

A Survey of Leprosy Impairments and Disabilities Among Patients Treated by MDT in Burkina Faso¹

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Burkina Faso, a West African country, has elaborated and carried out a National Leprosy Control Program (NLCP) since 1989 (Ministere de la Sante et de l'Action Sociale Burkina Faso. Programme National Lepre-Tuberculose, Volet lutte antilepreuse, Dec., 1989). In this control program, treatment of leprosy cases consisted essentially of multiple drug therapy (MDT) recommended by the World Health Organization (WHO). Between 1990 and 1994, this MDT program treated nearly 12,000 persons, two thirds of whom had received dapsone monotherapy. Thus, leprosy registered prevalence considerably decreased during this period from 13,000 to 2000 cases (¹). However, in this population treated by MDT, thousands of patients had leprosy impairments either existing at the time of detection or occurring during the treatment. The information system set up with the NLCP did not allow us to estimate the number of disabled cases nor to evaluate the need for disability care (Ministere de la Sante et de l'Action Sociale Burkina Faso. Rapport d'evaluation per operateur de la lutte antilepreuse au Burkina Faso realise par A. S. Diallo, Consultant OMS, Dec. 1991 and Rapport d'evaluation du Programme National Lepre du Burkina Faso. Travail conjoint Gouvernement/OCCGE/OMS, Mai, 1993).

The only leprosy hospital existing in the country is well equipped but was not operational due to the absence of trained staff and the lack of a physical rehabilitation program. That is why this survey was conducted in collaboration between the NLCP of Burkina Faso and the Marchoux Insti-

tute, a research and training center on leprosy in West Africa. The aims of the survey were to: a) estimate the frequency of impairments and disabilities due to leprosy among patients treated by MDT in Burkina Faso; b) evaluate the needs for the care of leprosy disabilities among these patients; and c) contribute to the planning for the activities for physical rehabilitation and disability prevention in this country. (In the following text, we have used alternately the terms "impairment" or "disability" to designate eye and nerve damage due to leprosy which could result in a "handicap" as described by Srinivasan¹⁰).

MATERIALS AND METHODS

Burkina Faso is a sub-Saharan country of 274,000 sq. km. with a population of 10 million. It is divided into 30 provinces, and the national health system is organized according to that administrative division. In each province a medical officer and a nurse specialized in leprosy control are in charge of the NLCP application. Information on leprosy patients is available in the following documents kept at that level: leprosy registers, MDT booklets, and leprosy clinical forms.

For this survey on leprosy disabilities, we decided to visit six provinces and to examine 600 patients treated with MDT between 1990 and 1995. To choose the six provinces, we clustered the 30 provinces of the country into six geographical regions of five provinces each (Fig. 1). In each geographical region, we chose the province with the greatest number of leprosy cases in 1990. The number of leprosy patients in the region decided proportionally the number of patients to be examined in each province (Table 1).

A month before the survey, we sent a calendar of the survey to the six provinces. The medical officer of each province selected randomized areas which allowed us to reach

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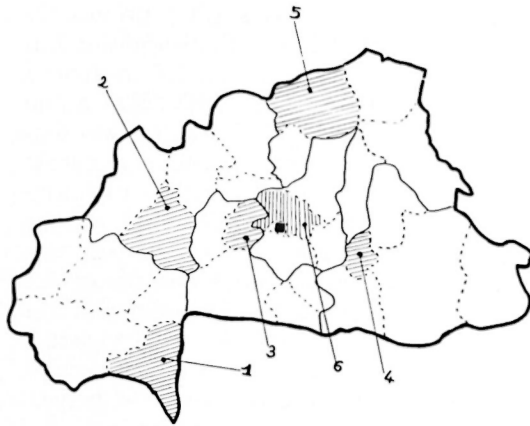


FIG. 1. Map of Burkina Faso showing the six provinces visited. 1 = Poni, 2 = Mouhoun; 3 = Boulkiemde; 4 = Kouritenga; 5 = Soum; 6 = Oubritenga; — = country boundary; — — = regional boundaries; - - - = provincial boundaries; ■ = province visited.

the number of patients of the local sample. Nurses informed leprosy patients of these areas to stay at home or to gather in the treatment centers during the survey day in their area.

During the survey, we collected information on patients and leprosy disabilities existing at the time of detection from leprosy registers, treatment booklets or the patients' clinical forms. We used a questionnaire to record information (Fig. 2, part one). We confirmed these data by interrogation of the patients found during the field visit. For actual disabilities due to leprosy, we obtained information by examination of the

patients during the visit. In our sample we included 46 patients with recorded information on impairments at diagnosis and who were missing during the review. Information on actual disabilities of these patients was not available.

The physiotherapist of the survey team practiced sensory and muscle tests on eyes, hands and feet of those patients seen. He used a ballpoint pen for sensory testing on the hands and feet as usually practiced by nurses at the time of diagnosis. We used the WHO scale of 1988 in three grades (0, 1, 2) to score the disabilities (¹²). According to the nature of the impairments, we evaluated the needs for disability care during examination of the patients in the field. Two classes of care grouped these needs: a) primary care that could be delivered by nurses in common health centers, including health education, training in skin and deformity care of hands and feet, delivery of protective means (footwear, gloves, sunglasses), non-complicated ulcers treatment; and b) secondary care to be delivered by physicians or physiotherapists in equipped health centers: complicated ulcer care, training in lid strengthening, excision or salvage surgery, reconstructive and palliative surgery with preoperative and postoperative physiotherapy. All patients in need of secondary care also required primary care. For reconstructive or palliative surgery, all indicated patients were not real surgery candidates but needed to be reviewed by a surgeon for possible treatment. Information on actual disability and care needs was recorded on a

TABLE 1. Number of cases included in the study by province in Burkina Faso.

Region	No. cases in 1990	Province	No. planned to be included ^a			No. effectively included			% Cases included
			Total	FC ^b	NC ^c	Total	FC	NC	
South	2,635	Poni	120	80	40	120	62	58	100
West	1,479	Mouhoun	66	44	22	66	47	19	100
Middle-West	1,617	Boulkiemde	72	48	24	71	51	20	99
Middle-East	2,631	Kouritenga	120	80	40	99	84	15	82.5
North	1,569	Soum	70	47	23	64	29	35	91
Center	3,381	Oubritenga	152	101	51	180	127	53	118
Total	13,312	6	600	400	200	600	400	200	100

^a Based on examining 600 total cases, the overall ratio of 600 to total cases (13,312) yields a weighted proportion for each province, e.g., 2635 patients in Poni Province \times 600/13,312 = 120 patients to be examined in Poni.

^b FC = Former cases treated with DDS before MDT.

^c NC = New cases treated with MDT alone.

questionnaire for each reviewed patient (Fig. 2, part two).

We used Epi-info software to analyze all of these data.

RESULTS

Characteristics of survey sample. In the sample of 600 patients, there was a predominance of females with 360 cases (60%). The average age was 47.9 years with a standard deviation of 16.2. Twenty-one percent of the cases were multibacillary (MB) patients and 67% were former cases of leprosy treated by dapsone (DDS) before MDT.

During the field visit, we found 554 cases for examination among the 600 cases included in the study. The 46 missing patients had either died or were absent from their village during our visit. The differences between the sample of 600 cases and the 554 patients reviewed during the study were not significant for the frequency distribution by the different variables (Table 2). This allowed the comparison between disabilities at detection time and actual disabilities without a previous adjustment. The distribution of the sample by type of leprosy and by treatment received was similar to the entire leprosy case distribution in Burkina Faso. This allowed extrapolation of our results for all leprosy cases treated by MDT in this country.

Disabilities at time of detection. Among the 600 cases of the sample, the frequency of impairment was 21.3% with a 95% confidence interval (CI) between 18% and 24.6%. Considering grade 2 disabilities, the frequency was 19% with a 95% CI between 17.5% and 20.5%. The frequency distribution of disabilities by sex, age, type of leprosy and treatment showed a predominance for males, older patients, MB form and former cases treated by DDS before MDT, even after adjustment for other variables: a) males = 32.1% with disabilities compared to females (14.2%, $p < 0.001$); compared to females, the relative risk for males was 2.26. b) older patients = 29.6% for those ≥ 50 years, 13.4% for those between 15 and 50 years old and 0% for children < 15 years old ($p < 0.001$). c) MB patients = 43.6% with disabilities and a significant relative risk of 2.83 compared to PB patients (15.4%, $p <$

0.001). d) former cases (FC) previously treated by DDS = 27% with disabilities and a significant relative risk of 2.7 compared to new cases (NC) treated with MDT alone (10%, $p < 0.001$) (Table 3). This lower disability rate for new cases probably reflects improvement in case detection with more health personnel involvement in the leprosy control program since 1990.

Disabilities due to leprosy were seen more frequently with hands (16.8%) than with feet (11.7%) and eyes (4.7%) (Table 4). Grade 2 disabilities were seen more frequently with hands and feet but less frequently with eyes. Among the 61 patients with grade 2 disabilities of the feet, 22 (36%) had planter ulcers and represented 3.7% of the sample cases.

From clinical forms and patient questioning, we obtained reliable information on the detection delay (duration between first leprosy signs and leprosy diagnosis) for 49 new cases. Among those 49 patients, the frequency of disability was higher in cases with a longer detection delay. The odds ratio calculated for patients with < 1 year detection delay versus the others was 0.00 with exact confidence limits of $0.00 < OR < 0.66$ (Table 5).

Actual disabilities (disabilities during field visit). Among the 554 cases examined during the field visit, the frequency of impairments was 29.8% with a 95% CI between 26% and 33.6%. The frequency of grade 2 disabilities was 27.4% with a 95% CI between 23.7% and 31.2%. The frequency distribution of disabilities by sex, age, type of leprosy and treatment showed the same predominance as disabilities at detection even after adjustment for other variables: a) males = 42.7% with disabilities and a significant relative risk of 1.99 compared to females (21.4%, $p < 0.001$). b) older patients = 39.9% for patients ± 50 years old, 20% for those between 15 and 50 years old and 0% for children < 15 years old ($p < 0.001$). c) MB patients = 57.9% with disabilities and a significant relative risk of 2.57 compared to PB patients (22.5%, $p < 0.001$). d) former cases (FC) previously treated with DDS = 36.1% with disabilities and a significant relative risk of 2.26 compared to cases treated with MDT alone (16%, $p < 0.001$) (Table 6).

SURVEY ON LEPROSY DISABILITIES IN BURKINA FASO

Identification number/ ____/

Date :

Province :

Part 1: INFORMATION on leprosy clinical form, leprosy register and treatment booklet

NAME and Surname : _____

Register number : _____ Village : _____

Year of birth : / ____/ Age: / ____/

Sex: / ____/

Leprosy form : / ____/ Class: / ____/

Year of diagnosis : / ____/ Disease duration: / ____/

IMPAIRMENTS OR DISABILITIES AT DIAGNOSIS

SITE	SIDE	NATURE	GRADE	MAXIMUM GRADE
EYES	Right			
	Left			
HANDS	Right			
	Left			
FEET	Right			
	Left			

CHEMOTHERAPY

DDS / ____/ Duration/ ____/

PCT / ____/ Duration / ____/

PRESCRIBED CARE: Nil/ ____/ Ocular care/ ____/

Health education / ____/ protective care of hands and feet/ ____/

Footwear / ____/ Surgery/Physiotherapy / ____/

Useful information to fetch the patient :

District : Village :

Parents :

Marital status : Ethnic origin : Religion :

Occupation :

Address : _____

FIG. 2. Questionnaire form used during the survey.

Part 2: INFORMATION during patient review

ACTUAL CLINICAL STATUS

Cured / ___ /
 on MDT / ___ /

ACTUAL IMPAIRMENTS OR DISABILITIES

SITE	SIDE	NATURE	GRADE	MAXIMUM GRADE
EYES	Right			
	Left			
HANDS	Right			
	Left			
FEET	Right			
	Left			

Year of impairments occurrence if after leprosy diagnosis:

RECEIVED CARE

Nil / ___ / Ocular care / ___ /
 Health education / ___ / protective care of hands and feet / ___ /
 Footwear / ___ / Surgery/Physiotherapy / ___ /

ACTUAL NEEDS OF CARE

SITE	SIDE	Primary care	Secondary care	Global care
EYES	Right			
	Left			
HANDS	Right			
	Left			
FEET	Right			
	Left			

FIG. 2. Continued.

Actual disabilities were seen more frequently with hands (25.1%) than with feet (18.1%) and eyes (5.8%) (Table 7). Grade 2 disabilities were seen more frequently at all sites (eyes, hands and feet) and reached 92.1% of disabled patients. Actual plantar ulcers (five cases) represented 0.9% of examined patients (Table 8), but we noted that

five patients with a plantar ulcer at diagnosis had salvage surgery and wore artificial legs; three other cases with an ulcer recorded on their leprosy forms were missing during the review. Only five patients with grade 1 disabilities at detection did not show actual impairment; 52 patients representing 11.9% of the nondisabled cases at detection de-

TABLE 2. Distribution of cases by sex, age, leprosy type and treatment and comparison between sample cases and patients found for physical examination.

	Sex		Age (yrs.)			Leprosy type		Treatment	
	M	F	<15	15-49	>49	MB	PB	DDS + MDT	MDT
Cases in survey sample (600)	40%	60%	3.5%	44.7%	51.8%	21%	79%	66.7%	33.3%
	240	360	21	268	311	126	474	400	200
p value	NS		NS			NS		NS	
Cases found during visit (554)	218	336	21	240	293	114	440	379	175
	39.4%	60.6%	3.8%	43.3%	52.9%	20.6%	79.4%	68.4%	31.6%

veloped impairments (Table 9). Many former cases previously treated with DDS were found among the 436 patients who developed disabilities after detection (73%). However, their association with actual disabilities compared to cases treated by MDT alone was not significant (χ^2 test $p > 0.05$) (Table 10). The treatment received (DDS + MDT or MDT alone) did not seem to modify the risk of disability occurrence.

Disability care needs. The disability care needs were greater for hands (25.1% of cases) than for feet (18.2%) and eyes (6.3%) (Table 11). Those in need of care were found more frequently among cases previously treated with DDS (35.9%) than those treated by MDT alone (15.4%). Primary care represented 82.8% of the needs and concerned 24.4% of the patients seen during the survey. Secondary care represented 17.2% of the needs for only 5% of the patients who

were visited. Compared to the care received estimated by patient questioning (5.4%), all care needs (29.4%) were very important.

Health education of patients and their families and patient training for skin and deformity care were the most frequent needs for all patients with impairments (Table 12). Among secondary care, we counted only five complicated ulcers to be surgically treated. Five other cases of plantar ulcer were already cured by salvage surgery which could partially explain the small number of complicated ulcers found in the field.

DISCUSSION

Frequency of disabilities. The frequency of disabilities at detection in our study is near to those of Ponnighaus, *et al.* in Malawi (?). Those authors found 20% of disabilities at detection for patients detected before

TABLE 3. Distribution of disabilities at leprosy detection by sex, age, leprosy type and treatment.

	Disabilities at detection			Grade 2 disabilities at detection		
	No.	%	p Value	No.	%	p Value
Males	77	32.1	$p < 0.001$	65	27.1	$p < 0.001$
Females	51	14.2		49	13.6	
<15 years	0	0	$p < 0.001$	0	0	$p < 0.001$
15-49 years	36	13.4		34	12.7	
>49 years	92	29.6		80	25.7	
MB	55	43.6	$p < 0.001$	50	39.7	$p < 0.001$
PB	73	15.4		64	13.5	
DDS + MDT	108	27	$p < 0.001$	101	25.2	$p < 0.001$
MDT alone	20	10		13	6.5	
Total	128	21.3		114	19	

TABLE 4. *Distribution of disabilities at leprosy detection for eyes, hands, and feet.*

Grades	Eyes		Hands		Feet		Maximum grade by patient	
	No.	%	No.	%	No.	%	No.	%
0	572	95.3	499	83.2	530	88.3	472	78.7
1	15	2.5	9	1.5	9	1.5	14	2.3
2	13	2.2	92	15.3	61	10.2	114	19
1 and 2	28	4.7	101	16.8	70	11.7	128	21.3

TABLE 5. *Distribution of 49 new case disabilities by delay time to detection.*

	Disabilities at detection		Total
	Yes	No	
Delay to detection			
< 1 year	0	29	29
1 to 2 years	1	12	13
> 2 years	4	3	7
Total	5	44	49
< 1 year	0	29	29
≥ 1 year	5 ^a	15	20

^a Fisher exact $p < 0.01$, $0.00 < O.R. < 0.66$.

1980, and 10% of patients detected after the introduction of a population survey for leprosy. We also found a decrease in the disability rate at detection (10% among patients detected since 1990). This decrease was consecutive to the bettering of the health service coverage and more medical staff involvement in the leprosy control program

with MDT. However, our results on disabilities at detection are not fully reliable, especially for the older patients, because they are based on document information and/or patient memory. In leprosy registers and clinical forms, descriptions of former cases' lesions at detection were often shorter than those of new cases. This mode of data collection could explain the very low number of plantar ulcers at detection in our study.

Another weakness of our results on actual disabilities was the verification of the leprosy diagnosis for patients seen during the survey. Most of them had finished their treatment and did not show any signs of leprosy. The frequency of actual disabilities in our survey (29.8%) is intermediary compared to other studies in the literature. In different papers disability proportion ranged from 10% to 60% (^{1, 5-9}). The great variation of the disability rate according to different studies is partially attributable to different definitions or classifications of disability and leprosy. In our survey, we considered some

TABLE 6. *Distribution of actual disabilities by sex, age, leprosy type and treatment.*

	Actual disabilities			Grade 2 actual disabilities		
	No.	%	p Value	No.	%	p Value
Males	93	42.7		85	38.9	
Females	72	21.4	$p < 0.001$	67	19.9	$p < 0.001$
< 15 years	0	0		0	0	
15-49 years	48	20	$p < 0.001$	43	17.9	$p < 0.001$
49 years	117	39.9		109	37.2	
MB	66	57.9	$p < 0.001$	62	54.4	$p < 0.001$
PB	99	22.5		90	20.4	
DDS + MDT	137	36.1	$p < 0.001$	131	34.6	$p < 0.001$
MDT alone	28	16		21	12	
Total	165	29.8		152	27.4	

TABLE 7. *Distribution of actual disabilities for eyes, hands and feet.*

Grades	Eyes		Hands		Feet		Maximum grade by patient	
	No.	%	No.	%	No.	%	No.	%
0	522	94.2	415	74.9	454	81.9	389	70.2
1	6	1.1	9	1.6	24	4.3	13	2.3
2	26	4.7	130	23.5	76	13.7	152	27.4
1 and 2	32	5.8	139	25.1	100	18.1	165	29.8

TABLE 8. *Nature and frequency of actual impairments among the 554 patients seen during field visit.*

Site of impairments	Nature	No.	%
Eyes	Red eyes (anesthesia only)	6	1.1
	Lagophthalmos, ectropion, with/or light loss of vision	20	3.6
	Great loss of vision, blindness	6	1.1
Hands	Sensory loss alone	9	1.6
	Ulnar or median clawing, finger stiffness	16	2.9
	Finger shortening/absorption, hand wounds	114	20.6
Feet	Sole sensory loss alone	24	4.3
	Toe stiffness, foot drop	6	1.1
	Plantar ulcer	5	0.9
	Toe/foot shortening	65	11.7

patients already cured and did not exactly follow the current WHO definition of a case of leprosy. Zhang, *et al.* in the Yangzhou Prefecture in China, found 56%–97% of cases with disabilities or deformities among 14, 257 leprosy patients (14). We did not take into account deformities of the face in our study.

The more frequent disabilities seen in males, older and MB patients were also found in other studies, and several reasons could explain these facts: longer delay for detection for men and MB patients, longer evolution of the disease in older patients, males working outdoors. These reasons probably explain the highest proportion of disabilities among cases treated with DDS before MDT. They were older and had a longer evolution of the disease than did patients treated with MDT alone. On the other hand, we found a low rate of plantar ulcers among patients examined during the survey

(0.9%) compared to results found in neighboring countries [Benin = 7.3% among 5273 cases (3); Senegal = 5.3% among 190 cases (4)]. Perhaps the desert climate in Burkina Faso, very hot and dry, and the habit of walking without shoes since childhood in

TABLE 9. *Distribution of 554 seen patients by presence of disabilities at detection and when examined on field visit.*

Disabilities at detection	Actual disabilities when examined		Total
	Yes	No	
Yes	113 20.4%	5 0.9%	118 21.3%
No	52 9.4%	384 69.3%	436 78.7%
Total	165 29.8%	389 70.2%	554 100%

TABLE 10. *Distribution of 436 patients without disabilities at detection by treatment and actual disabilities when examined on field visit.*

	No. cases	Actual disabled	%	P Value
Former cases (DDS + MDT)	277	38	13.7	NS
New cases (MDT alone)	159	14	8.8	
Total	436	52	11.9	

rural areas reduce the incidence of ulcers. A great majority of our cases had rough and thickened soles of their feet.

Extent of disabilities in Burkina Faso and care needs. Extrapolating our results to the entire number of leprosy cases treated with

MDT in Burkina Faso (12,000), we could estimate the number of disabled patients at 3500. This number must be multiplied by three if we take into account living leprosy patients cured by DDS between 1980 and 1990 (nearly 30,000 cases). Thus, the number of patients needing disability care could reach 10,000, equaling a rate of 1 per 1000 of the country's total population. The number of patients in need of disability care is fivefold more numerous than those needing MDT. Physical rehabilitation and disability prevention must be added to the NLCP (¹²).

Among these disabled patients 5% (nearly 500 cases) would need treatment in a center equipped for surgery and physical rehabilitation. Giraudeau and Despinay (²) found the same results in 1979 among patients treated by DDS in a rural area of Mali (a neighbor country of Burkina Faso). The national leprosy hospital in Burkina Faso

TABLE 11. *Distribution of disability care needs.*

Care need	Sites			Treatment received		
	Eyes	Hands	Feet	Former cases (DDS + MDT)	New cases (MDT alone)	Total cases
None	522 94.2%	415 74.9%	454 81.9%	242 63.8%	147 84%	391 70.2%
Primary	6 1.1%	127 22.9%	84 15.2%	114 30.1%	23 13.2%	137 24.7%
Secondary ^a	26 4.7%	12 2.2%	16 2.9%	23 6.1%	5 2.8%	28 5.1%
Total with needs	32 5.8%	139 25.1%	100 18.1%	137 36.2%	28 16%	165 29.8%

^a Patients in need of secondary care also require primary care, such as health education and protective measures for eyes, hands and feet (footwear).

TABLE 12. *Nature of disability care needs.*

	Eyes	Hands	Feet	
Primary care	Health education	6	127	84
	Protective care including skin and deformity care, footwear	0	127	84
Secondary care ^a	Noncomplicated ulcer or wound care	0	4	2
	Complicated ulcer care (excision surgery)	0	0	5
	Training in lid strengthening and think blink (physiotherapy)	17	0	0
	Review for possible reconstructive or palliative surgery with pre- and post-operative physiotherapy	9	12	11

^a Patients in need of secondary care also require primary care, such as health education and protective measures.

would be insufficient to face these needs for surgery and physiotherapy. Some general surgeons would need to be trained to deal with these needs in the regional hospitals of the country. Considering the number of disabilities occurring after detection, nurses in common health services must be trained in the early diagnosis of leprosy and neuritis and for disability prevention.

SUMMARY

Since 1990, Burkina Faso, a West African country, has carried out a national leprosy control program treating with WHO/MDT nearly 12,000 patients between 1990 and 1994. A sample survey of 600 cases among these patients showed that 29.8% were disabled cases. There was a predominance of males, older patients, the multibacillary form of leprosy, and former cases treated with dapsone before MDT. The actual rate increased 8.5% compared to the frequency of disabilities at detection (21.3%). The need for disability care was estimated, respectively, at 24.4% and 5% for primary and secondary grades of disability. These important needs were so great that the authors recommend the planning and initiation of a physical rehabilitation and disability prevention program in this country.

RESUMEN

Desde 1990, Burkina Faso, un país Africano occidental, ha implementado un programa nacional de control contra la lepra consistente en el tratamiento con PQT/OMS, de casi 12,000 pacientes entre 1990 y 1994. Una exploración de 600 casos entre estos pacientes mostró que el 29.8% fueron casos discapacitados. Hubo un predominio de hombres, de pacientes viejos, de la forma multibacilar de la lepra, y de casos tratados con dapsona antes de instituirse la PQT. La frecuencia de incapacidades aumentó en un 8.5% en comparación con la frecuencia encontrada al momento de su detección (21.3%). Se calculó la necesidad de atención de las incapacidades en un 24.4% y en un 5%, para los grados primario y secundario de incapacidad, respectivamente. Estas necesidades fueron tan grandes que los autores recomiendan la planeación y la iniciación de un programa de rehabilitación física y de prevención de las incapacidades en este país.

RÉSUMÉ

Depuis 1990, le Burkina Faso, un pays d'Afrique occidentale, a réalisé un programme national de lutte contre la lèpre, traitant par PCT/OMS près de 12.000

malades entre 1990 et 1994. Une enquête par échantillonnage de 600 cas parmi ces patients a montré que 29.8% d'entre eux étaient porteurs d'incapacités. Il y avait une prédominance d'hommes, de patients âgés, de forme multibacillaire de lèpre, et de cas traités antérieurement par dapsone avant la PCT. Le taux observé était plus élevé de 8.5% par rapport à la fréquence des incapacités à la détection (21.3%). Les besoins de soins pour incapacités ont été estimés à respectivement 24.4% et 5% pour les incapacités de grade I et II. Ces besoins étaient si grands que les auteurs recommandent la planification et la mise en route d'un programme de réhabilitation physique et de prévention des incapacités dans le pays.

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