95% CI 85–87) in 1973–77. It then declined slowly during 1978–82 to 1983–87 and with the introduction of MDT, declined further to 26·82 per 10,000 population (95% CI 18–35) during 1988–92.

At the start of the control programme in 1958–62, the MB proportion among registered cases was 43·26% (95% CI 38–48) and the proportion of cases under 14 years old was 23·17% (95% CI 22·9–23·4). As the programme matured, the MB proportion among registered cases levelled off at approximately 22% during 1973–77 to 1978–82. The MB proportion increased again during the period 1988–92 to 46·55% (95% CI 40–53). The proportion of registered cases under 14 years old consistently declined, reaching a level of 4·17% (95% CI 3·9–4·4) in 1988–92.

Table 2. Total new cases, new case detection rate (per 10,000), new case MB proportion and proportion of new cases under 14 years

Year	New cases	New case detection (95% CI)	New case MB proportion (95% CI)	New cases under 14 yr proportion (95% CI)
1968–1972	61,350	7·41 (6·30–8·52)	11·85 (11·84–11·86)	26·81 (26·8–26·82)
1973–1977	54,660	3·61 (3·27–3·94)	15·37 (12·29–18·45)	21·63 (18·97–24·29)
1978–1982	49,603	2·96 (2·58–3·35)	19·69 (17·53–21·85)	18·82 (18·02–19·62)
1983–1987	37,918	2·07 (1·52–2·62)	34·33 (32·57–36·09)	14·96 (13·58–16·34)
1988–1992	38,618	1·96 (1·43–2·52)	40·54 (37·2–43·88)	11·22 (10·92–11·52)

Table 2 shows new case detection rates, new case MB proportions and the proportion of new cases under 14 years old. Rates for earlier years (1958–62 and 1963–77) were not available. The total number of new cases detected over the period declined from 61,350 in 1968–72 to 38,618 in 1988-92. New case detection rates also declined consistently from a high of 7·41 per 10,000 population (95% CI 6–9) in 1968–72 to 1·9 per 10,000 population (95% CI 1–3) in 1988–92. This trend was significant at $p < 0·003$. During the same period, the MB proportion among new cases increased from 11·85% (95% CI 11·8–11·9) in 1968–72 to 40·54% (95% CI 37–44) in 1988–92 and the proportion of new cases under 14 years old decreased from 26·81% (95% CI 26·80–26·82) in 1968–72 to 11·22% (95% CI 10·9–11·5) in 1988–92.

Table 3 shows the detection rates for contract surveillance (1963–67 to 1988–92), examinations of school children (1973–77 to 1988–92) and mass village surveys (1973–77 to 1988–92). At the start of the programme in 1963–67, contact detection rates were high, 9·09 per 1000 contacts examined (95% CI 7–11). This rate declined to a low of 1·86 per 1000 (95% CI 1·6–2·1) in 1978–82 and again increased significantly ($p < 0·003$) to 3·48 per 1000 (95% CI 2–5) in 1988–92.

The detection rate for school children declined significantly ($p < 0·003$) from a high of 0·87 per 1000 school children examined (95% CI 0·7–1) in 1973–77 to 0·31 per 1000 (95% CI 0·3–0·4) in 1988–92. The decline was consistent throughout the observation period. The detection rate from mass surveys was 5·02 per 1000 population examined (95% CI 3–7) in 1973–77 and showed a significant decline ($p < 0·003$) to 1·73 per 1000 (95% CI 1·2–2·3) in 1988–92.

Table 4 shows average numbers and proportion of new cases detected per year through passive case finding methods during each time period from 1973–77 to 1988–92. Data on earlier years were not available. Average numbers of new cases detected through passive case-finding methods declined from 7489 in 1973–77 to 5711 in 1988–92. At the same time, the proportion of new cases detected through passive case-findings increased significantly from 68·43% (95% CI 64·27–72·59) in 1973–77 to

Table 3. Contact detection rate, school detection rate, mass survey detection rate

	Contact exam:		School exam:		Mass survey	
Year	No:	Rate* (95% CI)	No:	Rate* (95% CI)	No:	Rate* (95% CI)
1963–1967	1,524,727	9·09 (6·82–11·36)	—	—	—	—
1968–1972	2,232,576	6·22 (5·38–7·06)	—	—	—	—
1973–1977	2,119,346	4·07 (2·77–5·37)	3,738,289	0·87 (0·72–1·02)	1,149,802	5·02 (3·26–6·78)
1978–1982	1,960,034	1·86 (1·63–2·09)	2,881,626	0·75 (0·59–0·91)	2,523,269	3·77 (3·05–4·49)
1983–1987	1,112,675	2·54 (1·97–3·11)	1,886,923	0·46 (0·39–0·53)	1,598,644	1·8 (1·63–1·97)
1988–1992	857,830	3·48 (2·39–4·58)	2,369,652	0·31 (0·26–0·36)	3,063,455	1·73 (1·20–2·26)

(* Per 1000 population examined per year.)

Table 4. New cases detected through passive methods and passive case detection proportion

Year	Passively detected cases	Average new cases/year (SD)*	Passive detection proportion* (95% CI)
1973–1977	37,434	7487 (953·75)	68·43 (64·27–72·59)
1978–1982	34,498	6001 (693·69)	69·71 (68·19–71·21)
1983–1987	31,409	6282 (2149·7)	81·7 (77·21–86·19)
1988–1992	28,556	5711 (1305·67)	76·82 (69·16–84·48)

* Average for the time interval.

81·7% (95% CI 77·21–86·19) in 1982–87. The difference in the proportions in 1973–77 and 1988–92 was not significant.

During the period from 1958 to 1987, a total of 61,587 cases treated with dapsone monotherapy were discharged from the register (Table 5). Since the introduction of MDT in 1988, a total of 96,307 leprosy patients were discharged by December 1992. The MDT coverage among patients registered in 1992 was 55·17% and the cumulative MDT coverage (proportion of all registered patients receiving MDT during 1988 to 1992) was 83·28%.

Table 6 gives the total number of relapse cases found each year, which were cases detected mainly through self-reporting. Relapses reported among PB cases also includes those treated with dapsone monotherapy in the past, since the routine reporting forms do not show them separately. The absolute numbers show that the relapses among MB cases were more common than among PB cases. Rates were not calculated for each year because the total number of discharges and the relapse cases were from different source populations.

Discussion

The data analysed in this study were routinely collected for monitoring leprosy control activities in Myanmar. These data are best interpreted in the context of operational changes in the leprosy control programme that occurred during the study period.

The registered number of leprosy cases increased yearly until 1977, a trend that may

Table 5. Total number of leprosy cases discharged from treatment with dapsone monotherapy and MDT and treatment coverage

Treatment regimen	Number discharged	Current coverage (%)	Cumulative coverage (%)
Dapsone (1958–87)	61,587	—	—
MDT (1988–92)	96,307	55·17	83·28*

* Based on 1992 data.

Table 6. Total relapse cases detected each year and number of cases discharged under MDT

	No: of relapse			No: of discharges under MDT		
Year	PB	MB	Total	PB	MB	Total
1989	70	26	96	23,165	1978	25,143
1990	48	66	114	10,504	12,521	23,025
1991	8	42	50	6472	12,631	19,103
1992	23	72	95	21,611	3027	24,638
Total	149	206	355	61,752	30,157	91,909

be attributable to the intensive case-finding activities that were carried out by the vertical leprosy control programme (Table 3). At the same time, cases accumulated on the register because of the strict criteria for release from control (RFC) that was used during that period. The decline observed after 1977 is likely to be attributable to an increase in the number of cases being discharged from the register with the introduction of more flexible criteria for release from control 1978[2] in addition to a decline in the total number of new cases detected during each period (Table 2). This decline in new cases could have been due to an overall decline in the incidence but also may have resulted from the change in the leprosy control programme in the late seventies and early eighties from vertical programme to an integrated programme. During the transition period in which case-finding activities were transferred to the basic health services, the number of new cases declined perhaps because of inexperience in leprosy diagnosis on the part of the basic health service staff coupled with reluctance of patients to seek treatment from a different type of provider. The smaller decline observed in the registered prevalence from 1968 to 1982 compared with the dramatic decline of registered prevalence (53%) between 1983 and 1992 might be explained by the fact that the registers were updated in 1987 and MDT was introduced in 1988. The shorter treatment duration required with MDT compared with dapsone monotherapy enabled the control programme to release a large number of cases (96,307) from the register during this time period.

The high MB proportion among the registered cases at the start of the control programme stabilized at around 22% and remained at this level from 1973 to 1982, even though some PB cases were discharged during the period. A similar trend has been reported from other southern Asian countries (5–20%).[3] The significant increase in the MB proportion among registered cases during the period 1988–92 is a result of implementing the MDT regimen, in which longer duration of treatment is required for MB cases as compared with PB cases. The increase in the MB proportion among the registered cases is also due in part to the increase in the MB proportion of new cases detected each year (Table 2). The effects of changes made in classification of leprosy cases from intermediate, tuberculoid and lepromatous to PB and MB, as well as modifications made during the past years in classifying PB and MB, could have brought about higher MB proportion among the registered cases also. It is difficult to know how much of this increase observed in the MB proportion through-out the years is due to the true change in the epidemiological pattern of the disease.

The proportion of registered cases under 14 years of age declined continuously

during the study period, and might be attributable to the reduction of transmission among children. This interpretation is supported by a consistent decline of the school detection rates (Table 3) as well as of the proportion of new cases under 14 years old (Table 2).

During the period 1988–92 while the new case detection rate decreased, the MB proportion of new cases increased and at the same time the proportion of new cases under 14 years of age declined (Table 2). These changes could be due to a decline in the incidence of leprosy in the country.[1,3,4] A similar pattern was found in Thailand[5] and Malawi.[6] A possible alternative explanation for an increase in the MB proportion of new cases is that increased reliance on passive case-finding could have led to an increased MB proportion, since cases detected passively tend to be older and more likely to have MB leprosy. The proportion of passively detected cases has increased significantly from 1973 to 1987 with the exception of the last period 1988–92 (Table 4). Comparison of the two periods, 1973–77 and 1988–92, shows that the proportion of new cases detected through passive methods has not changed significantly, whereas the MB proportion of new cases has changed significantly from 15·37% (95% CI 12–18) to 40·54% (95% CI 37–44). Considering that the increase in the MB proportion of new cases and the decline in proportion of new cases under 14 years old could not have been due solely to increases in the proportion of new cases detected through passive means, and the additional finding of declining detection rates among school children and mass surveys could mean that the overall incidence of leprosy is declining in the country. This interpretation is based on the assumption that the quality of screening conducted in schools and villages has been constant throughout the study period.

During the period studied, incidence may have fallen because of a reduction in transmission of infection as a result of chemotherapy (dapsone early on and MDT later) or alternatively, because of the effect of increasing coverage of BCG achieved by the Expanded Programme for Immunization since the early eighties, improvement in living standards (and consequently better personal hygiene), or a combination of these factors. Data showing the specific effects of chemotherapy or the improvement in living standards on the transmission of *Mycobacterium leprae* is unavailable for Myanmar. Several studies have shown that BCG provides varying levels of protection against leprosy (20 to 80%).[3,7–10] In a recent case-control study conducted in Myanmar by Bertolli,[11] a single dose of BCG was found to give an overall protection of 55% (95% CI 21–74) and with protection up to 87% (95% CI 69–95) with administration of 3 doses.

In an earlier study which was conducted in Myanmar during 1962 to 1972, the case detection rates in 12 project areas of Central Myanmar were found to be decreasing for all types of leprosy and for all ages.[12] The decline in the new case detection rate prior to the introduction of rifampicin (1984) and MDT (1988) in Myanmar was similar to that found in Thailand,[5] Malawi[6] and French Polynesia.[13]

Information on the proportion with disability grade two among new cases can be used to study how well new case detection reflects incidence. However, this information was not available at the national level because it was not collected routinely. But in a study of 320 new cases in Hmawbi Township (Myanmar) from 1964 to 1974, the overall grade two disability rate among new cases was 26·88%. In this same study, grade two disability among new cases in contacts of leprosy patients was 15·25%, 12·9% among new cases found during school surveys, 33·9% among cases detected by mass surveys and 32·5% for cases detected passively.[14] These figures show that there was a

considerable time lag between onset of disease and detection even during the time when leprosy control was a verticle programme.

The only prospective data on leprosy incidence comes from the BCG trial conducted in Central Myanmar[7] between 1964 and 1978, in which incidence among the vaccinated and control groups was 8·6 and 12·6 per 100,000 per year, respectively. The national data for new case detection at that time was 7·41 per 10,000 during 1968–72 and 3·61 during 1973–77. The new case detection rate in Central Myanmar (which includes the BCG trial area) for 1972 was 8 per 10,000 population.[12] The discrepancy found between the prospective data and survey detection rates shows that new case detection rates do not approximate incidence very well. Routine collection of the proportion of new cases with disability is essential for future evaluation of the case detection rates.

A total of 61,587 cases were released from control during the 30 years of dapsone monotherapy (1958–87) and 96,307 were discharged in just 5 years after the introduction of MDT (1988–92). This dramatic contrast highlights the immediate benefit of MDT, and provides incentive to increase MDT coverage beyond the current level of 55·17% and expand into the uncovered regions by integrating into existing primary health care systems operating in these areas of the country. The cumulative MDT coverage attained for the whole country was 83·28% (1992), and this coverage was achieved mainly through integration of MDT into the primary health care programme.

The number of relapses found each year are low. The number of relapses found during the four-year period from 1989 to 1992 was 355. Under reporting or most probably, a delay in reporting of relapse cases could be occurring because relapses are detected only through passive means by patient self-report. At the same time, the tendency to over diagnose a case of relapse with the use of a simple clinical criteria especially in the field is also possible, and these two factors could be cancelling each other out in estimating relapses. Taking into consideration control measures being integrated into the primary health care programme and the low relapse rates with MDT observed in other programmes by WHO,[15] active surveillance of cases discharged (cured) after treatment is not recommended for screening of relapse in Myanmar.

The epidemiological pattern of leprosy in Myanmar has changed over time. With the expansion of MDT coverage in the coming years, the trend of decline observed in the registered prevalence is expected to continue. Increasing the coverage of MDT is expected to facilitate interrupting the chain of transmission and contribute greatly to progress in eliminating leprosy in Myanmar.

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Reference values for touch sensibility thresholds in healthy Nepalese volunteers

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Summary A hundred and thirty-six apparently healthy volunteers between the ages of 16 and 67 were used to determine normative thresholds of tactile sensibility in the Nepali adult population.

Tactile sensibility thresholds on standardized sites on hands and feet were assessed for two sensory tests: Semmes–Weinstein monofilaments (SWM) and moving-point discrimination (M2PD). Results are reported as the proportion of subjects able to feel a given threshold. The effect of age, sex, side, occupation, smoking habit and alcohol consumption on the results was examined with quantile regression.

On the hand 200 mg seemed an appropriate threshold for 'normal' touch sensibility measured with monofilaments. About 99% (95% confidence interval 97–100) of individuals could detect this filament at all sites. A similar proportion could discriminate two points 4 mm apart which were moved from proximal to distal on the volar pad of the distal phalanx of the index and little finger. For the sole of the foot the thresholds were 2 g and 8 mm. Variability of results was greatest at the heel.

Normal thresholds for tactile sensibility were higher than those published for the North American population. Monofilament thresholds suitable for screening were 200 mg (log number 3·61) and 2 g (log number 4·31) for hand and foot, respectively. For moving 2-point discrimination on the hand this threshold was 4 mm.

Introduction

Mycobacterium leprae specifically affect the peripheral nerves causing functional

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impairment. The resulting anaesthesia of the skin and muscle weakness are the major causes of disability and mutilations. In an early stage of leprosy the neural damage can usually be reversed by treatment.[1–3] Therefore early detection and prevention of neural damage are very important. A detailed assessment of any neural deficit and periodic retesting are useful objective guides of management during treatment.[1–5] In Nepal, Semmes–Weinstein monofilaments (SWM), and, to a lesser degree, moving two-point discrimination (M2PD) are used to detect impairment of sensibility in the hands and feet of leprosy patients. Published normative data are based on the thresholds of sensibility in healthy subjects in the United States.[4,6–8] It seemed likely that these normal values would not be appropriate for evaluating tests on rural Nepali patients, many of whom are farmers or manual labourers usually only wearing loosely fitting plastic chappals as footwear. Therefore, we wished to determine the thresholds of sensibility for SWM and M2PD in hands and feet of healthy Nepali people. We investigated the influence of age, sex, smoking, alcohol consumption, occupation, and right and left sides in hand and foot.

Material and methods

SUBJECTS

Seventy-four male and 62 female healthy Nepali volunteers (272 hands and feet) were tested. Each subject was asked some questions on matters that might influence the test results, including age, sex, occupation, complaints about health, medicines used, alcohol consumption, smoking and use of footwear. They were healthy, not known to have had leprosy and they did not receive any medication known to interfere with sensory function. The volunteers consisted of three different groups:

Sixty-nine students at the forestry campus in Pokhara. The students were young, aged 16–22, and were not used to physical labour.
Forty-six volunteers from the village Ghachok, most of whom were farmers engaged in manual labour.
Twenty-one volunteers around the 'Pipal trees', the social meeting places in Pokhara. These had either manual and/or non-manual jobs.

THE SEMMES–WEINSTEIN MONOFILAMENTS (SWM)

A set of 10 monofilaments of equal length with diameters ranging from 0·13 to 1·14 mm was used to assess light touch sensibility. The force necessary to bend the filament depends on the filament's diameter and is precalibrated (70 mg–280 g). The marking numbers are derived from a log scale, corresponding to the log of the force exerted by that filament in 0·1 mg units (see Table 1). The 70 to 750 mg filaments are applied to the same site three times because these thinner filaments slip more easily and one touch might not reach the threshold force of the filament. The 1 to 280 g filaments only need to be applied once. The filament is applied perpendicular to the tested area in such a way that it bends slightly.[11] The subject, who has his eyes closed, is asked to respond with 'yes' each time the filament is felt. A quiet environment is recommended for testing with both monofilaments and moving two-point discrimination, because the subjects'

Table 1. Semmes–Weinstein Monofilaments used in the study, with log scales, corresponding forces and rounded measured forces

Marking number*	Diameter (mm)	SW force† (g)	LPR force‡ (g)	BT force§ (g)	Stress¶ (g/mm^2)	Force** (milli-Newtons)
2·83	0·132	0·068	0·091	0·072	6·52	0·71
3·22	0·137	0·166	0·112	0·172	7·50	1·69
3·61	0·171	0·408	0·213	0·205	9·29	2·01
3·84	0·214	0·697	0·562	0·445	15·7	4·36
4·08	0·228	1·194	0·977	0·745	23·9	7·30
4·17	0·244	1·494	1·58	0·977	33·7	9·57
4·31	0·284	2·062	1·85	2·35† †	29·5	23·0
4·56	0·313	3·632	2·81	4·91† †	36·6	48·1
5·07	0·475	11·7	17·0	7·37	94·9	72·2
6·65	1·142	447	—	279	—	2734

Adapted from Levin, Pearsall & Ruderman[11] and Bell & Tomancik.[9]

* corresponds to $\log_{10}$ of force in 0·1 mg units, † force published by Weinstein, ‡ actual force measured by Levin *et al.* (at least 10 applications/filament on a top-loading balance), § actual force measured by Bell & Tomancik (105 applications/filament on strain gauge device), ¶ actual stress measured by Levin *et al.* * force in mN calculated from column 5 by multiplying the force in grams by 9·8 (conversion factor at sea level), † † actual force measured by Bell & Tomancik (280 applications/filament; 28 different kits).

concentration is important.[7] The following areas were tested on the palmar surface of the hand and the sole of the foot:

Median nerve: on the distal phalanx of the index finger, the skin over the 2nd metacarpophalangeal joint (MCP2) and on the distal phalanx of the thumb.
Ulnar nerve: on the distal phalanx of the little finger, the skin over the 5th metacarpophalangeal joint and proximally on the hypothenar eminence.
Posterior tibial nerve: on the distal phalanx of the big toe, the skin over the 1st and 5th metatarsophalangeal (MTP) joints and on the centre of the heel.

MOVING TWO-POINT DISCRIMINATION (M2PD)

A Disk-Criminator® was used for moving two-point discrimination. This is a disk with metal prongs different distances apart, developed by Mackinnon and Dellon.[12] The least possible pressure is given while moving the prongs along the surface of the finger from proximal to distal, parallel to the long axis of the finger. Testing began with two prongs 6 mm apart and was continued with diminishing (or increasing) distances until the subject was just able to distinguish between one or two prongs. One or two prongs were used randomly. The minimum distance in millimetres was taken as the smallest distance for which two correct answers out of three attempts were given.[12]

Test sites used were: the distal phalanx of the index, little fingers on the hand; and the big toe and heel on the foot.

The SWM tests were performed by the physiotechnicians from Green Pastures Hospital. M2PD was tested by both the physiotechnicians and the investigators, CMK, MvL and IBK. The hand or foot to be tested was carefully positioned and supported by a cushion or towel to prevent movement or tiredness.

STATISTICAL ANALYSIS

As the distribution of the test values in the healthy volunteers was not normally distributed (the majority of subjects could feel the thinner filaments or smaller distances) we decided to report the proportion of subjects that could detect a given threshold. The reported threshold filaments and interprong distances were chosen such that they were closest to the 97·5th and 99th percentiles for the respective test site. The percentages are given with their 95% confidence interval. The latter represent the range of values within which the true value lies, with a probability of 95%. All analyses were done separately for 'right' and 'left' because the thresholds on both hands or feet of the same subject are neither necessarily identical, nor statistically independent.

The influence of sex, smoking, alcohol and occupation upon the results was tested by using univariate analysis by the non-parametric Wilcoxon Rank Sum test.[13] Quantile regression,[14] a nonparametric regression technique, was employed to assess the association between the different factors and the results. The Wilcoxon matched-pairs signed-ranks test was used to determine whether or not there was a significant difference between results of testing right and left hands.[13] A p-value of less than 5% was taken as the level of statistical significance.

Results

The subjects' ages ranged from 16 to 67 and the distribution is shown in Figure 1. Table 2 shows the distribution of the co-factors investigated in this group of subjects. Fifty-six percent were non-manual workers and 44% were manual workers. Twenty-five percent were smokers and 16% drank alcohol. Ninety-one percent of subjects used no medicines, the variety of different medicines taken by the other 9% did not include any that are known to interfere with sensory functions. Eighty-six percent had no physical complaints and the rest of the complaints were not of a neurological nature.

The 70-mg filament was felt by 95·2–96·7% of the subjects on the thumb, MCP2, the

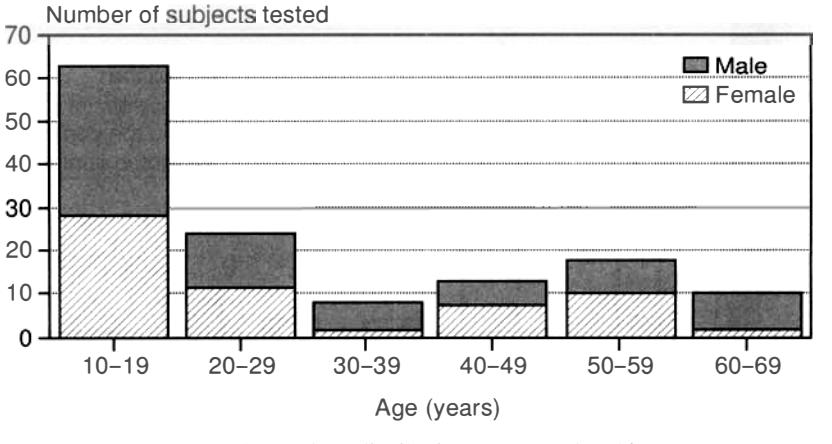

Figure 1. Age and sex distribution among study subjects.

Table 2. Distribution of co-factors among the study subjects ($N = 136$)

	Male ($N = 75$)			Female ($N = 61$)		
Co-factor	Yes (%)	No (%)	Unclear (%)	Yes (%)	No (%)	Unclear (%)
Manual labour	29 (38·7)	46 (61·3)		34 (55·7)	27 (44·3)	
Using footwear	63 (84)	1 (1·3)	11 (14·7)	60 (98·4)	1 (1·6)	
Smoking	19 (25·3)	56 (74·7)		14 (23)	44 (72·1)	3 (4·9)
Uses alcohol	17 (22·7)	58 (77·3)		4 (6·6)	54 (88·5)	3 (4·9)

index finger and the hypothenar eminence. This filament was felt by 93·0 and 94·1%, respectively, on the little finger and MCP5. Figure 2 illustrates the distribution of filament thresholds found for the thumb and the big toe in our sample. Because the 70-mg filament was the thinnest filament used, the data were non-normally distributed, particularly on the hand.

Table 3 shows the proportions of subjects feeling the filament nearest to the 97·5 and 99th percentiles. There were no significant differences between right and left sides. The 200-mg filament was felt on the big toe by only 58·7%, on MTP1 by 70·9%, on MTP5 by 68·8% and on the heel by 31·3% of the subjects. The big toe, MTP1 and MTP5 had a reference SWM threshold of 2 g, using the 97·5 percentile as cut off level. Four grammes appeared a more relevant normal value for the heel.

A M2PD threshold of 2 mm was felt by 84·3% of the subjects on the index finger and by 73·8% on the little finger. Table 4 shows the results near the 97·5 and 99th percentiles of testing with M2PD. Using the 97·5 percentile as cut off level, M2PD had a reference threshold of 4 mm for the index and the little fingers.

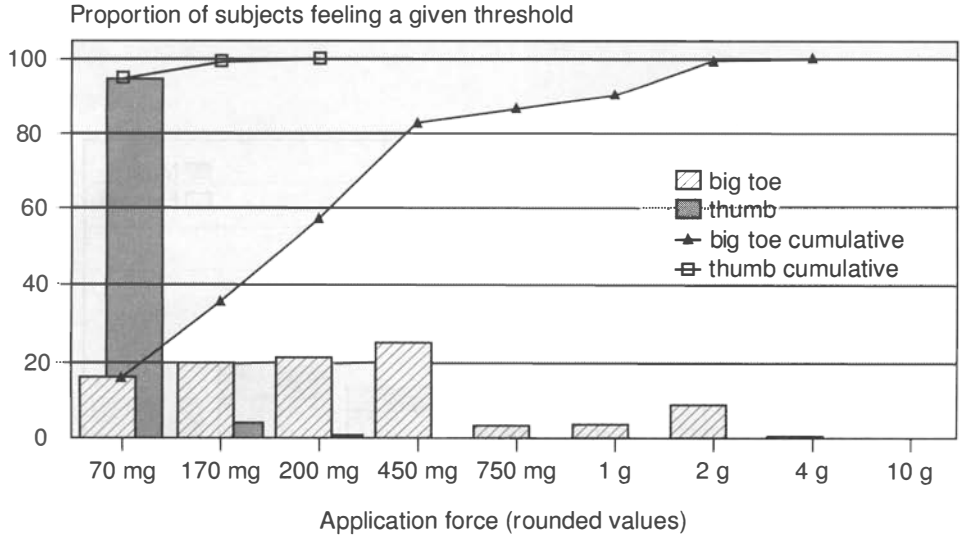

Figure 2. Distribution of monofilament scores on the thumb and big toe ($N = 136$).

Table 3. Touch sensibility thresholds in healthy Nepali volunteers measured with Semmes–Weinstein Monofilaments (136 pairs of hands and 134 pairs of feet) and the proportion of people feeling that particular threshold (with the 95% confidence interval)

Site	Threshold	Left	Right	Threshold	Left	Right
Median nerve						
Thumb	170 mg	97·1 (94·2–100)	99·3 (97·9–100)	200 mg	99·3 (97·9–100)	100
MCP2	170 mg	97·1 (94·2–100)	98·5 (96·5–100)	200 mg	99·3 (97·9–100)	100
Index	170 mg	97·1 (94·2–100)	98·5 (96·5–100)	200 mg	99·3 (97·9–100)	100
Ulnar nerve						
Little	170 mg	97·8 (95·3–100)	97·1 (94·2–100)	200 mg	99·3 (97·9–100)	99·3 (97·9–100)
MCP5	170 mg	97·1 (94·2–100)	97·8 (95·3–100)	200 mg	98·5 (96·5–100)	99·3 (97·9–100)
Hyp	170 mg	97·1 (94·2–100)	98·5 (96·5–100)	200 mg	100	99·3 (97·9–100)
Post tibial nerve						
Big toe	2 g	99·3 (97·9–100)	99·3 (97·9–100)	4 g	99·3 (97·9–100)	100
MTP1	2 g	100	98·5 (96·5–100)	4 g	100	100
MTP5	2 g	99·3 (97·9–100)	99·3 (97·9–100)	4 g	99·3 (97·9–100)	100
Heel	2 g	95·5 (92·0–99·0)	94·8 (91·1–98·5)	4 gm	98·5 (96·3–100)	97·0 (94·1–99·9)

mg = milligrammes, g = grammes.

Table 4. Moving 2-point discrimination thresholds in healthy Nepali volunteers (133 pairs of hands and 112 pairs of feet) and the proportion of people feeling that particular threshold (with the 95% confidence interval).

Site	Threshold	Left	Right	Threshold	Left	Right
Median nerve						
Index	3 mm	97·0 (94·1–99·9)	97·0 (92·9–100)	4 mm	100	100
Ulnar nerve						
Little	3 mm	91·2 (86·1–96·3)	91·8 (87·1–96·5)	4 mm	99·2 (97·6–100)	98·5 (96·3–100)
Post tibial nerve						
Big toe	6 mm	97·3 (94·4–100)	97·3 (94·4–100)	7 mm	98·2 (95·7–100)	99·1 (97·3–100)
Heel	7 mm	96·4 (92·9–99·9)	93·7 (89·2–98·2)	8 mm	98·2 (95·7–100)	99·1 (97·3–100)

mm = millimetres.

For both the SWM and M2PD there was a significant difference between the thresholds on the heel and the rest of the foot ($p = 0{\cdot}001$).

SIGNIFICANT VARIABLES

In univariate analysis, the touch thresholds of hands and feet were associated with smoking and type of work, smokers and manual workers having a higher threshold than nonsmokers and non-manual workers ($p < 0{\cdot}01$ and $p < 0{\cdot}001$, respectively). Sensibility thresholds increased with age. When using a multivariate regression model (quantile regression, and the 95th quantile) age was the only variable found to have a significant effect on touch thresholds on several sites on hands and feet after adjusting for the effects of sex, type of work, smoking and use of alcohol.

Discussion

Indentation of the skin is currently believed to be the most quantifiable way of measuring touch perception.[15] Either the application force or the skin displacement is measured. Ideally the stimuli should be controlled with a known waveform that is invariant over a broad range of stimulus magnitudes.[15] This is only possible with automated instruments that deliver controlled stimuli using electromechanical transducers. It is clear, however, that in most clinics such equipment will not be available in the foreseeable future. This is particularly true in the field of leprosy where most patients are treated in rural clinics with minimal resources. The Semmes–Weinstein Monofilaments and moving 2-point discrimination provide practical and economical alternatives which give quantifiable results.

The study was carried out under difficult but not uncommon conditions in leprosy field work. The environment for testing was not ideal; spectators may have distracted the subjects and testers. This may have increased variability in results. Our findings are therefore likely to be useful under operational conditions.

Abnormal sensibility may be caused by a variety of diseases, the most common of which are leprosy, diabetes, Dupuytren's contracture and carpal tunnel syndrome. When unusually high thresholds were found, particular care was exercised to exclude these diseases. However, prevailing circumstances made it difficult to apply additional tests routinely.

SEMMES–WEINSTEIN MONOFILAMENTS

The monofilaments or 'von Frey hairs', as they are often referred to , can deliver a touch-pressure stimulus that is constant for any given filament, provided the application force is enough to bend the filament.[16,17] Care should be taken to apply the filament perpendicularly to the skin, so that the tip does not slip and that the resulting deformation of the filament is crescent-shaped and not 'S-shaped'.[11] Too fast an application may result in 'ringing', an initial spike of force, which may exceed the buckling force of the filament.[17] The material used for the standardized filaments is straight monofilament nylon, the kind that is used to manufacture toothbrushes. The

diameters are standardized (see Table 1) and the length of filaments should be 38 mm.[7] Where possible, diameter and length should be checked before use since the filament's force is influenced by these factors.[9] Monofilaments should be checked before each testing session, because an already bent filament will give less force. Bent filaments that cannot be straightened easily should be replaced.

Using the 97·5 percentile as cut off for 'normal', we found that both the 200-mg filament and 170-mg filament would be acceptable as reference thresholds. However, the 200-mg filament (log no. 3·61) was chosen as the reference point for several reasons:

It was appreciated by a larger proportion of subjects (98·5–100%), thus increasing the specificity of the test.
Because of its diameter, it is more robust than the 170-mg filament, and will last longer. It is therefore more suitable for use under field conditions than the more vulnerable 170- and 70-mg filaments.
It is currently available in bulk as loose filaments (through the American Leprosy Missions) and can be easily fitted into locally made handles.

If a patient feels the 200-mg monofilament, there is almost a 100% chance that the patient's sensibility is intact (high specificity). This is very important because treatment may be given based on the results of monofilament testing. On the other hand, choosing a higher threshold as normal will give an increase of false negative results (low sensitivity). Patients with a decreased sensibility, but still feeling the 200-mg monofilament, will not be recognized as having a dangerous impairment of neural function.[15]

On the foot, the 2-g filament (log no. 4·31) appeared to be appropriate as reference threshold (Table 3). The reference thresholds of the SWM found in the USA were 45–70 mg for the hand and approximately 300 mg for the foot.[4,7,8]

MOVING 2-POINT DISCRIMINATION

Moving 2-point discrimination (M2PD) has been advocated as a test of innervation density of the rapidly-adapting fibre system.[6] While using this test, the application force must be kept as constant as possible in order to minimize the variability in the test results caused by the examiner. A study of interobserver repeatability using these tests will be published elsewhere (van Brakel *et al.*, submitted). Testing moving two-point discrimination on the foot was very difficult. As many subjects were guessing, it was almost impossible to get reliable thresholds. This may be due to the fact that the sole of the foot is not used for finer tactile discrimination and also because the formation of callosities on the sole is more marked than on the hand.

Appropriate reference thresholds for M2PD in our sample were 4 mm for the hands and 7 mm for the big toe. Our experience suggested that testing of M2PD on the sole of the foot, particularly on the heel, cannot be recommended. Dellon found a reference value of 2 mm in the distal tip of the finger, while a value of 3 mm was regarded as an early abnormal value.[6,8]

Compared to American reference values, the Nepali reference values are higher especially on the foot, both for the SWM and the M2PD. This difference may be explained by a higher proportion of people walking barefoot or in chappals (sandals).[18] This applies to both manual and non-manual workers compared to those in the North American samples. Manual work and lack of footwear increase the tendency to

formation of callosities on hands and soles of feet which might lead to higher thresholds of sensibility.[18]

When analysing the determinants of sensory threshold (explanatory variables), age was the only factor significantly associated with the level of threshold after adjusting for the effects of factors such as occupation and smoking in a multivariate model. The sensory threshold increased with age on most of the sites tested. Unfortunately, the sample size of our study was not big enough to produce age band-specific normative values. A similar age dependency of thresholds of touch sensibility was described by Dyck.[19] A much larger sample will be needed to provide us with the age-specific normal thresholds.

Conclusions

The reference values for monofilaments used in the USA are unsuitable in Nepal. For the hand we found the 200-mg filament to be the most suitable reference value, and for the foot this was the 2-g filament (instead of 70 mg and 300 mg, respectively).

We found a reference threshold of 4 mm for moving two-point discrimination of the hand (instead of 2 mm, which is used as threshold for reference in the USA).

We do not recommend the use of moving two-point discrimination on the foot.

Acknowledgments

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The role of village leaders in the implementation of multidrug therapy for leprosy, Sudan—a pilot study in the Angasana Hills

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Summary The purpose of this study is to implement multidrug therapy (MDT) and to evaluate the possible role of village leaders in supervising MDT treatment in remote and inaccessible areas in Sudan where health facilities are poor.

Three villages from the Angasana Hills in the south-east of Sudan, where leprosy is endemic, have been chosen for this study.

A health education course for village leaders in the area was conducted. Three medical assistants from a nearby village were identified to examine all leprosy suspects and to put the diagnosed cases on treatment. The village leaders were to supervise the treatment of the patients during the rainy season.

Out of 43 cases detected all paucibacillary (PB) cases detected (11 cases) completed their treatment and 28 out of 32 multibacillary (MB) cases were regularly on treatment.

It has been obvious that the village leaders were useful in supervising MDT in the Angasana area, a process which can be extended to other inaccessible areas in the Sudan.

Introduction

Sudan is one of the biggest countries in Africa with a surface area of one million square miles, and a population of 24 millions. It is bounded by nine countries. It has different types of climates, the Equatorial climate in the south, the Savanna in the centre and the desert in the north. Sudan is divided into 26 states, the majority of the population is rural. Due to the vastness of the country, there is a problem of communication between different states, especially in the western and southern states, and that is made more worse during the rainy season. The health infrastructure is inadequate in many places in the western and eastern states. But health infrastructure in the south is very poor due to the state of insecurity resulting from the war in the south of Sudan since 1983.

Leprosy is a well-known disease in Sudan. It is mainly prevalent in the eastern, central and southern states. The estimated number of leprosy patients in Sudan is 24,850 (Figure 1)[1]. The total number of new patients showed a progressive rise from 600 patients in 1990 to 3070 patients at the end of 1994. Though leprosy control activities started in the early seventies, intensification of leprosy activities was achieved in 1992

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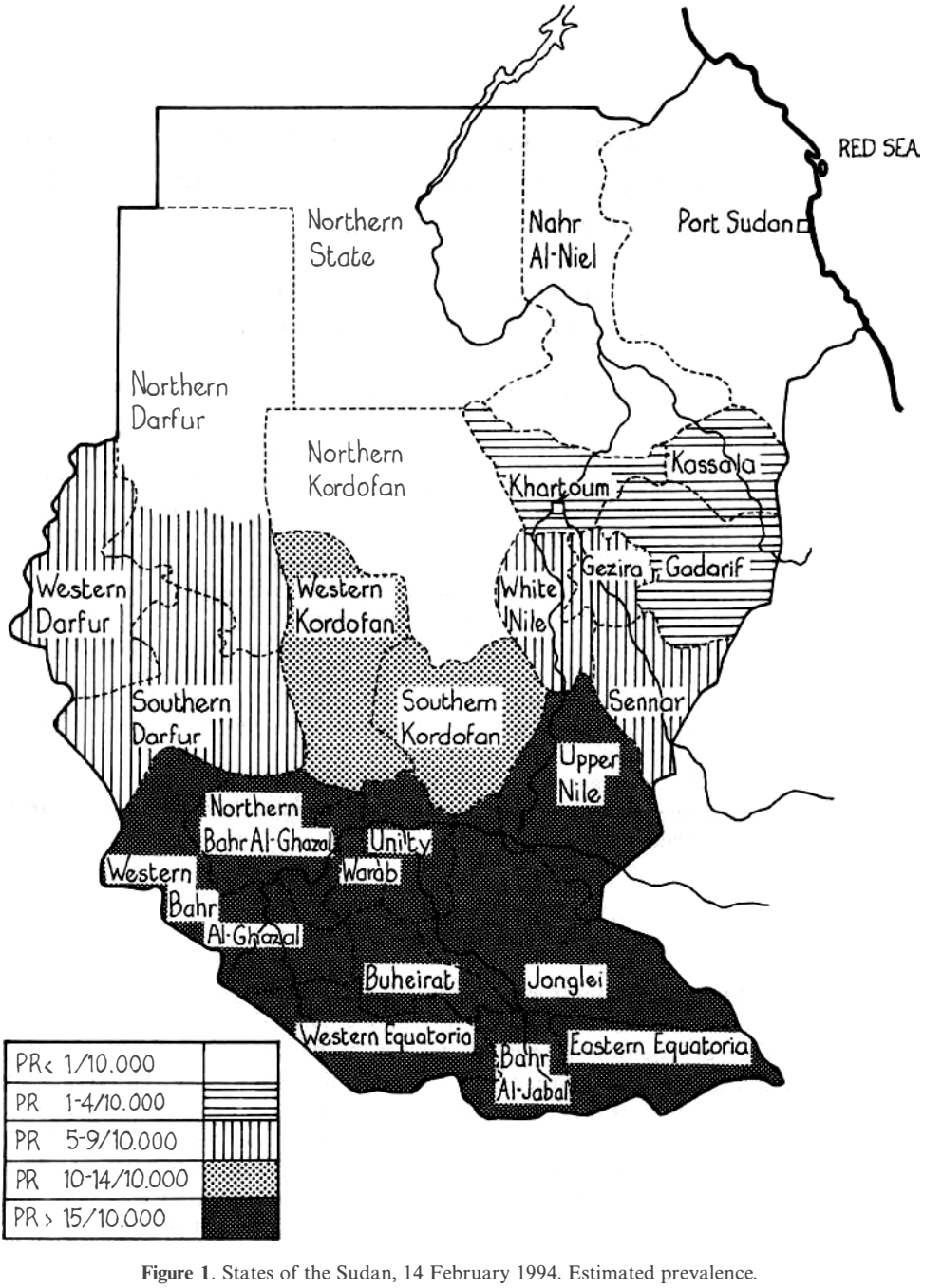

Figure 1. States of the Sudan, 14 February 1994. Estimated prevalence.

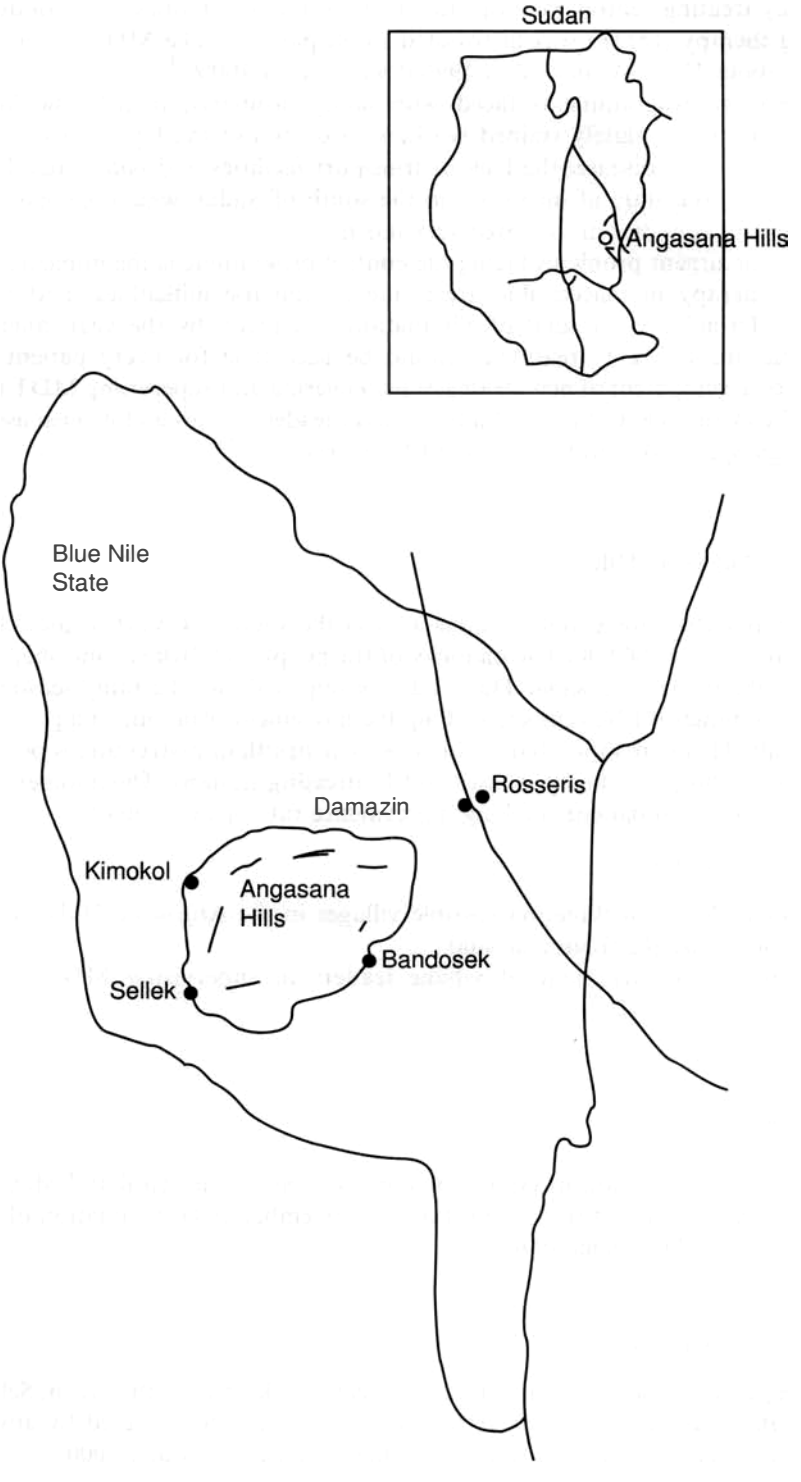

Figure 2. The Angasana Hills and surrounding districts.

when many treating centres were opened; many training activities were conducted and multidrug therapy (MDT) was distributed to all patients. The MDT coverage before 1992 was about 13%, by the end of 1994 it was almost 100%.[1]

The leprosy programme is faced with many problems, namely the inadequate infrastructure, inadequately trained workers to carry out the leprosy work; the high social stigma of the disease; the lack of transport facilities and bad roads; long rainy seasons; beside the state of insecurity in the south of Sudan which has hampered the leprosy control activities in that area very much.

One of the urgent problems facing the control programme is the implementation of multidrug therapy in inaccessible areas due to climatic difficulties, bad roads and insecurity. To achieve the goal of elimination of leprosy by the year 2000 in those inaccessible areas, MDT treatment should be accessible for every patient and this necessitates development of new strategies in delivering and supervising MDT treatment through the involvement of public leaders, village leaders, youth and women associations and through Special Action Project (SAPEL) intervention.[8]

Study area: Angasana Hills

The Angasana Hills are a mountainous area in the south-east part of the Sudan. The population is about 100,000. The majority of the people are farmers and shepherds and the main tribe is the Angasana. The roads are unpaved and the rainy season starts in June and continues till November, making the movement from one village to the other very difficult. There are more than 30 villages. The health infrastructure is poor: there is only one small hospital, 4 dispensaries and 12 dressing stations. The number of leprosy patients is about 280 patients making a prevalence rate of 28/10,000.[2]

Objectives of the study:

To implement MDT in three inaccessible villages in the Angasana Hills using village leaders to supervise the treatment; and
To evaluate the involvement of village leaders in supervising MDT for leprosy patients.

Methodology

The study started two months before the rainy season, i.e., in April and May 1994 and included the whole rainy season from June to November 1994. Evaluation of the study was conducted in December 1994.

SELECTION OF THE AREA

Three villages from the Angasana Hills were selected. Kimrol in the north, Sellek in the west and Bandosek in the south. All three villages were not covered by any form of health service. The total population in the three villages is about 12,000.

SEMINAR FOR VILLAGE LEADERS

A seminar for 30 leaders from different villages in Angasana including the three chosen villages was conducted in March 1994. It was concerned with increasing the awareness of the leaders about leprosy, its aetiology and treatment, and the importance of early detection and early treatment of leprosy cases.

EXPECTED DUTIES OF VILLAGE LEADERS INCLUDE:

Presenting suspected cases with visible deformities or with suspected skin lesions to be examined by the medical assistant; and
supervision of treatment of leprosy patients during the rainy season from June to November 1994.

SELECTION OF THE MEDICAL ASSISTANTS

Three medical assistants from the nearby villages covered by the health service were chosen. Each medical assistant visited one village once a month during April and May.

DUTIES OF THE MEDICAL ASSISTANT INCLUDED THE FOLLOWING

To examine suspected leprosy cases;
to diagnose, treat and register leprosy cases;
to educate the patients about the disease and the importance of regularity in treatment; and
to present a report about his activities at the end of the year.

SELECTION OF PATIENTS

All suspected leprosy patients in the village were brought by the village leaders to the medical assistants during their monthly visits in April and May 1994.

All diagnosed leprosy patients were classified according to the WHO classification[3] and put on the recommended WHO regimen of multidrug therapy.[4] Patients were given supervised treatments by the medical assistants in April and May 1994. Six months treatment was given to each patient to cover the period of the rainy season.

DIAGNOSIS OF PATIENTS

Diagnosis was mainly on clinical grounds depending on the presence of the cardinal signs for leprosy.[5]

CLASSIFICATION

Classification of leprosy was according to the national guidelines in the national manual.

Paucibacillary

Patient with well-defined anaesthetic skin lesion with or without peripheral nerve enlargement, the number of both skin lesions and enlarged peripheral nerves should not exceed five.

Multibacillary

When the number of both the skin lesions and enlarged peripheral nerves exceeded five.

Disability Grading was carried out according to WHO grading for disability.[6]

SUPERVISION

The Co-investigator visited the villages in December 1994 and performed the following activities:

interviewed and examined all available patients;
interviewed the village leaders; and
checked the patient registers.

INDICATORS

The following indicators were used;

total number of patients detected;
detection rate;
proportion of newly detected PB and MB cases;
proportion of Grade II disability in new detected cases;

$$\frac{\text{number of PB patients completed MDT}}{\text{number of PB patients expected to complete MDT}};$$

$$\frac{\text{number of MB patients completed 8 doses}}{\text{total number of MB cases put on MDT}}.$$

Results

Out of the 127 suspected cases 43 leprosy cases have been identified making a case detection rate of 36/10,000. The male to female ratio was 1·3/1·0. Total of MB cases detected was 32 patients (74%) and total of PB cases detected was 11 (26%).

The mean age was 32 years. No patients below 15 years of age were detected. Grade II disability was noticed in 3 MB patients (7%) and Grade I disability was noticed in another 3 MB patients. The remaining patients showed no disability.

All patients were put on MDT treatment according to the guidelines. All PB cases completed their six doses and discharged from treatment.

All MB patients except four completed their treatment from April to November 1994. (See Tables 1 and 2.)

Table 1. No. and classification of patients detected in each village

	MB		PB		Total	
Village	Male	Female	Male	Female	MB	PB
Bandosek	5	6	5	1	11	6
Sillek	6	4	2	1	10	3
Kimrol	5	6	1	1	11	2
Total	16	16	8	3	32	11

Table 2. Classification, disability grading, No. of MDT doses received and No. of defaulters

	PB		MB		PB	MB		
	Without disabilities Grade II	With disabilities Grade II	Without disabilities Grade II	With disabilities Grade II	Completed 6 doses	Completed 8 doses	Default. PB	Default. MB
Bandosek	6	—	11	—	6	10	—	1
Sillek	3	—	9	1	3	8	—	2
Kimrol	2	—	9	2	2	10	—	1
Total	11	—	29	3	11	28	—	4

Discussion

It is clear from the results that the village leaders were able to perform their duties well. This was evident by the increased leprosy awareness among the community and the detection of 43 new cases, which was a relatively big number compared to the number of new cases detected in other villages in the same area. Although the number of women reporting for treatment was slightly less than that of the males, it was considered a relatively high figure compared to the number of women detected in other areas in the country. It is a well-known fact that women in the rural areas in Sudan refrain from being examined clinically by men. Detection of such a figure among women reflects their great concern and awareness about the disease.

Also, as expected in a new area, the majority of the patients were of the multibacillary type.[7] Achievements of these activities in the three villages reflects the great input of the community leaders in promoting the awareness of the population about leprosy and bringing patients for treatment.

Another point of consideration is that, Grade II disability is a figure 7% less than the lowest rate of disability in new patients detected in other areas in the Sudan which ranged from 15 to 30%. This is explained by the early detection and early reporting of cases for treatment in the study area.

Regarding the compliance of patients, the results were excellent and very encouraging. All PB cases completed the treatment and 28 out of 32 MB cases (88%) were quite regular in taking treatment, and the remaining 4 cases took only 2 doses and they disappeared from

the area. Further follow-up of the MB patients on treatment is to be carried out to monitor their regularity and compliance to treatment.

The recent implementation of the first phase of the special action project (SAPEL) for South Kordofan State[9] demonstrated clearly the important role of the public and village leaders in implementation of MDT therapy. They have been quite helpful in promoting leprosy control activities by bringing up cases for treatment, supervising patients' treatment, tracing the absentees.[9] Further implementation of such activities using the village leaders in other areas will promote leprosy activities and give a better evaluation of the process of involvement of such important sectors of the community in leprosy control activities. The elimination of leprosy cannot be achieved in such special areas without the involvement of those sectors.

In conclusion it has been quite obvious that involvement of community leaders in the field of leprosy is very important and perhaps should be mandatory in certain areas where the health facilities are poor or in areas which are geographically inaccessible.

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SPECIAL ARTICLE

Lepra India, Annual Report 1994

Foreword

The British Leprosy Relief Association – LEPRA, is the successor of the British Empire Leprosy Relief Association (BELRA), which has done yeoman service in treatment of leprosy patients in India from 1925, at a time when hardly any organization was willing to undertake work in this most neglected field. The new organization Lepra made a second entry into India in 1987 to support the Government of India in the MDT programme. "Lepra India" was established as a partner to Lepra UK. Having signed the Memorandum of Understanding with the Government of India, Lepra India agreed to follow the guidelines of the Government of India to implement the MDT programme in the allotted endemic districts. The first district to be taken up was Bidar in Karnataka, very soon followed by the twin cities of Hyderabad and Secunderabad and the districts of Karimnagar and Medak in Andhra Pradesh. In all these districts Lepra was to provide funds only for some of the specified items while the government provided the infrastructure and paid all the salaries.

Request then came from Orissa State to implement the programme in the very difficult hilly tribal areas. A new situation arose here since the State Government was unable to provide the infrastructure, but these areas badly needed help and no one was willing to undertake this arduous task. Lepra India took up the challenge by providing the entire infrastructure and very systematically conducting the MDT programme incurring a very heavy expenditure. Lepra India is carrying on, on its own, implementation of MDT in the districts of Koraput, Malkangiri, Rayagada and Sonepur. It is also supporting the State Government in the districts of Nowrangpur and Balangir. Thanks to the untiring efforts of all the committed workers, the programme has been very successful.

Prevention of deformities is another major task undertaken by Lepra India. This needed training and orientation of all the workers. A detailed plan of action has been prepared and the programme is being introduced gradually in all the areas of operation by Lepra India.

The progress made so far has been very encouraging. Further, a surgical unit has also been established in Muniguda in Rayagada District to make the services available to the patients in the most remote and backward areas.

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Lepra India is also supporting smaller projects under voluntary organizations in the states of Uttar Pradesh, Madhya Pradesh, Andhra Pradesh, Orissa, West Bengal and Kerala. All these projects are engaged in MDT programme.

This report is being presented to outline the activities and achievements in all Lepra India projects. Whatever success that has been achieved is the result of sincere effort of all the dedicated workers through the rank and file. We have full confidence to help the Government of India in its objective of elimination of leprosy in the near future.

Dr K. V. Desikan
Chairman, Lepra Society

Preface

As we move towards year 2000, the subject of health is attracting global attention and more so in Third World countries, where diseases such as leprosy/TB/AIDS are prevalent. Leprosy, though receding still remains a threat, especially in India. Of the 2.1 million world's leprosy sufferers, a staggering number, i.e. 64%, are in India.

In the crusade against leprosy Lepra India, a registered charitable voluntary health organization, in partnership with Lepra UK is spearheading a concerted effort to eliminate leprosy from our country.

Lepra India's support scenario includes Government programmes, NGOs and direct programmes. In addition, it runs a modern surgical theatre for the correction of deformities and also funds several leprosy centres for surgical rehabilitation.

Lepra by its sustained campaign and awareness programmes has greatly succeeded in overcoming the stigma and other prejudices attached to leprosy.

Lepra's achievement can be gauged from the fact that since its inception in 1988, it has cured 100,109 by December 1994. The prevalence rate in areas covered by it has dropped from 7·06 to 1·4 patient per 1000 population. The disability rate in new cases being detected is 4·3% as against 9% in the beginning.

Though Lepra has achieved significant results, still the momentum must be sustained to reach the goal of a leprosy-free society. Meanwhile emphasis has to be laid on programmes for socioeconomic rehabilitation of patients with disability.

I am pleased to present this project-oriented Annual Report for the year 1994 and I acknowledge that the achievements would not have been possible, but for the full and whole-hearted support from our donor agency Lepra UK. I am personally greatful to the Chairman and Vice-Chairman, Lepra India, Director, Lepra UK and all my colleagues involved in the implementation of MDT at all levels.

Tilak S. Chauhan
Chief Executive,
Lepra India

Hyderabad Leprosy Eradication Project (HYLEP)

The Hyderabad Leprosy Eradication Project covers an urban population of 6 lakhs (600,000) in the old city of Hyderabad. It is one of the 4 projects engaged in antileprosy work in the city. Muslims constitute 60% of the population. Urdu is the common language. About 44% of the population live in slums and congested localities.

The project was started on 14 October 1989. The Project area is divided into 8 sectors each of about 75000 population. Each sector is entrusted to one Paramedic. Two non medical supervisors guide the workers in planning and implementation of the programme. A field officer coordinates the day-to-day work. The senior medical officer is over-all incharge of the project. As health education is an important aspect in an urban population, a health educator is also appointed.

To start with, an intensive health education campaign was taken up followed by a house-to-house survey to detect leprosy cases. To overcome the Purdah system, local female auxiliary workers were engaged in the survey.

Drugs are given free to patients at suitably located treatment points near to their homes. In addition 6-weekly clinics are conducted in the local hospitals. This facilitates voluntary reporting of cases and treatment of complications.

Schoolchildren and contacts of patients are examined every year in the project. Rapid enquiry surveys of slums and the general population are undertaken to detect newly developed cases.

Health education is an integral part of the day-to-day work of each paramedic. During a survey flash cards on leprosy are shown to people and the early signs of leprosy are explained. Besides group talks, slide shows, exhibitions and video shows are regularly conducted in slums, schools, youth clubs, factories and service organizations. Antileprosy week is celebrated every year from 30 January to 5 February.

In 1994 a rally was organized on 30 January in which 500 schoolchildren and leprosy workers of voluntary and government units participated. Nine group meetings and 3 programmes of essay and elocution competitions were conducted and prizes were given to the best performers in each event. A Katha-Kavitha and slogan competition on leprosy was organized in which eminent writers and poets participated.

Prevention of disability is an integral part of the programme since 1992. Patients who are at risk are identified, status of each common trunk nerve is recorded in a

specially designed case card and are followed up at regular intervals. Early nerve damage is detected by testing anaesthesia by graded nylon bristles and motor weakness by voluntary muscle testing. Therapeutic and physiotherapy measures are taken to contain and reverse the nerve damage. Suitable advice is given to patients who report with established anaesthesia and muscular weakness to prevent further worsening of disability in the hands, feet and eyes.

To encourage learning through participation the staff of Hylep get together every week and one among them initiates discussion on a topic allotted to him in advance. The topic is discussed through question and answers and the senior medical officer summarizes important aspects. In addition orientation of field staff is arranged by inviting experts to update their knowledge. A 2-day orientation was arranged for all the staff working in the city on 25 and 26 July 1994.

Balangir Leprosy Eradication Project (BOLEP)

The Balangir Leprosy Eradication Project covers the entire 4·7 (470,000) population of

General survey:

Type of survey	Period	Population		Cases detected		
		Enumerated	Examined	MB	PB	Total
House-to-house	12/89 10/91	5,61,959	3,55,934	118	1068	1186
Rapid enquiry	11/91 07/92	5,41,035	3,11,929	45	546	591
House-to-house	11/92 12/94	3,65,650	1,92,389	42	294	336

School survey during 1994:

No. of schools	Schools covered	Students enumerated	Students examined	Cases detected		
				MB	PB	Total
440	145	44,135	36,012	–	48	48

MDT performance during 1994:

	MB	PB	Total
Cases on record as on 31.12.1993	132	368	500
Cases detected during 1994	73	394	467
Cased deleted as cured during 1994	41	397	438
Cases deleted as left the area, died etc	18	53	71
Total cases deleted	59	450	509
Balance cases as on 31.12.1994	146	312	458

Important indicators:

	Prevalence rate	New case detection rate	MB rate	Child rate	Disability rate
At the beginning	16/10000	2·32/1000	11·29%	45·8%	6·5%
As on 31.12.1994	7·7/10000	1·09/10000	13·8%	56·3%	6·34%

Patients under POD

	MB	PB	Total
Active	80	149	229
RFT	55	428	483
Total	135	577	712

Deformities treated

	Treated	Improved	Static
Claw hand	71	54	17
Lagophthalmos	6	4	2
Foot drop	3	2	1
Ulcers	34	6	28

the newly formed Subarnapur district in Orissa. The Project was started on 1 April 1990. Subarnapur is one of the most backward districts of the State. It is highly endemic for leprosy. The population is mostly rural and the majority of them are Hindus. Their standard of living is poor and the literacy rate is 24%. Communication facilities are poor.

The River Mahanadi and its tributaries divide the project area of 2284 sq.km into 3 distinct zones. One of the zones Birmaharajpur, can only be reached by ferry as there is no bridge across the Mahanadi. Each zone is supervised by a non medical supervisor. A project officer is overall incharge of organizational and administrative aspects of the

project. Multidrug therapy is looked after by a medical officer. The Project is divided into 20 sectors; each sector is manned by a paramedic.

Antileprosy work was started in the project by verifying the list of cases handed over by the State Government. The case detection programme was started by conducting a rapid enquiry survey. MDT was started in January 1991; 20 MDT circuits were formed with 10 to 12 drug delivery points for each circuit. A team headed by the medical officer visits each drug delivery point regularly. Patients are brought to the DDPs at the prescribed time by the PMWs, on the treatment day. Preclinic motivation is also done by the PMWs to ensure maximum attendance.

Schoolchildren and contacts of leprosy cases are examined every year. Total population surveys are also repeated at regular intervals for the detection of new cases.

Health education is an integral part of antileprosy work in BOLEP. The project has developed very good relations with the local government officials and the public. Regular meetings are arranged in the villages. Antileprosy day is celebrated every year. Processions and rallies are organized in which NCC, Scouts, Guides and students participate. Essay competitions on leprosy are organized for school and college students.

Effective health education has increased the voluntary reporting of cases—45% of cases reported voluntarily during 1994. Another important result of effective health education in the project area is that the local leaders invite the staff to conduct leprosy surveys in their villages. They provide all facilities and cooperate in the detection of cases and their regular treatment.

ECONOMIC EMPOWERMENT OF CURED LEPROSY PATIENTS

Nineteen cured leprosy patients staying in a self-settled colony at Sonepur were provided with income generating schemes and a dormitory with 20 beds was constructed with the support of the Government and the local NGO.

Income generating schemes such as horticulture and social forestry projects were started with the assistance of the Indian Bank. Manamunda which donated Rs.40,000/-. Also, 9 poultry units costing Rs.13,000/- each will be financed by the Indian Bank.

These schemes will help in reducing the social stigma prevailing in the community and inculcate the habit of earning their livelihood honorably.

General survey:

Type of survey	Period	Population		Cases detected		
		Enumerated	Examined	MB	PB	Total
Rapid Survey	05/90 12/91	3,80,124	2,32,872	779	3439	4218
1st Mass Survey	02/92 03/94	4,26,779	3,78,620	627	1866	2493
2nd Mass Survey	04/94 12/94	2,50,298	1,95,459	260	724	984

School survey during 1994:

No. of schools	Schools covered	Students enumerated	Students examined	Cases detected		
				MB	PB	Total
782	728	68,443	45,889	6	79	85

MDT performance during 1994:

	MB	PB	Total
Cases recorded as on 31.12.1993	1615	1223	2838
Cases detected during 1994	789	1199	1988
Cased deleted as cured during 1994	830	1432	2262
Cases deleted as left the area, died etc	247	76	323
Total cases deleted	1077	1508	2585
Balance cases as on 31.12.1994	1327	914	2241

Important indicators:

	Prevalence rate	MB rate	Child rate	Disability rate
At the beginning	228/10000	26·6%	20·7%	7·9%
As on 31.12.1994	47/10000	39·7%	23·9%	7.2%

Koraput Leprosy Eradication Project (KORALEP)

The Koraput Leprosy Eradication Project (KORALEP) covers the two newly formed districts of Koraput and Malkangiri with a population of 14,76,774. The area is vast (14,649 sq.km) and the terrain is hilly and difficult. Communications are meagre. There are 6096 villages in the Project. Most of them are small and scattered; 53% of the population is tribal and the literacy rate is 18%.

Difficult terrain, scattered small villages, and illiterate tribal population with traditional sociocultural life styles, make the task of eradication of leprosy in Koraput a challenging one.

The project is designed and supervised by a field consultant. A senior medical officer is in-charge of the programme. He is assisted in supervision by a field officer. Three zones have been formed with a NMS responsible for each zone. The entire area is divided into 30 sectors. Each sector is looked after by one paramedic who is responsible for 50,000 population. Locally trained village voluntary workers who are fluent in the local dialect assist the paramedic in detection and motivation of cases for treatment.

Initially a rapid enquiry survey was conducted to detect leprosy cases followed by house-to-house and total population surveys. School and contact surveys are done annually. All cases detected are put on MDT. The project area is divided into 25 MDT circuits with 184 treatment points, which are located in the PHCs, schools, Panchayat Offices and community halls.

Health education is given importance in the project. During the survey, flash cards are shown to people to explain signs and symptoms of leprosy. Group talks, slide shows, exhibitions and video programmes are also conducted regularly.

During 1994, 12 group talks, 24 slide shows, 2 video shows and 4 exhibitions were organized in the project area. There has been a steady increase in the percentage of voluntary reporting of cases from 23% in 1992 to 40% in 1994.

A community health programme was started in August 1994 with the objective of providing treatment facilities for minor ailments initially involving local tribal youth as health volunteers and to enable them to gradually function as a vital link between the people and health workers at primary health centres. A training programme of 3 weeks for 13 tribal educated youths was organized with the help of 11 specialists from the headquarters hospital in Koraput. A health survey in 7 villages was completed. A weekly clinic was also started in October 1994 for minor ailments.

A 6-bedded health care centre was established on 8 October 1994 at Koraput. The Centre is intended for temporary hospitalization of leprosy cases with reactions and other complications. During the 3-month period to the end of December 1994, 15 patients were admitted in this centre; 7 cases for reactions, 2 for neuritis, 5 for trophic ulcers and 1 for intercurrent infection.

General survey:

Type of survey	Period	Population		Cases detected		
		Enumerated	Examined	MB	PB	Total
Rapid Enquiry	11/91 10/93	13,75,376	7,84,090	848	1852	2700
House-to-house	11/93 12/94	6,75,287	5,11,119	246	1202	1448

School survey during 1994:

No. of schools	Schools covered	Students examined	Cases detected		
			MB	PB	Total
2650	–	23,888	0	35	35

MDT performance during 1994:

	MB	PB	Total
Cases on record as on 31.12.1993	1166	1503	2669
Cases detected during 1994	407	1626	2033
Cased deleted as cured during the year	78	1613	1691
Cases deleted as left the area, died etc	48	38	86
Total cases deleted	126	1651	1777
Balance cases as on 31.12.1994	1447	1478	2925

Important indicators:

	Prevalence rate	MB rate	Child rate	Disability rate
At the beginning	74/10000	36%	17%	8·7%
As on 31.12.1994	20/10000	20%	19%	5·1%

Lepra's support to government MDT districts:

Lepra India provides financial, logistic and technical support for the implementation of MDT programmes in 5 districts in 3 states of India. This is in persuance of an agreement signed in 1989 between Lepra India and the Ministry of Health, Government of India. The districts supported as per this agreement are Bidar in Karnataka State. Karimnagar and Medak in Andhra Pradesh and Balangir and Nabarangpur in Orissa. Lepra India provides to each district:

The entire requirement of antileprosy drugs for all patients;

3 jeeps, microscopes, typewriters, duplicating machine and audiovisual aids;

the purchase of emergency drugs;

the total cost of POL and maintenance for vehicles supplied by Lepra and parts for Government vehicles under NLEP;

MDT incentives to all the cadres of staff as per the Government of India guidelines;

the welfare needs of patients including a supply of MCR footwear, spectacles, and supplementary diet for inpatients;

the printing of case cards, purchase of stationery and health education material;

funds for training and orientation to staff;

technical consultation services to all the 5 districts.

A brief note on each district follows:

BIDAR

Bidar is one of the backward districts of Karnataka State. It sits as a crown on the state

map. No wonder it is the jewel in the crown of the state as far as the implementation of MDT is concerned.

It has a population of 12,55,799. MDT was started in the district in October, 1988 with the support of Lepra India. As an exception Lepra India provided all 5 jeeps to the district to implement MDT. In addition to the successful implementation of MDT the district administration also contributed significantly towards rehabilitation of leprosy patients such as:

Economic rehabilitation: 21 leprosy patients were helped to secure government jobs; bank loans were arranged for 47 leprosy patients for income generating schemes.

Social acceptance: marriages of 7 cured leprosy patients were performed.

Physical rehabilitation: 66 eye operations were conducted; 100 pairs of spectacles and 108 pairs of MCR footwear were provided.

Lepra India also conducted orientation for NLEP staff and all medical officers of PHCs in the district.

MDT performance during 1994:

	MB	PB	Total
Cases on record as on 31.12.1993	463	911	1374
Cases on record during 1994	177	1263	1440
Cased deleted as cured	232	1488	1720
Cases deleted otherwise	25	34	59
Balance of cases as on 31.12.1994	383	652	1035
Prevalence rate as on 31.12.94 . . . . . 8/10000			

KARIMNAGAR

Karimnagar was one of the hyper-endemic districts for leprosy. GOI sanctioned MDT for the district in 1988. After a rapid enquiry survey and screening, MDT was started in the district in 1989. Due to various administrative reasons MDT could not be implemented in all the units simultaneously. However, by 1991 the entire district was covered. Although the prevalence rate has shown a marked reduction, the new case detection rate has not shown any appreciable decline. After MDT 31656 cases have been deleted from treatment.

MDT performance during 1994:

	MB	PB	Total
Cases on record on 31.12.93	1433	2556	3989
Cases recorded during the year	511	2881	3392
Cased deleted as cured	709	3965	4674
Cases deleted otherwise	164	199	363
Balance of cases as on 31.12.94	1071	1273	2344
Prevalence rate as on 31.12.94	7·7/10000		

Orientation of staff was taken up in the district, once for updating the knowledge of the field staff in leprosy, and the second time for prevention of deformity. One of the units of Huzurabad has also started POD for cases on treatment.

MEDAK

Medak is the neighbouring district to Hyderabad and also to Bidar. MDT was sanctioned for the district in 1989. Initially, GOI provided funds for MDT but later Lepra India was identified as the donor agency. Mr William Peters, Chairman of Lepra UK inaugurated MDT in the town of Gajwel in August 1989. MDT was started in all the 4 units of the district between January and April 1990. MDT implementation in the district was satisfactory.

This District did not have the required PMWs, which was affecting the implementation of MDT. Lepra India, therefore, agreed to support 15 daily wage workers from 1989 to 1994 to enable the district to start MDT on time in Narayankhed unit.

MDT performance during 1994:

	MB	PB	Total
Cases on record on 31.12.93	916	915	1831
Cases recorded during 1994	326	1017	1343
Cased deleted as cured	480	1184	1664
Cases deleted otherwise	121	128	249
Balance of cases as on 31.12.94	641	620	1261
Prevalence rate as on 31.12.94	5·6/10,000		

BALANGIR

MDT implementation in the Balangir district of Orissa started in 1989.

MDT implementation in Balangir is not as smooth as in other districts due to certain administrative problems. Ten out of 20 sectors in the Patangarh unit are yet to start MDT, as the posts of PMWs in those sectors remain vacant. In 2 sectors of the Titlagarh unit, MDT is not taken up as these sectors are inaccessible during the monsoon.

Orientation training to field staff of the district was conducted during the year. Consultancy services were also provided by Lepra.

MDT performance during 1994:

	MB	PB	Total
Cases on record on 31.12.93	3651	2669	6320
Cases recorded during the year	757	2593	3350
Cased deleted as cured	1947	3242	5189
Cases deleted otherwise	726	352	1078
Balance of cases as on 31.12.94	1735	1668	3403
Prevalence rate as on 31.12.94	28/10000		

NABARANGPUR

Nabarangpur is one of the four districts carved out of the old Koraput district. The other three districts, i.e. Koraput and Malkangiri are covered by Lepra India and Rayagada is covered by The Leprosy Mission and Hoina Leprosy Research Trust with the assistance of Lepra India.

MDT was taken up in the Nabarangpur district in January 1993. The Government has not yet sanctioned a complete infrastructure in the district. 17 out of 40 posts of paramedical workers are vacant. Therefore, MDT coverage is only partial and has not yet gained momentum because of various administrative problems.

Lepra's Support to Non-Governmental Organizations

Since its inception, Lepra India has been extending financial assistance to voluntary leprosy organizations engaged in the SET method of work.

MDT performance during 1994:

	MB	PB	Total
Cases on record on 31.12.93	870	2379	3249
Cases recorded during the year	288	732	1020
Cased deleted as cured	18	1094	1112
Cases deleted otherwise	123	1457	1580
Balance of cases as on 31.12.94	1017	560	1577
Prevalence rate as on 31.12.94		20/10000	

During the last 6 years, Lepra India supported ten voluntary leprosy organizations such as grants to meet expenses towards salaries, maintenance, administration and for creating infrastructure.

A brief description of each voluntary organization is given below. Particular area/ population covered, and achievements after MDT implementation are given in Annexture I.

ANDHRA PRADESH:

Grama Nava Nirmana Samithi, Hyderabad

Grama Nava Nirmana Samithi is one of the 4 projects engaged in antileprosy work in the twin cities of Secunderabad and Hyderabad. The project was started in October 1985. It covers 13 wards of the Municipal Corporation of Hyderabad. The population is predominantly Hindu.

An initial total population survey, with emphasis on maximum coverage in slums, was conducted. MDT was introduced to the project at the beginning. The project was divided into 15 MDT circuits having 71 treatment points. Due to the reduction in the caseload, there are 44 treatment points now; 1 circuit is visited each day. The project has a well-equipped physiotherapy unit. The staff of the project have been trained in the POD programme by the medical consultant and senior medical officer of Lepra India.

The project also has a footwear unit where MCR footwear and special shoes for cases with footdrop and other foot complications are manufactured. The project supplies the footwear requirement of institutions at Hyderabad and adjoining districts.

Hyderabad Leprosy Control and Health Society, Hyderabad

The society was started in 1985 and registered with the Government in 1986. Ward No. 18 of the old city of Hyderabad was allotted for leprosy work in 1989. Until then, the organization was mainly organizing medical camps and health education programmes and referring detected cases of leprosy to Osmania General Hospital.

The organization conducted a total population survey in the allotted area examining 83% of the population. All cases detected were on monotherapy until September 1992. MDT was started in September 1992, Lepra India started supporting the project in January 1993.

Prema Samajam, Vizianagaram

Prema Samajam is a voluntary organization registered in 1950 to provide care for the aged, needy and disabled. It is located in the urban area of Vizianagaram.

Leprosy Control Programme was started in February 84 in 36 wards of Vizianagaram town. A total population survey was undertaken in the project area before commencement of MDT in June 1984.

The leprosy control project was run by the organization from its own resources and the support extended by OXFAM until 1986. Subsequently it was funded by Lepra.

The project has a well-equipped physiotherapy unit, a weaving unit in which training-cum-production facilities are available. The weaving unit produces bandage cloth which is sold to voluntary organizations in Vizianagaram and adjacent districts.

The Organization has two in-patient wards of 5 beds each for male and females patients.

BIHAR

Gandhi Kusht Nivaran Pratisthan, Bhabua

Gandhi Kusht Nivaran Pratisthan was established in 1960 and was running 4 SET units covering a population of around 8 lakhs (800,000). In 1989, the project had to be closed down because of an acute financial crisis. About 8000 patients were under MDT at the time of closure of the Project. Lepra India started funding this programme in January 1993 initially with a population of 4 lakhs (400,000).

The area is backward, partly hilly and has very poor communication and transport facilities. A rapid enquiry survey was conducted before undertaking MDT. The area is highly endemic for leprosy with a prevalence rate of 11 per 1000, before commencement of MDT. The Project is divided into 8 MDT sectors for supervised administration of MDT.

The Project has a temporary hospitalization ward, a physiotherapy unit, an infirmary for crippled and dependent patients and vocational training unit with work-cum-production facility to provide training to needy patients in suitable trades and crafts.

KERALA

Paul Chittilapilly Memoral Leprosy Control Project, Kalladikode

The PCM Leprosy Project started functioning from February 87. It is a project of the congregation of Samaritan Sisters, founded for the cause of leprosy patients.

The Project was covering a population of one lakh (100,000) from 1987 to 1991. From 1992, an additional population of 1·5 lakhs (150,000) was allotted to the project by the State Government. The area is hilly and the terrain is difficult.

The Project concurrently runs general health programmes along with leprosy control activity. A hospital building was constructed with the financial assistance of Lepra India where general and leprosy patients are admitted without any discrimination.

The Project has completed surveys in 7 out of 11 panchayats. MDT was started in the Project in 1988. The treatment points are fixed in Govt. hospitals and family welfare centres with a view to orient the public and health staff with leprosy work. Health education activity is regularly carried out for different groups. The project has all necessary educational equipment and material.

MADHYA PRADESH

St Joseph's Leprosy Centre, Deepalay, Sanawad

St Joseph's Convent is run by the sisters of St Joseph of St Trudpert whose Regional House is at Bijalpur, Indore. The sisters run a school and maternity hospital in Sanawad.

St Joseph's Leprosy Centre started its survey work in May 1992. The SET pattern of work was started in February 1993. The Project covers a population of two lakhs (200,000) in Khargone district in Western Madhya Pradesh.

ORISSA

Hoina Leprosy Research Trust, Muniguda

The Hoina Leprosy Research Trust was established in 1986. The Trust was allotted 3 blocks in 1987 and another 3 blocks in 1991 by the State Government.

The Trust covers the entire sub-division of Gunupur of Rayagada district. The area is hilly and communication facilities are poor in the rainy season because of several rivers and rivulets. The population is predominantly tribal.

In the preparatory stage, a total population survey was conducted in which 80% of the population was examined. The area is organized into 9 MDT sectors for treatment of patients.

A surgical unit funded by Lepra India, has been established at the project headquarters, for undertaking reconstructive surgery for various deformities due to leprosy. The unit started functioning in July 1994. It caters to the needs of Western Orissa, Southern Madhya Pradesh and the Northern districts of Andhra Pradesh bordering Orissa. The unit consists of 10 beds and operations are done free of charge.

The Leprosy Mission, Rayagada

The SET unit of the Leprosy Mission at Rayagada covers the Rayagada sub-division of the Rayagada district, which was earlier a part of the Koraput district. Rayagada town is also covered by The Leprosy Mission.

An MDT Programme was implemented by the project in November, 92. Lepra India extends financial support to the organization only for MDT implementation which includes antileprosy drugs, and incentives to staff.

UTTAR PRADESH

Trinity Association for Social Service, Kopia

This organization was established in 1983 to provide medicosocial services to the poor,

destitutes and aged. Regular leprosy work has been undertaken since January 93. The Project area is surrounded and criss-crossed by rivers and is flooded every year during the rainy season. The transportation facilities are also poor. The population is rural and the literacy rate is 35% in males and 15% in females. A total population survey was carried out for the detection of cases before the commencement of MDT. The area has been organized into 10 sectors with one PMW per sector. MDT was started in 1993 in all the sectors.

WEST BENGAL

Gandhi Memorial Leprosy Foundation, Calcutta

The Calcutta Urban Leprosy Project of Gandhi Memorial Leprosy Foundation was established in December 1989. The Project has been covering 9 corporation wards of Calcutta.

House-to-house surveys and explanations with the use of flash cards where people were reluctant to be examined, were carried out, so that persons with suspected signs could report voluntarily. MDT was started simultaneously.

Lepra's support to this Project was completed in 1994.

Annexure I

Achievements of voluntary organizations supported by Lepra India during 1994

Names of projects	Area (sq. km)	Population	Year of starting	Total cases recorded till '94 MB	PB	Total	RFT MB	PB	Deletions Total	Others MB	PB	Total	Balance cases as on 31.12.94 MB	PB	Total	Prevalence rate (per 1000) MDT Beg.	in '94
GNNS	50	933605	1987	734	4099	4833	368	3147	3515	243	739	982	123	213	336	4·4	0·35
HLCHS	15	245132	1992	133	619	752	38	452	490	45	74	119	50	93	143	1·1	0·65
PS	28	115209	1984	264	1315	1579	188	1185	1373	58	77	135	18	53	71	2·5	0·60
GKNP	1206	400708	1993	368	1586	1954	34	906	940	71	370	441	263	310	573	5·7	1·40
PCM	219	289643	1987	324	685	1009	197	532	729	60	114	174	67	39	106	2·1	0·36
SJC	655	20000	1992	430	417	847	98	103	201	122	104	226	210	210	420	2·1	2·10
HOINA	4500	379252	1987	1084	2494	3578	493	1904	2397	160	199	359	431	391	822	8·0	2·36
TLM	3085	335347	1992	514	786	1300	49	366	415	46	46	92	419	374	793	7·0	2·40
TAFSS	521	351118	1993	330	971	1301	47	584	631	8	6	14	275	381	656	5·1	1·80
GMLF	N.A.	353274	1989	100	345	445	14	156	170	15	34	49	71	155	226	0·9	0·06
Total				4281	13317	17598	1526	9335	10861	828	1763	2591	1927	2219	4146		

Anexure II

Summary of achievement of all Lepra projects

Project	Cases recorded till Dec '94			Cases released as RFT			Cases under treatment by Dec '94			Prevalence rate (000)	
	MB	PB	Total	MB	PB	Total	MB	PB	Total	Beginning	1994
HYLEP	427	3250	3677	172	2425	2597	146	312	458	1·30	0·70
BOLEP	4937	14932	19869	1989	7803	9792	1327	914	2241	13·00	6.70
KORALEP	1625	4628	6253	78	3061	3139	1447	1478	2925	0·80	2·00
KARIMNAGAR	10294	29101	39395	7269	24392	31661	1071	1273	2344	11·00	0·80
MEDAK	5513	10375	15888	3593	8241	11834	641	620	1261	5·87	0·60
BIDAR	3894	11699	15593	2938	10365	13303	383	652	1035	4·90	0·80
BALANGIR	6615	21977	28592	2680	12585	15265	1767	1696	3463	16·50	2·80
NOBARANGPUR	1245	4655	5900	22	1635	1657	839	738	1577	5·50	2·00
GNNS	734	4099	4833	368	3147	3515	123	213	336	4·35	0·35
HLC & HS	133	619	752	38	452	490	50	93	143	1·10	0·60
PS	264	1315	1579	188	1185	1373	18	53	71	2·50	0·60
GKNP	368	1586	1954	34	906	940	263	310	573	5·70	1·40
PCM	324	685	1009	197	532	729	67	39	106	2·10	0.36
SJC	430	417	847	98	103	201	210	210	420	2·10	2·10
HOINA	1084	2494	3578	493	1904	2397	431	391	822	8·00	2·36
TLM	514	786	1300	49	366	415	419	374	793	7·00	2·40
TRINITY	330	971	1301	47	584	631	275	381	656	5·10	1·80
GMLF	100	345	445	14	156	170	71	155	226	0·90	0·06
Total	38831	113934	152765	20267	79842	100109	9548	9902	19450	–	–

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SPECIAL ARTICLE

Prevention of disability in leprosy—ILEP Medical Bulletin

A survey of the prevention of disability policy and activities in a random sample of 200 ILEP assisted projects was conducted in 1995. This was followed by a workshop of field experts in different aspects of prevention of disability who work in different geographical regions. The survey findings and state of current knowledge on prevention of disabiltiy were reviewed during the workshop and recommendations on the planning, implementation and evaluation of simple and effective prevention of disability developed. Prevention of disability includes complex activities, such as nerve decompression and reconstructive surgery, however these recommendations focus on the simple techniques and approaches which can be implemented through leprosy control programmes, primary health care and community-based rehabilitation. These recommendations have been approved by the ILEP Medical Commission.

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1 INTRODUCTION

The overall aim of leprosy control programmes is to prevent disabilities. Now is a unique opportunity to implement specific disability prevention activities as a result of the successful implementation of MDT. Stigma is reducing and the hand over to integrated programmes allows the possibility of prevention of disability (POD) being introduced at a primary care level.

The ILEP Medical Commission produced a set of guidelines for Prevention of Disability in Leprosy Control Programmes in 1993.[1] The purpose of the guidelines was to motivate managers of leprosy control programmes to establish adequate prevention of disability activities. ILEP does not routinely collect information on disability except the percentage with grade 2 disability at detection, and neither ILEP nor WHO collect routine data on prevention of disability activities. Thus there is no information readily available on what is going on in this area.

This Bulletin is aimed at ILEP Member-Associations and at leprosy programme managers.

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2 REVIEW OF PREVENTION OF DISABILITY

The ILEP Medical Commission undertook a survey of a random sample of 200 ILEP supported leprosy control programmes to determine to what extent prevention of disability (POD) activities were being carried out and what, if any, difficulties and successes were being experienced. This survey was conducted between April and September 1995 and included projects supported by 9 different associations in Africa, the Americas, and Asia. The survey received a response rate of over 60% and included small and large projects which were a mixture of vertical and integrated programmes in 25 countries. The projects surveyed represented over 50,000 new patients, over 135,000 registered patients, and over 330,000 cases who had completed chemotherapy.

A workshop of experts in POD was held in London in October to review the findings of the survey, consider the latest disability data from ILEP and WHO, and to provide advice to ILEP members on the planning, implementation and evaluation of simple and effective prevention of disability. The workshop also considered the need for indicators for POD and their routine collection on an annual basis as an ILEP questionnaire. The ILEP and WHO data on impairments are broadly similar with 7–9% of newly-detected cases having WHO grade 2 disability, however this varies considerably between projects (0–79%). These data on impairments at detection can be used to give a rough estimate of the size of the impairment problem globally, however more detailed and different information is required for programme planning.

The International Classification of Impairments, Disabilities, and Handicaps (ICIDH) defines these terms as follows:

Impairment is any loss or abnormality of psychological, physiological or anatomical structure or function, *Disability* is any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being, and *Handicap* is a disadvantage for a given individual, resulting from an impairment or disability, that limits or prevents the fulfilment of a role, depending on age, sex, and social and cultural factors, for that individual.[2] Deformity is a visually recognized impairment.

POD in leprosy includes activities to prevent impairment, reverse impairment, prevent increase in impairment, and prevent impairments becoming disabilities. This approach will lead to prevention of disabilities and handicaps. Rehabilitation focuses on the prevention, management and reversal of disability and handicap.

It should be noted that some of the benefits of POD are only seen after a number of years of consistent implementation. POD should not always be expected to give instant results, however any prevention or reduction of impairments will be of profound benefit to individuals and on the need for potentially expensive rehabilitation in the future.

Leprosy control programmes should work with and support the developments in Community-Based Rehabilitation (CBR) as it will provide an important potential for POD in the future. The current development of CBR is not at a stage to take responsibility for all people disabled through leprosy but it is important that those affected by leprosy are included in CBR programmes.

3 MAJOR SURVEY FINDINGS

— in 1995 there is evidence that the implementation of POD activities is now

widespread with 95% of projects surveyed reporting that POD activities are included in the organization of their leprosy control work.
— POD activities are being carried out in both vertical and integrated programmes.
— 39% of projects did not have written guidelines for POD, 99% use the WHO disability grading and 79% also have their own individual patient form for recording impairments.
— nearly all projects are using steroids to treat recent nerve damage and more than 90% treat such patients in the community rather than in hospital.
— 94% of projects train patients in self-care and almost 90% give advice on appropriate footwear.
— less than 60% of projects surveyed had a copy of the ILEP POD Guidelines.
— the survey provided detailed information about the difficulties of POD including problems in training, in assessment and recording of impairments, compliance with self-care and problems in providing a footwear programme including the issue of regular repairs.
— the survey showed that although the implementation of POD activities has begun, much more effort is needed to improve the coverage and the quality of the work.

4 RECOMMENDATIONS FOR SIMPLE, EFFECTIVE POD

A RECOMMENDATIONS ON THE ORGANIZATION OF POD

1 All projects should have **written local guidelines for POD**. The ILEP POD Guidelines, which are currently being reviewed, should be used as a source document for the development of local guidelines.
2 It is recommended that ILEP Member-Associations review the distribution of their publications and the need to re-issue key recommendations given that less than 60% of ILEP supported projects report having a copy of the ILEP POD guidelines published in 1993.
3 POD activities can and should be **carried out by all field staff,** but effective POD is, to a great extent, dependent on the active participation of patients. (Although therapists often facilitate the implementation of POD, they are not essential.)
4 Supervision of POD activities should be given a **high priority** by leprosy programme managers. The detailed supervision required is described in the Guidelines.

B RECOMMENDATIONS FOR THE EARLY DETECTION OF LEPROSY

5 Early case detection (before impairments develop) should be given a **high priority** in leprosy control programmes. Both programme and patient causes of delay in detection should be examined.
6 Leprosy must be included in the curriculum of all health workers to increase awareness and early diagnosis of leprosy. Present curricula should be reviewed and action taken to ensure that leprosy is always included.

C RECOMMENDATIONS FOR ASSESSMENT AND RECORDING

7 The assessment, recording, and reporting of impairments must be related to actions to prevent or treat impairments.

8 Sensory and voluntary motor function should be assessed at detection and ideally monthly, but not less than 3 monthly during MDT, however the methods used for these assessments will depend on the local staffing and circumstances. Both ball-point pen and filaments can provide good results for sensory testing, however, the technique of testing is more important than what instrument is used.

D RECOMMENDATIONS FOR RECENT NERVE DAMAGE

9 All patients must be made aware of the possibility of sudden nerve function loss and acute eye problems, and the need to report promptly for treatment.

10 Patients with recent nerve function loss should be treated in the community with fixed courses of steroids. (The availability of steroids is important and the use of blister packs to improve distribution of steroids and compliance with treatment should be considered.)

E RECOMMENDATION FOR SELF-CARE (EYE, HAND AND FOOT)

11 Self-care is the responsibility of the patient, but health workers have the responsibility to educate and enable patients in self-care. Health workers need flexibility and skills in listening and problem solving. Locally adapted booklets may be used to help patients learn and to re-enforce training.

F RECOMMENDATION FOR FOOTWEAR

12 The use of cushioned insole footwear should be advocated as it is effective in preventing the occurrence and recurrence of plantar ulcers. Issues such as cost, acceptability, availability, distribution, durability, repairs, and effectiveness need to be addressed locally.

G RECOMMENDATIONS FOR MONITORING AND EVALUATION

13 The POD aspects of leprosy control programmes should be monitored internally by the programme staff.
(Monitoring should include the early case detection of leprosy patients using WHO grade 1 and 2 at detection as an indicator; the early detection and treatment of recent nerve function impairment by comparing impairment at detection with that at RFT in cohorts of patients; self-care and footwear programmes using vision, bone loss and wound counts as indicators and qualitative assessment of POD using patient interviews.)

14 It is recommended that ILEP develop indicators for both the process and outcome of POD activities.

H RECOMMENDATIONS FOR POD RESEARCH

15 There are many research needs identified in the field of POD, such as the development of better methods of nerve function assessment, prevention and early detection of nerve damage and its effective treatment, and the improved

effectiveness of self-care and footwear. Many of these can be undertaken by simple studies under field conditions, while others may require more complex study designs and multicentre approaches.

There is a need to develop indicators of POD activities based on change in impairments in cohorts of patients. These should be piloted before being included in routine reporting systems such as the ILEP B form.

References

[1] Prevention of Disability: Guidelines for Leprosy Control Programmes. **ILEP Medical Commission 1993 (being revised)**.

[2] International Classification of Impairments, Disabilities, and Handicaps. **WHO Geneva, 1980**.

ILEP is a Federation of autonomous anti-leprosy Associations. The advice contained in this publication is not binding on ILEP Members.

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Teaching Materials and Services; News and Notes

Drug Information, Bibliographic Resources, *Essential Drugs Monitor*

In developing countries it can often be very difficult to learn about available bibliographic resources relating to pharmaceuticals and their appropriate use. Even when resources are known, funds for their purchase may represent an insuperable problem. We are therefore listing below selected newsletters, bulletins, organizations and services which provide information free of charge or at low cost to developing countries, or with whom a swap arrangement may sometimes be made. We hope that this information will be a useful resource for all our readers. Please *do not* contact the Action Programme to obtain any of these publications but write direct to the addresses provided.

International Publications

WHO Publications

WHO Model Prescribing Information

Drugs used in anaesthesia, 1989. Eng. Fre. Provides up-to-date and objective information on the correct and safe prescribing of essential drugs used in anaesthesia. The information has general applicability but is particularly relevant to developing countries, where limited availability of equipment, training and skills must be considered when recommending safe practice. The publication, which was prepared by WHO in collaboration with the World Federation of Societies of Anaesthesiologists, includes model information sheets for 31 drugs.

Drugs used in parasitic diseases, 1990. (2nd ed. in press). Eng, Fre, Spa. Covers drugs used for the prevention and treatment of protozoal and helminthic infections. These include filarial infections, the leishmaniases, malaria, schistosomiasis and the trypanosomiases.

Drugs used in mycobacterial diseases, 1991. Eng, Fre, Spa. Gives model prescribing information for 13 essential drugs used for the prevention and treatment of tuberculosis, for the treatment of leprosy and for the treatment of diseases caused by non tuberculosis mycobacteria. These include localised cutaneous lesions, pulmonary disease, lymphadenitis and disseminated disease.

Additions to the Model Prescribing Information series: Drugs used in sexually transmitted diseases and HIV infection (in press). Drugs used in skin diseases (in preparation).

The use of essential drugs (including the 8th Model List of Essential Drugs), 1995. Technical Report Series No. 850. This booklet also contains a general section with information on the criteria for the selection of essential drugs and various uses of the model list. Updated every two years.

Drugs for children, WHO Regional Office for Europe, 1987. In two parts: the first covering prescribing principles and therapeutic approaches, the second covering specific drug groups and clinical problems.

Drugs for the elderly, WHO Regional Office for Europe, 1989. Describes the principles of drug treatment in old age and the best therapeutic practice for the elderly.

Acute respiratory infection in children: case management in small hospitals in developing countries, 1990. Provides guidance on the clinical management of acute respiratory infections in children.

Management and prevention of diarrhoea: practical guidelines, 1993. Describes the principles and practices of treatment of diarrhoea in all ages, with special emphasis on the use of ORT in children. It also outlines child care practices that are vital for the prevention of diarrhoea.

The rational use of drugs in the management of acute diarrhoea in children, 1990. Reviews the documented pharmacology, mechanism of action, efficacy, adverse effects and drug interactions of oral formulations of antidiarrhoeal preparations. Presents conclusions and makes recommendations on the role and use of these in the treatment of acute diarrhoea in children.

New emergency health kit, 1990. Standard drugs, renewable supplies and equipment for 10 000 people for 3 months, with treatment guidelines. Available in Eng. Fre and Spa.

Management of severe and complicated malaria: a practical handbook, 1991. Provides general management principles, clinical features and complications. Separate sections cover management of severe malaria in children during pregnancy.

WHO Ethical criteria for medicinal drug promotion. The text of a WHO statement adopted by the World Health Assembly of 1988, setting out general principles which could be adapted by governments to national circumstances. Reprinted in Essential Drugs Monitor No. 17 (1994).

The priced publications listed above are available from: World Health Organization, Distribution and Sales, 1211 Geneva 27, Switzerland.

*Selected annotated bibliography on essential drugs, 1994**. Provides an entry point to literature on drug related issues, including policy and regulation, selection, quality assurance, use, supply and finance.

*Selected references on essential drugs, 1994**. A regularly updated list of documents which are available from the Documentation Centre of the Action Programme on Essential Drugs.

*National, regional and international essential drugs lists, formalaries and treatment guides, 1994**. A global index of these publications.

*These publications are available, free of charge, from The Action Programme on Essential Drugs, 1211 Geneva 27, Switzerland.

Management of bloody diarrhoea in young children, 1994. Simple and effective guidelines, and their rationale, for the management of bloody diarrhoea in children under 5 years of age. *Available free of charge, from WHO, Programme for Control of Diarrhoeal Diseases, 1211 Geneva 27, Switzerland.*

Other UN and specialised agencies

Handbook for emergencies, UNHCR (Office of the United Nations High Commissioner for Refugees), 1982. UNHCR, Case Postale 2500, CH-1211 Geneva 2 Depot, Switzerland. Chapter on health, including essential drug needs.

Liste standard de médicaments, Comité international de la Croix Rouge, 1986. CICR, ave de la Paix 19, 1202 Geneva, Switzerland. Essential drugs list divided into therapeutic categories.

Manual for essential drugs use, published by UNICEF (Emergency Operations in Former Yugoslavia), 1995. UNICEF, 3 UN Plaza, New York, NY 10017, USA. Essential drugs and vaccines used by UNICEF (United Nations Children's Fund), listed alphabetically by generic name in English. Generic and proprietary names given in Russian.

Essential drugs policy, UNHCR, 1989. UNHCR, Case Postale 2500, CH-1211 Geneva 2 Depot, Switzerland. Chapter on health, including essential drug needs. A technical manual which provides essential information for those managing and supervising drug supplies in refugee health services.

Drug formulary, UNRWA (United Nations Relief and Works Agency for Palestine Refugees in the Near East), 1991. UNRWA. Vienna International Centre, P.O. Box 700, A-1400. Vienna, Austria. Drugs grouped by therapeutic category, with indications, dosage, and precautions.

Model formulary of psychotropic medicines for Africa, UN International Drug Control Programme 1992. UNDCP, Vienna International Centre, P.O. Box 700, A-1400, Vienna, Austria. Presents general information on prescribing practices and then covers the four main groups of psychotropic medicines: anxiolytics, antidepressants, antipsychotics and antiepileptics.

Nongovernmental organizations

Liste de médicaments destinées aux postes de santé villageois, pharmacies ou dépôts villageois avec infirmier, CREDES (Centre de Recherches et d'Etudes pour le Développement de la Santé/Research and Study Centre for Health Development), 1987. CREDES, 53 rue de Turbigo, 75003 Paris, France. Gives comparative prices for drugs (Medeor/IDA) for village health posts, depots/village pharmacies.

Clinical guidelines: diagnostic and treatment manual, Médecins sans Frontières, 1990. Médecins sans Frontières, 8 rue Saint-Sabin, 7544 Paris Cedex 11, France. Description of clinical features, proposed and alternative treatment regimes: separate section on wounds and minor surgical procedures. Available in English (2nd ed.). French (3rd ed., 1992) and Spanish (1st ed., 1988).

Essential drugs: practical guidelines, Médecins sans Frontières, 1993. Médecins sans Frontières, 8 rue Saint-Subin, 7544 Paris Cedex 11, France. Practical guide to the use of essential drugs which are classified under generic name. Also contains text of WHO publications 'New emergency health kit' and WHO Model list of essential drugs. Available in English, French (2nd ed., 1993) and Spanish.

Essential drug information sheets, IDA (International Dispensary Association), 1989. International Dispensary Association, P.O. Box 37098, 1030 AB Amsterdam, The Netherlands. Free of charge. Drugs listed by generic name with indications for use, dosage, and precautions.

Manual for rural health workers diagnosis and treatment with essential drugs. Fondation Heymans, in collaboration with WHO, 1989. World Health Organization, Distribution and Sales, 1211 Geneva 27, Switzerland. Available in English and French.

Medeor manual, Action Medeor (German Medical Relief Organization), 1989. Action Medeor, St Toniser Strasse 21 D-4154. Tonisvorst 2, Germany. Updated and expanded summary of the Medeor pharmacopoeia. Available in English and French.

Guidelines for donors and recipients of pharmaceutical donations (2nd ed.), Christian Medical Commission, 1990. Christian Medical Commission, World Council of Churches, 150 rte de Ferney, 1211 Geneva 20, Switzerland. Describes common problems with pharmaceutical donations and provides practical advice for potential donors and recipients. Available in English, French, Spanish and German.

Other

Standard treatment for primary health care, University of Uppsala, 1986. International Child Health Unit, Department of Paediatrics, University of Uppsala, Sweden, 1986. Listed by medical problems.

Les 120 médicaments de l'hôpital secondaire—Manuel des Prescripteurs (2nd ed.), Institut Universitaire d'Etudes de Développement, 1991. IUED, 24 rue Rothschild, Case postale 136, 1211 Geneva 27, Switzerland. Drugs listed alphabetically (generic name) with indications, dosage, precautions.

Les 40 médicaments du district (3rd ed.), Institut Universitaire d'Etudes du Développement, Geneva, Switzerland, 1989. IUED, 24 rue Rothschild, Case postale 136, 1211 Geneva 27, Switzerland. Drugs listed alphabetically (generic name) with indications, dosage, precautions. Available in French and Portuguese.

Essential drugs handbook for paediatric out-patient practice, Instituto Superiore di Sanitá, Directoprate General for Development Cooperation, 1990. Instituto Superiore di Sanitá, Viale Regina Elena 299, Rome 00161, Italy. Drugs grouped by therapeutic category, with indications, dosage, precuations.

Buscando remedio, Ara A, Marchand B. Centro de Investigaciones y Estudios de la Salud, 1994. CIES, Atencion Primaria y Medicamentos Essenciales, Apartado 72728, Managua, Nicaragua. Learning and action guide for local health workers. Provides general information on medicines, with details of the drugs used most regularly in primary health care. Also covers treatment of commonly occurring health problems. In Spanish.

WHO/PHC and Drug-Related Newsletters

WHO newsletters

These newsletters are free of charge. If you wish to obtain copies, please write directly to the relevant Programme at the address given.

AIDS Action. WHO Global Programme on AIDS/Appropriate Health Resources and Technologies Action Group, Farringdon Point, 29–35 Farringdon Road, London EC1M 3JB, UK.
Eng, Fre, Spa, Por. Quarterly.

Practical information on a wide range of international AIDS care and prevention issues. Targeted at workers at district and community levels.

AIDS Health Promotion Exchange. WHO Global Programme on AIDS, Information, Library and Documentation Department, Royal Tropical Institute, Maruitskade 63, NL-1092 AD Amsterdam, The Netherlands.
Eng, Fre, Spa. Quarterly.

Reports on worldwide AIDS education and prevention activities. Intended for health-educators, community workers, administrators and teachers.

Bridge. WHO Health Systems Research and Development Unit, Bridge, Foundation for Health Services Research, 1350 Connecticut Avenue N.W., Washington DC 20036, USA.
Eng. Twice a year.

A newsletter which links producers and users of health research for development.

Changing Medical Education and Medical Practice. World Health Organization, Division of Development of Human Resources for Health, CH-1211 Geneva 27, Switzerland.
Eng. (some articles in Fre). Twice a year.

A forum for exchanging views and initiatives world-wide, to make medical education and practice more responsive to people's health needs.

CVI Forum. World Health Organization, Global Programme for Vaccines and Immunization, CH-1211 Geneva, Switzerland.
Eng. Three times a year.

News on all aspects of the Children's Vaccine Initiative.

EPI Newsletter. Expanded Programme on Immunization in the Americas, Pan American Health Organization, 525, 23rd St. N.W. Washington DC 20037, USA.
Eng, Spa. Bimonthly.

News and reports for health workers on immunization programmes in the Americas.

Eastern Mediterranean Region Drugs Digest. World Health Organization, Regional Office for the Eastern Mediterranean, P.O. Box 1517, Alexandria 21511, Egypt.
Ara, Eng. Twice a year.

Reproduces selected articles on drugs and therapeutics, of interest to doctors, pharmacists and other health workers in the Region.

Essential Drugs Monitor. World Health Organization, Action Programme on Essential Drugs, CH-1211 Geneva 27, Switzerland.
Eng, Fre, Spa, Russ. Twice a year.

Covers national drug policy and essential drugs programmes worldwide. Regular features include operational research, supply and rational use of drugs.

Global AIDS News. World Health Organization, Global Programmes on AIDS, CH-1211 Geneva 27, Switzerland.
Eng. Quarterly.

News, interviews, activities, treatment updates and new publication about AIDS.

LEP News. World Health Organization, Leprosy Unit, CH-1211 Geneva 27, Switzerland.
Eng, Fre. Twice a year.

A newsletter to assist leprosy programmes in exchange ideas and maintain a flow of information from the field.

ONCHO Information. World Health Organization, Onchocerciasis Control Programme, P.O. Box 549, Ouagadougou, Burkina Faso.

Eng, Fre. Quarterly.

A summary of meetings, activities and events in the Programme area.

Safe Motherhood Newsletter. World Health Organization, Division of Family Health, CH-1211 Geneva 27, Switzerland.
Eng, Fre, Ara. Three times a year.

Discusses recent developments in maternal health services, medical care and working at the community level. Includes a resource list.

TDR News (Tropical Diseases Research). (UNDP/World Bank/WHO, World Health Organization, TDR Communications, CH-1211 Geneva 27, Switzerland.
Eng. Quarterly.

Reports on the product research and development, applied field research and strategic research on tropical diseases promoted by this WHO Programme.

Technet News: Logistics for Health. World Health Organization, Expanded Programme on Immunization, CH-1211 Geneva 27, Switzerland.
Eng, Fre. Irregular.

Aimed at everyone involved in immunization. Includes news about developments in the cold chain.

Update. World Health Organization, Division of Diarrhoeal and Acute Respiratory Disease Control, CH-1211 Geneva 27, Switzerland.
Eng, Fre. Irregular.

Information about the main developments and resources available in the Division.

Update: Global Programme for Vaccines. World Health Organization, Global Programme for Vaccines and Immunization, Expanded Programme on Immunization, CH-1211 Geneva 27, Switzerland.
Eng, Fre. Three times a year.

Technical updates covering a wide range of topical issues. The latest global data for various aspects of EPI are also included.

**WHO Drug Information.* World Health Organization. Distribution and Sales, CH-1211, Geneva 27, Switzerland.
Eng, Fre, Spa. Quarterly.

Provides an overview of topics relating to drug development and regulation. The objective is to bring issues that are of primary concern to drug regulators and manufacturers to the attention of a wide range of health professionals concerned with rational drug use.

**World Health.* World Health Organization, Distribution and Sales, CH-1211 Geneva 27, Switzerland.
Eng, Fre, Spa, Ger, Por, Rus, Ara, Farsi. Bimonthly.

Focuses on primary health care and provides information on experiencies and programmes throughout the world.

**World Health Forum.* World Health Organization, Distribution and Sales, CH-1211 Geneva 27, Switzerland.
Eng, Fre, Spa, Rus, Ara, Chin. Quarterly.

Contains a wide range of articles, particularly on health promotion, community health issues and primary health care in developing countries.

**Only available on paid subscription.*

Non-WHO primary health care newsletters

Selected primary health care newsletters, mainly available free of charge to developing countries.

AMREF News. African Medical and Research Foundation, 11 Waterloo St, Clifton, Bristol, BS4 B2, UK.
Eng. Irregular.

Reports on AMREF projects and developments.

ARI News. Appropriate Health Resources and Technology Action Group, Farringdon Point, 29–35 Farringdon Road, London EC1M 3JB, UK.
Eng, Fre, Spa, Chinese, Bangla, Nepali. Three times a year.

Information about the causes of acute respiratory infections and approaches to prevention, treatment and control. Particularly useful for senior health workers.

CHETNA News. Centre for Health Education, Training and Nutrition Awareness, Lilavatiben, Lalbhai's Bungalow, Civil Camp Road, Shahibaug, Ahmedabad–380 04, Gujarat, India.
Eng. Quarterly.

Provides news about CHETNA's projects and the work of other organizations involved in community health care with a focus on India. Aimed at all health workers.

Child-to-Child. Child-to-Child Trust, Institute of Education, 20 Bedford Way, London WC1H 0AL, UK.
Eng. Once a year.

A newsletter which provides information on Child-to-Child activities worldwide and an update on materials produced.

Children in Focus. UNICEF Caribbean Area Office, 2nd Floor, Building 2, Chelston Park, Culloden Road, Bridgetown, Barbados.
Eng. Quarterly.

A channel for the exchange of information on issues related to child development in the Caribbean.

Cobasheca Newsletter. African Medical and Research Foundation, Community-Based Health Care Support Unit, P.O. Box 30125, Nairobi, Kenya.
Eng. Quarterly.

Provides an exchange of ideas between community-based health programmes in East Africa. Articles on the philosophy and approach of community-based health care and current practice at local level.

Contact. Christian Medical Commission. World Council of Churches, 150 route de Ferney, 1211-Geneva 2, Switzerland.
Eng, Fre, Spa, Por. Bimonthly.

Covers various aspects of the community's involvement in health and reports approaches to the promotion of health and integrated development.

Defender. African Medical and Research Foundation, Community-Based Health Care Support Unit, P.O. Box 30125, Nairobi, Kenya.
Eng. Quarterly.

Information on local, regional and national health issues directed to the general public.

Dialogue on Diarrhoea. Appropriate Health Resources and Technologies Action Group, Farringdon Point, 29–35 Farringdon Road, London EC1M 3JB, UK.
Eng, Fre, Spa, Por, Chinese, Bangla, Nepali, Tamil, Turkish, Urdu. Quarterly.

Information on the prevention and treatment of diarrhoeal diseases and related health education.

Echo Round the World. Equipment for Charity Hospitals Overseas, 2 Joint Mission Hospital Equipment Board, Ullswater Crescent, Coulsden, Surrey CR3 2HR, UK.
Eng. Three times a year.

Provides health workers with news on essential drugs, medical equipment and the projects and activities of the Joint Mission Hospital Equipment Board.

Health Action. Appropriate Health Resources and Technologies Action Group, Farringdon Point, 29–35 Farringdon Road, London EC1M 3JB, UK.
Eng. Quarterly.

Provides health information to help strengthen district health management teams and increase awareness of issues in primary health care implementation.

Health Alert. Health Action International Network, 9 Cabantuan Road, Philam Homes, Quezon City, Philippines.
Eng. Bimonthly.

News on health related issues and the economic and political developments that shape the health care situation.

IBFAN Africa Newsletter. IBFAN/Africa, Centrepoint, Dhlanubeka House, Ground Floor, PO Box 781 Mbabane, Swaziland. Address for the French edition, *Courier de l'IBFAN*, is: MAPBIN/CHAN, 2nd Floor, Hansrod Building, CNR Jummah Mosque and Sir Virgil Naz Streets, Port-Louis, Mauritius.
Eng, Fre. Quarterly.

Information on AIDS, infant feeding, drugs, nutrition, safe motherhood and women's health in Sub-Saharan Africa.

Learning for Health. Education Resource Group, Liverpool School of Tropical Medicine, Pembroke Place, Liverpool L3 5QA, UK.
Eng. Twice a year.

For all involved in health education and health training. Covers methodology, communication strategy, curriculum and resource development.

Outlook. Program for Appropriate Technology in Health, 4 Nickerson Street, Seattle, Washington 98109–1699, USA.
Eng, Fre, Spa, Por, Chinese. Three times a year.

Articles on reproductive health products, related drug regulatory decisons and safety issues of special interest to developing countries.

Remedios Newsletter. Remedios AIDS Foundation, 1066 Remedios Street, Malate 1004, Manila, Philippines.
Eng. Monthly.

Serves as a forum for NGOs involved in HIV/AIDS prevention work. Among the topics covered are community health care, drugs, health education and research.

Drug bulletins and drug-related newsletters

This listing contains classic-type drug bulletins and also consumer organization bulletins relating to drug matters.

These are mainly priced publications, but in some cases special arrangements can be made for developing countries or agreements may be made to swap publications. Please contact the publishers at the addresses provided, not the Action Programme on Essential Drugs.

ALGERIA
Bulletin d'Information Pharmacotherapeutique. Institut National de la Santé Publique, 4 Chemin El-Bakr–El-Biar 15030, Algar. *Fre. Quarterly.*

AUSTRALIA
Australian Adverse Drug Reactions Bulletin. Adverse Drug Reactions Advisory Committee, P.O. Box 100, Woden ACT 2606. *Eng. Quarterly.*
Australian Prescriber. PO Box 100, Woden ACT 2606. *Eng. Quarterly.*
QUM Newsletter (Quality Use of Medicines). Pharmaceutical Benefits Branch, Department of Human Services and Health, GPO Box 9848, Canberra ACT 2601. *Eng. Quarterly.*

AUSTRIA
Pharmainformation. Pharmakologisches Institut, University of Innsbruck, Peter Mayr Strasse 1A, A-6020 Innsbruck. *Ger. Quarterly.*

BELGIUM
Folia Pharmacotherapeutica. Heymans Institut, University of Ghent Medical School, De Pintelaan 185, B-9000 Ghent. *Fre. Monthly.*

BOLIVIA
Boletín Informativo de Medicamentos. Faculdad de Ciencias Farmacéuticas y Bioquimicas, Avenida Saavedra 2224 (3er Piso), Miraflores, La Paz, *Spa. Quarterly.*
Carta Medica. Accion Internacional por la Salud. R.S. 207651—Casilla de Correos 568, La Paz. *Spa. Twice a year.*
Medicamentos y Terapeutica. Casillas 9790 y 2504, La Paz. *Spa. Three times a year.*

BRAZIL
Sobravime. Sociedade Brasileira de Vigilancia de Medicamentos, Rua Nova Bareo, Edificio Barao IV sala 402, 01042-010 Sao Paulo SP.
Por. Quarterly.

CAMEROON
The Prescriber's Bulletin. Prescriber's Bulletin Association, P.O. Box 281 Buea. *Eng, Fre. Quarterly.*

CANADA
The Canadian Journal of Hospital Pharmacy. Canadian Society of Hospital Pharmacists, 1145 Hunt Club Road, Ottawa, Ontario K1V0Y3. *Eng, Fre. Bimonthly.*
The Drug Report. Ontario Medical Association's Committee on Drugs and Pharmacotherapy, Suite 300–525, University Avenue, Toronto, Ontario M5G 2K7. *Eng. Quarterly.*

CHILE
Boletín Informativo sobre Medicamentos. Instituto de Salud Publica de Chile, Ministerio de Salud, Ayda. Marathon 1000, Casilla 48, Santiago. *Spa. Quarterly.*

CROATIA
Bilten O Lijekovima and *Pharmaca Croatia*. University Hospital Rebro, Kispaticeva 14, 41000 Zagreb. *Croatian. Quarterly.*

CYPRUS
Ad-Dawa. Arab Resource Collective, P.O. Box 7380, Nicosia. *Ara. Quarterly.*

DENMARK
Europharm Forum Newsletter. European Forum of Pharmaceutical Associations, c/o Pharmaceuticals Unit, WHO Regional Office for Europe, Scherfigsvej 8, Copenhagen DK-2100. *Eng. Twice a year.*
Practical Drug Information. Medicinsk Afd.P., Bispebjorg Hospital, Bispebjerg Bakke 23, 2300 Copenhagen NV, *Eng. Ten times a year.*

DOMINICAN REPUBLIC
Centro de Informacion de Drogas y de Intoxicaciones Boletin. Universidad Nacional Oedro Henriquez Urena, Escuela de Farmacia, Santo Domingo. *Spa. Quarterly.*

ECUADOR
Boletín Informativo. A.I.S. International Por la Salud, Casilla 94-41 Suo.7, Quito. *Spa. Twice a year.*

ERITREA
Pharma Focus. Eritrean Pharmacists' Association, P.O. Box 5145, Asmara Eritrea. *Eng. Quarterly.*

ESTONIA
Drug Information Bulletin. State Agency of Medicines, Kalevi str. 4, P.O. Box 150, EE2400 Tartu. Estonian. *Bimonthly.*

FRANCE
Dossier. Centre National d'information sur le Médicament Hospitalier, 7 rue du Fer à Moulin, 75005 Paris. *Fre. Bimonthly.*
La Lettre Médicale. BP 179–75523 Paris Cedex 11. *Fr. Monthly.*
La revue Prescrire. BP 459–75527 Paris Cedex 11. *Fre. Monthly.*
P.H.C. Informations. Service d'Information Médico-Pharmaceutique, 7 Rue du Fer à Moulin, BP 09–75221 Paris Cedex 05. *Fre. Quarterly.*
Prescrire International. BP 459–75527, Paris Cedex 11. *Eng. Bimonthly.*
ReMeD. Réseau Médicaments et Développement, 7 rue du Fer à Moulin, 75005 Paris. *Fre. Quarterly.*

GERMANY
Arzneimittelbrief. Am Nordgraben 2, 1000 Berlin 27. *Ger. Monthly*
Arznei-telegramm. Petzowerstrasse 7, 1000 Berlin 27. *Ger. Monthly*.
Arzneiverordnung in der Praxis. Herbert Lewin Strasse 5, 5000 Koln 41. *Ger. Monthly*.
Pharma Brief. BUKO Pharma-Kampagne, August-Bebel Strasse 62, D-33602 Bielefeld. *Ger. Monthly*.

GHANA
DURG-AFRO Newsletter. African Drug Utilisation Research Group, Centre for Tropical Clinical Pharmacology and Therapeutics, Universiy of Ghana Medical School, P.O. Box 4236, Accra. *Eng. Irregular*.
Pharmaceutical Spectrum. Pharma Info Consult, 1st Floor, Trinity House, P.O. Box 01446, Osu-Accra, *Eng. Quarterly*.

GEORGIA
Drugs Today. The Pharmacological Committee, Ministry of Health, Gamsakhurdia Avenue, 380060 Tbilisi. *Georgian. Quarterly*.

GREECE
Farmako. EOF National Drug Organization, 284 Messogion Avenue, 15562 Athens. *Greek. Bimonthly*.

HUNGARY
Gyogyszereink. National Institute of Pharmacy, Zrinyi u.3, P.O. Box 450,1051 Budapest. *Hungarian. Quarterly*.

INDIA
BODHI (Bulletin on Drug and Health Information). Foundation for Health Action, 254 Lake Town, Calcutta 700 089. *Eng. Quarterly*.
Drug Disease Doctor. DD 35 Seba, Sector-I, Salt Lake, Calcutta 700 064. *Eng. Quarterly*.
Drugs Bulletin. Department of Pharmacology, Postgraduate Institute of Medical Education Chandigarh 160 012, *Eng. Quarterly*.
Drugs Today. Christian Medical Association of India, Plot No. 2, A-3 Local Shopping Centre, Janakpuri, New Delhi 110058. *Eng. Twice a year*.
Rational Drug Bulletin. Community Development Medicinal Unit, 86-C Dr. Suresh Sarkar Road Entally, Calcutta–700 014, West Bengal. *Eng. Quarterly*.

INDONESIA
Farmakon. Jl. Bungur Besar Raya 85, Blok A 1 Fl.3, Jakarta. *Eng. Quarterly*.
Informasi Obat. Direktorat Pengawasan Obat, Direktorat Jenderal Pengawasan, Obat dan Makanan. Jl. Percetakan Negara No. 23, Jakarta 10560. *Indonesian. Quarterly*.
Lembran Obat dan Pengobatan. Department of Clinical Pharmacology, Gadjah Mada University, Yogyakarta. *Indonesian. Monthly*.

ITALY
Informazione sui Farmaci. Via Doberdo 9, 42100—Reggio Emilia. *Italian Quarterly*.
Ricerca & Practica. Istituto Mario Negri, Via Eritrea 62, 20157 Milan. *Italian. Bimonthly*.

JAPAN
ICADIS News. Information Centre Against Drug Induced Suffering, c/o Yakugai Joho Centre, Sun Heights Minato 1F, Minato-cho, 4 chome, Hyogoku, Kobe 652. *Eng. Quarterly*.
The Informed Prescriber. Room 404, 1-43-8-8 Nishi-Koigakubo, Kokubunji-shi, Tokyo 185, 355-03. *Japanese (abstracts in English). Bimonthly*.

KENYA
Meds Update. Mission for Essential Drugs and Supplies. P.O. Box 14059, Nairobi. *Eng. Quarterly.*

LATVIA
Cito! MIC, R. Vagnera iela 15, Riga, LV-1050. *Latvian. Monthly.*

LEBANON
The Lebanese Pharmaceutical Journal. Lebanese Order of Pharmacists, B.P. 2807 Beirut. Reproduces articles from other sources in original language. *(Fre, Eng, Ara). Three times a year.*

MALAWI
Malawi Drug Bulletin. Ministry of Health, P.O. Box 30377, Lilongwe 3. *Eng. Quarterly.*

MALAYSIA
Berita Ubat-Ubatan. National Drug Information Centre, National Pharmaceutical Control Bureau, Ministry of Health. *Eng. Quarterly.*
HAI News. International Organization of Consumers Unions, P.O. Box 1045, Penang. *Eng. Bi-monthly.*

MEXICO
Alerta Farmacéutica. HAI-Mexico, Apdo Postal 62A, Patzcuaro 61600. *Spa. Quarterly.*

NAMIBIA
Drug News. Ministry of Health and Social Services, Private Bag 13366, Windhoek. *Eng. Quarterly.*

NEPAL
Drug and Therapeutics Letter. Drug Information Unit, Department of Clinical Pharmacology, TU Teaching Hospital, Institute of Medicine, PO Box 3578, Maharajgunj. Kathmandu. *Eng. Bimonthly.*
Drug Bulletin of Nepal. Ministry of Health, Department of Drug Administration, Thapathali, Kathmandu. *Eng. Biannual.*

NETHERLANDS
Geneesmiddelenbulletin. Lomanlaan 85, 3526XC Utrecht, *Dutch. Fortnightly.*
HAI Alert: Information for Drug Regulators. Health Action International, Joseph van Lennepkade 334 T, 1053 NJ, Amsterdam. *Eng. Quarterly.*
HAI Europe Update. Health Action International, Joseph van Lennepkade 334 T, 1053 NJ, Amsterdam. *Eng. Twice a year.*
IDA News. International Dispensary Association, P.O. Box 37098, 1030 AB Amsterdam. *Eng. Twice a year.*
International Pharmacy Journal. International Pharmaceutical Federation, FIP Publications Department, Alexandersraat 11, 2514 JL. The Hague. *Eng, Fre. Bimonthly.*
News Bulletin. International Pharmaceutical Students' Federation, FIP Secretariat, Andries Bickerweg 5, 2517 JP The Hague. *Eng. Three times a year.*
Pharma Selecta. C/O Kombuis 173, 9732 GK Groningen. *Dutch. Fortnightly.*

NEW ZEALAND
Drugs and Therapy Perspectives for Rational Drug Selection and Use. Adis International Ltd., 41 Centorian Drive. PB 65901, Mairangi Bay, Auckland 10. *Eng. Fortnightly.*
Prescriber Update. Ministry of Health, P.O. Box 5013, Wellington. *Eng. Quarterly.*

NIGERIA
Pharmacy Bulletin. P.O. Box 644, Zaria. *Eng. Irregular.*

NORWAY
Nytt fra Statens legemiddelkontroll. News from the State Medicines Control Authority, Norwegian Medicines Control Authoirty, Sven Oftedals vei 6, N 0950 Oslo 9. *Norwegian. Monthly.*

OMAN

Pharmaceutical Newsletter. Directorate General of Pharmaceutical Affairs and Drug Control, P.O. Box 393, Code 113, Muscat. *Eng. Quarterly*.

PAKISTAN

The Network's Newsletter. Association for Rational Use of Medication in Pakistan, The Network, House #57, G-8/2, Islamabad. *Eng. Quarterly*.

Pakistan Drug Information. Feroz Centre, 14-D West Blue Area, Islamabad. *Eng. Irregular*.

PANAMA

Medicamentos y Terapéutica. Comision de Medicamentos, Caja de Seguro Social, Apartado 1393, Panama 1. *Spa. Quarterly*.

PERU

Accion Para La Salud Boletín. Pasaje Enrique Palacios 49-D, Aptdo, 126, Chimbote. *Spa. Monthly*.

CMA Boleti. Jr. Ricardo Palma N5, Santa Monica, Cusco. *Spa. Bimonthly*.

Correo de A.I.S. Accion Internacional por la Salud, Avda. Palermo 531. Of. 104, Lima 13. *Spa. Bimonthly*.

Medicamentos y Salud Popular. Servicio de Medicinas PRO-VIDA, Apartado Postal 17-0187, Lima 17. *Spa. Three times a year*.

PHILIPPINES

RDU Update. The National Drug Information Centre, Department of Pharmacology, College of Medicine, University of The Philippines, Manila, #547 Pedro Gil Street, Ernita, Manila. *Eng. Quarterly*.

The Drug Monitor. Health Action International Network, 9 Cabantuan Road, Philam Homes, Quezon City. *Eng. Bimonthly*.

POLAND

Biuletyn Lekow. The Drug Institute, 30/34 Chelmska St, 00-725 Warsaw. *Polish. Quarterly*.

SINGAPORE

Drug Information Newsletter. Department of Pharmacology, National University of Singapore, Kent Ridge Crescent, 0511 Singapore. *Eng. Quarterly*.

SLOVAKIA

Liekovy Bulletin. State Institute for the Control of Drugs, Kvetna 11, 825 05 Bratislava, *Slovakian. Monthly*.

SPAIN

Boletín Terapéutico Andaluz. Consejeria de Salud, Avda del Sur 7, 18014 Granada. *Spa. Monthly*.

Boletín Terapéutico Valenciano. Conselleria de Sanitat I Consum, C/Rodriguez Formos 4, 46010 Valencia. *Catalan. Bimonthly*.

Butlleti d'Informacio Terapéutica. 587 Gran Via de les Corts Catalanes, 08007 Barcelona. *Catalan. Monthly*.

Butlleti Terapéutic & Butlleti Groc. Institut Catala de Farmacologia, CS Val d'Hebron, 08035 Barcelona. *Spa. Quarterly*.

Información Terapeútica. Ministerío de Sanidad y Consumo, Paseo del Prado 18–20 28014 Madrid. *Spa. Twice a year*.

SOUTH AFRICA

INFOR-MED. Medicines Information Centre, Department of Pharmacology, University of Cape Town, Observatory 7925, Cape Town. *Eng. Monthly*.

Medifile. TPS Drug Information Centre, 50 Stiemens Street, P.O. Box 31238, Braamfontein 2017. *Eng. Monthly.*

SRI LANKA
NIRODHA (New Initiatives for Rationalization of Drugs and Health Actions). 16/5 Elliot Place, Colombo 8. *Eng. Quarterly.*
The Sri Lanka Prescriber. Faculty of Medicine, P.O. Box 271, Kynsey Road, Colombo 8. *Eng. Twice a year.*

SWEDEN
SADRAC Bulletin. Swedish Adverse Drug Reactions Advisory Committee, Box 607, S-75125 Uppsala. *Eng. Irregular.*

SWITZERLAND
Health Horizons. International Federation of Manufacturers Associations, 67 rue de Saint Jean, CH-1201 Geneva 27. *Eng, Fre, Spa. Three times a year.*
Med in Switzerland. Declaration de Berne, case 80, 1000 Lausanne 9. *Fre. Irregular.*
Pharma-Flash. Clinical Pharmacology Unit, University Hospital, CH-1211 Geneva 4, *Fre. Ten per year.*
Pharma-kritik. Bergliweg 17, CH-9500 Wil. *German. Fortnightly.*
The Medical Letter on Drugs and Therapeutics. French translation of the American publication. Case Postale 456, CH-1211 Geneva 4. *Fre. Bi-monthly.*

TANZANIA
Drug Information Bulletin. TADATIS, 4th Floor, Central Pathology Laboratory, Muhimbili Medical Centre, Dar es-Salaam. *Eng. Quarterly.*
Zanzibar Drug Information Bulletin. Drug Committee, Ministry of Health, P.O. Box 236. Zanzibar. *Eng. Quarterly.*

UNITED KINGDOM
CMR News. Centre for Medicines Research, Woodmansterne Road, Carshalton, Surrey SM5 4DS. *Eng. Quarterly. Three times a year.*
Commonwealth Pharmaceutical Association Newsletter. 1 Lambeth High Street, London SE1 7JN, *Eng. Three times a year.*
Drug and Therapeutics Bulletin. Consumers' Association, 2 Marylebone Road, London NW1 4DF. *Eng. Fortnightly.*
International Society of Drug Bulletins Newsletter. International Society of Drug Bulletins, 103 Hertford Road, London N2 9BX. *Eng. Quarterly.*
MaLAM International News. Medical Lobby for Appropriate Marketing—UK, 13 Springhead Road, Thornton, Bradford BD13 DA. *Eng. Monthly.*
MeReC Bulletin. Medicines Resource Centre, Hamilton House, 24 Pall Mall, Liverpool, L3 6AL. *Eng. Monthly.*
Pharmaceutical Technology Europe. Advanstar House, Park West, Sealand Road, Chester CH1 4RN. *Eng. 11 issues a year.*
Prescribers' Journal. Department of Health, Hannibal House, Elephant and Castle, London SE1 6BY. *Eng. Bimonthly.*
SCRIP, World Pharmaceutical News. 18–20 Hill Rise, Richmond, Surrey TW10 6UA. Eng. Twice a week.

UNITED STATES OF AMERICA
APUA Newsletter. The Alliance for the Prudent Use of Antibiotics, P.O. Box 1372, Boston MA 02117. *Eng. Quarterly.*
CEPOR Newsletter. University of North Carolina School of Pharmacy, Center for Pharmaceutical Outcomes Research, CB7360 Beard Hall, Chapel Hill, NC 27599-7360. *Eng. Quarterly.*

CSDD Newsletter. Tufts University, Center for the Study of Drug Development, 192 South Street, Suite 550, Boston MA 02111. *Eng. Three times a year.*
FDA Consumer. United States Food and Drug Administration. Rockville MD 20857. *Eng. Monthly.*
FDA Medical Bulletin. Public Health Service, Food and Drug Administration (HF1-42), Rockville MD 20857. *Eng. Twice a year.*
INRUD News. International Network for Rational Use of Drugs, 116 Allandale Road, Boston, MA 02130. *Eng. Twice a year.*
The Medical Letter. The Medical Letter Inc. 56 Harrison Street, New Rochelle, NY 1081. *Eng. Fortnightly.*
The Prescriber. The Essential Drugs Unit, H-10 F, UNICEF, 3 United Nations Plaza, New York N.Y. 10017. *Eng, Fre, Spa, Por, Ara. Quarterly.*

VENEZUELA
Boletín Informativo Medicamentos. Facultad de Farmacia, UCV Universidad de Caracas, Caracas. *Spa. Quarterly.*

ZIMBABWE
Bulletin DATIS. Department of Pharmacy, University of Zimbabwe, Avondale P.O. Box A178, Harare. *Eng. Bimonthly.*
Drug and Toxicology Information Service Bulletin. Department of Pharmacy, University of Zimbabwe Medical School, P.O. Box A, 178 Avondale, Harare. *Eng. Quarterly.*
Zimbabwe Pharma News. P.O. Box ST 23, Southerton, Harare. *Eng. Bimonthly.*

Further information about drug bulletins can be obtained from: The International Society of Drug Bulletins, 103 Hertford Road, London N2 9BX, UK. The Society also arranges training courses and other relevant activities.

Resource Organizational/Services

Action Programme on Essential Drugs. World Health Organization, 1211 Geneva 27, Switzerland. Since 1981 WHO's Action Programme on Essential Drugs has provided operational support to countries in the development and implementation of national drug policies based on the essential drugs concept, and the rational use of drugs.

Action for Rational Drug Use in Asia (ARDA), P.O. Box 1045, 10830 Penang, Malaysia. ARDA is an informal regional network which focuses on promoting the concept of essential drugs. The group also campaigns for the removal of harmful drugs, the recognition of patients' rights and the provision of independent, authoritative drug information for doctors and consumers.

Drug Utilization Research Group. WHO Regional Office for Europe, 8 Scherfigsvej, 2100 Copenhagen 0, Denmark. Since it began over 20 years ago, this group of individuals and institutes has developed and tested the instruments and methods essential to ensure the standardization and reliability of drug utilization studies. Its work has now progressed beyond methodology into interpretation and action.

The Appropriate Health Resources and Technologies Action Group (AHRTAG). Farringdon Point, 29–35 Farringdon Road, London EC1M 3JB, UK. A nongovernmental organization which promotes primary health care in developing countries. Among its activities it publishes practical manuals, international newsletters, bibliographies and resource lists. It also provides a consultancy service to international and nongovernmental organizations on information systems and resource centre development.

The Child-to-Child Trust. Institute of Education, 20 Bedford Way, London WC1H 0AL, UK. Child-to-Child is an approach to health education and primary health care which involves children

in improving the health of their communities. Based at London University, the Child-to-Child Trust designs and distributes health education materials, assists in the implementation of projects using the Child-to-Child approach and coordinates a world-wide information network on these projects.

HAI-Europe. J. van Lennepkade 334-T, 1053 NJ Amsterdam, The Netherlands. Health Action International (HAI) is a global network of consumer, development and health organizations which aims to promote a more rational use of medicines and health and drug policies which aim to put consumers' interests first. It also monitors unethical marketing practices.

International Federation of Pharmaceutical Manufacturers Associations. 30 Rue de Saint-Jean, CH 1211 Geneva 18, Switzerland. A nongovernmental organization which represents member associations of national pharmaceutical manufacturers of prescription medicines throughout the world. The Federation's objectives include assuring contact among members, coordinating their efforts and dealing with questions of common interest, such as health legislation, research and marketing practices.

International Society of Drug Bulletins. 103, Hertford Road, London N2 9BX, UK. Through its network of members ISDB promotes the international exchange of information of good quality on drugs and therapeutics and encourages and assists the development of professionally independent drug bulletins in all countries.

International Network for Rational Drug Use (INRUD). 165 Allendale Road, Boston MA 01230, USA. INRUD was established in 1989 to promote rational drug use. The group's emphasis is on increasing the understanding of behavioural aspects of drug use, the development of research tools and the promotion of well-designed research studies.

Medical Lobby for Appropriate Marketing (MaLAM). P.O. Box 172, Draw Park SA 5041, Australia. Established in 1982, MaLAM is a non-profit organization which provides dialogue between health professionals and pharmaceutical companies, support for quality scientific medical care and encouragement for reliable pharmaceutical promotion.

Market News Service (MNS). International Trade Centre UNCTAD/GATT, Palais des Nations, CH-1211 Geneva 10, Switzerland. The Service includes a monthly listing which informs developing countries on purchasing prices of raw materials for the production of essential drugs.

Pour une Information Médicale Ethique et le Développement (PIMED). 28 Quai de la Loire, 75019 Paris, France. PIMED aims to provide reliable information on pharmaceuticals and to promote cooperation on health issues, particularly those affecting developing countries.

Teaching Aids at Low Cost (TALC). P.O. Box 49, St Albans, Herts AL1 4AX, UK. TALC supplies a wide range of PHC publications and training materials at very low cost.

United States Pharmacopeial Convention Inc. 12601 Twinbrook Parkway, Rockville MD 20852, USA. Sets standards for the preparation of medicines used in the USA. It revises and publishes the US Pharmacopeia, the National Formulary and the USP DI (dispensing information) and other scientific information used as a basis for determining the strength, quality, purity, packaging and labelling of drugs.

World Federation of International Proprietary Medicine Manufacturers (WFPMM). 15 Sydney House, Woodstock Road, London W4 1DP, UK. The Federation's objectives include the continuing improvement of standards of quality, efficacy and safety of proprietary medicines and the responsible use of these medicines.

Bibliography on Teaching and Learning Material: Leprosy Related Subjects—entries invited

INFOLEP, on behalf of TALMILEP, is preparing a new supplement copy of the *Bibliography on Teaching and Learning Material: Leprosy & Related Subjects* which will be finalized in the winter of 1995/96.

Through this bibliography TALMILEP propagates the use of the many materials which are available in different languages for the various categories of health workers. This publication may enable them to order certain publications and/or encourage the use of certain titles either directly or through translation and/or adaptation.

This new edition offers the possibility to have recorded the teaching and learning materials in leprosy which have been produced in whichever language in the course of the last three years. What we need, is just a sample copy of the publication(s) and a short description of the contents and target group in English of what has been published within the various leprosy control programmes and projects throughout the world.

A new section recording audiovisual materials on leprosy (videofilms and slide series) will be added to the bibliography. So, if you have any film and/or slide series produced within the last 5 years, please send your informatory details (title, producer, contents, target group, costs, supplier) to INFOLEP for registration.

Please send your materials as soon as possible to INFOLEP: INFOLEP Leprosy Information Services, Netherlands Leprosy Relief Association, Wibautstr, 135, 1097 DN Amsterdam, The Netherlands. Tel. + 20-59 50 530; Fax: + 20-66 80 823; E-mail: infolep@antenna.nl

Midwives who dispense MDT drugs, Myanmar

Myanmar is one of the major endemic countries for leprosy, and in 1994 it recorded 8303 new cases. Uniquely, the health workers who form the direct interface between the health services and the patients are midwives. These are young to middle-aged women fully trained in obstetrics, but they are also responsible for ensuring that leprosy patients receive—and swallow—the regular course of MDT drugs.

Equipped with bicycles so that they can get around the often difficult terrain, these women somehow manage to combine meeting the needs of women in the various stages of childbirth with dispensing the appropriate anti-leprosy drugs at the right time. To a certain degree, they are also involved in casefinding and in diagnosing whether a person with leprosy is a paucibacillary or a multibacillary case.

As in many endemic countries, a common problem is that, until the midwife reports a leprosy case, she is not sent the necessary MDT supply from the local or regional hospital. This means a long delay; weeks may elapse before a new case can start on the correct PB or MB course of medication. The Myanmar health authorities are at present working out a more elastic supply system which will ensure that the midwife's little community 'clinic' always has a basic stock of MDT drugs available to meet local needs. It is clearly preferable for several months' supplies of the drugs to be kept at the village level, rather than being held far away in a central warehouse.

Implementing Multiple Drug Therapy, OXFAM—withdrawal

The above title, currently in its 4th edition (1988), has been withdrawn from sale because it is felt to be out-of-date and overdue for revision. It is, therefore, recommended that existing stocks, including translations (French, Spanish, Portuguese, Bengali and Oriya) should either be discarded or run down as soon as conveniently possible. Similar, more up-to-date publications are produced by WHO and other agencies.

Erratum

A study on performance of two serological assays for diagnosis of leprosy patients by Om Parkash et al., published in *Lepr Rev* (1995) **66,** 26–30.

Please note that the corresponding author for this paper is: Dr Om Parkash, Central JALMA Institute for Leprosy, PO Box 31, Tajganj, Agra-282001, India.

p. 28, paragraph 2, line 4: for *Dhandaya Chapani* read *Dhandayu-Thapani*.

Instructions to Authors

Papers submitted for publication in *Leprosy Review* should be sent to the Editor, Professor J. L. Turk, LEPRA, Fairfax House, Causton Road, Colchester CO1 1PU, England. The name(s) of the author(s) and the place where the work was done should be clearly indicated below the title of the paper. Degrees and diplomas are not to be included.

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