Estimated number of leprosy cases in the world*

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Planning for disease control requires estimates of the number of leprosy patients from local to global levels. From the mid-sixties to the mid-eighties, global estimates appeared to be constant at between 10 and 12 million. The introduction of multidrug therapy (MDT) in many countries and the consequent reduction of prevalence of the disease has necessitated a reassessment of the global estimate. Based on available information and its interpretation, the number of leprosy cases in the world in 1991 has been estimated at 5.5 million. The number of individuals with deformities due to leprosy, including persons now cured of the disease, has been estimated at between 2 and 3 million.

Introduction

Leprosy continues to be an important public health problem in most parts of Asia, Africa, and Latin America. The magnitude of the problem is often expressed by the number of cases registered by leprosy programmes although it is recognized that the registered cases do not reflect all the cases existing in any given area. Therefore, from time to time, attempts have been made to estimate the prevalent number of cases at national, regional and global levels. More recently, and particularly since 1985, the leprosy situation in many parts of the world has undergone major changes, following the widespread introduction of multidrug therapy (MDT), as recommended by the WHO Study Group on Chemotherapy of Leprosy for Control Programmes in 1981 (*1*). This has necessitated determining the current global estimate of leprosy cases so that future strategies and planning are based on more reliable information.

Past surveys

Problems in estimating leprosy

Estimates on disease prevalence are generally based on well-planned, sample surveys. This was carried out in limited situations (*2*) for estimating leprosy prevalence and detailed methods have been outlined.[a] However, in terms of obtaining prevalence information for large areas or countries as a whole, sample surveys are neither practicable nor cost-effective. The main reasons for this are the very low frequency of occurrence of leprosy and its uneven distribution, which demand huge sample sizes in order to attain reasonable levels of precision. Even more, non-sampling errors, including inadequate coverage for examination of individuals, observer variations, and varying and imprecise case definitions, introduce gross inaccuracies which make even total population surveys difficult to interpret. In spite of the above problems, estimates of leprosy prevalence at different levels are required and attempts have been made by applying indirect methods, involving extrapolations through application of correction factors to already available information, for instance on the number of registered cases. Such correction factors have been derived from apparently reliable information available from limited areas. Extrapolations have also been attempted from information on prevalence among children (*3*), prevalence of deformities, and even from rapid village surveys. Sometimes a combination of more than one method has been suggested.[b] It should be recognized that, although from

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[a] **Sundaresan, T.K.** *Sample survey in leprosy—an introductory manual.* Unpublished WHO document, WHO/CDS/LEP 86.1, 1987.

[b] *Report of a meeting on methods for rapid assessment of the leprosy situation. Geneva, 15–16 April 1988.* Unpublished WHO document, WHO/CDS/LEP/88.2, 1988.

the purely statistical point of view the precision of many of the estimates can be questioned, the estimates in general have been found to be reasonably adequate for planning purposes.

Previous global estimates

The magnitude of the global problem of leprosy has been expressed, by WHO, through estimates on the number of prevalent cases in the world at any one time. Such estimates have been found to be valuable for planning and setting priorities. In 1966, based on a country by country analysis, it was estimated that the total number of cases in the world was 10 786 000 (*4*). The figure was updated in 1972 giving estimates of 10 407 200 cases (*5*). The WHO Expert Committee in its fifth report estimated a figure of over 12 million cases (*6*), and the WHO Study Group on Epidemiology of Leprosy in Relation to Control in 1983 referred to an estimate of 11 525 000 cases (*7*). Since then, an estimated figure of 10 to 12 million has frequently been mentioned in several documents. All the above attempts assumed that the leprosy situation, in different countries and globally, was static in terms of numbers, any reduction of the disease through cure or death being balanced by the occurrence of new cases, and that case definitions remained unchanged.

Methodology

Methods for making current estimates

It is well known that leprosy is very unevenly distributed at the global, national and even local levels. Information on registered cases clearly indicates that the top 25 countries contribute nearly 95% of all registered cases in the world, the top five contributing 82% (*8*). Therefore, in order to make a reasonably reliable global estimate of the prevalence of the disease, greater attention was given to making estimates for the top 25 countries by a detailed review of information on registered cases. In the case of the top five countries, estimates were made by more intensive reviews of all available information and discussion with relevant programme managers. In general, the estimates for the 25 countries were arrived at by applying correction factors to registered cases, in addition to extrapolating from other related information as well as reviewing information provided by WHO consultants and programme managers. For leprosy-reporting countries or territories other than the top 25, numbering some 127, estimates were made by developing and applying appropriate correction factors for each WHO Region, unless more reliable information was available for any country including some that had been collected earlier through a questionnaire. The correction factor for each Region was calculated as the ratio between the registered cases in those countries of the Region included in the top 25 and the estimates made earlier for them. Although admittedly this is a crude method, it was found to be reasonably satisfactory for making global estimates.

Current estimates

Number of cases in the world

Based on the methodology indicated earlier, the global number of leprosy cases, as of 1991, has been estimated at about 5.5 million. This figure is half the 10–12 million estimated during the 1960s, 70s and 80s. This large reduction is a result of (*a*) the large number of patients cured through MDT which has a finite period of treatment; (*b*) elimination from existing registers of those individuals who do not qualify as 'cases', as defined by the WHO Expert Committee on Leprosy in its sixth report (*9*), which recommended that for the purpose of prevalence only a patient requiring or receiving chemotherapy should be recognized as 'a case of leprosy'; (*c*) possible late effects of intensive dapsone-based control activities in some areas; (*d*) strengthening of leprosy control activities in many countries while introducing MDT; and (*e*) natural declining trends as observed in some parts of Africa. Table 1 provides information on the estimated cases according to WHO Regions and by countries grouped according to the number of cases.

Number of patients and former patients with deformities

While the estimate of 5.5 million relates to cases requiring or receiving chemotherapy, there are a large number of patients who have been cured and discharged from the registers but still have residual deformities of WHO Grade 2 (*10*) as a result of past leprosy. These individuals constitute a substantial burden to the community from the rehabilitation point of view. Currently, as most leprosy programmes are not involved in rehabilitation activities they do not possess or maintain information on such patients, although there is some information available on patients under treatment who have deformities. With the increasing application of multidrug therapy and the large number of patients being discharged from registers, some programmes are increasing their focus on deformed patients, whether

Table 1: **Estimated number of leprosy cases in countries by WHO Region, in 1991**

Range of estimated cases in countries	Number (x1000), by WHO Region						
	Africa	Americas	Eastern Mediterranean	Europe	South-East Asia	Western Pacific	Total (x1000)
≥200	360 (1) [a]	270 (1)	0 (0)	0 (0)	3440 (3)	0 (0)	4070 (5)
100–199	0 (0)	0 (0)	0 (0)	0 (0)	250 (2)	120 (1)	370 (3)
20–99	375 (9)	57 (2)	152 (3)	0 (0)	54 (1)	87 (2)	725 (17)
1–19	178 (21)	60 (10)	52 (8)	7 (2)	5 (2)	28 (7)	330 (50)
<1	3 (15)	4 (27)	3 (10)	2 (12)	1 (1)	3 (12)	16 (77)
Total	916 (46)	391 (40)	207 (21)	9 (14)	3750 (9)	238 (22)	5511 (152)

[a] Figures in parentheses give the number of countries involved.

under treatment or cured. It, therefore, becomes important to make estimates for such individuals. It is possible to attempt to estimate the number of deformed patients by making reasonable assumptions on (*a*) the estimated number of new cases in the past, going back at least fifty years; (*b*) the proportion of such cases who ultimately develop deformities; (*c*) the survival rate of deformed patients; and (*d*) the intensity and efficacy of leprosy control activities. In order to make a global estimate of the number of persons deformed by leprosy and surviving through 1991, assumptions were made on the above factors and different figures covering different periods were assumed for the estimated new cases, the proportion who became deformed, and the survival rates. Thus, depending on the assumptions made, there appear to be 2 to 3 million individuals in the world with deformities (WHO Grade 2) caused by leprosy, with or without active disease.

Number of cases in the top 25 countries

Table 2 gives information on the estimated number of cases in the top 25 countries and also the number of registered cases in each country by WHO Region. They also happen to be countries with more than 20 000 cases each.

The 25 countries having the largest number of estimated leprosy cases and contributing 93.7% of the total estimated cases in the world are discussed here purely from the point of view of their contribution to the total global case-load. They are not necessarily the top 25 countries from the point of view of estimated rate of prevalence. Thus, their ranking for the estimated number of cases and the estimated prevalence rate would vary considerably. However, the top 25, from the point of view of total estimated cases generally, coincide with the top 25 from the point of view of total registered cases (except for 3 countries) although the individual rankings within the 25 vary.

Table 2: **Estimated and registered leprosy cases in the top 25 countries, by WHO Region, in 1991**

Region and country	Number (x1000)	
	Estimated	Registered
Africa		
Nigeria	360	156
Mozambique	65	24
Ethiopia	60	16
Zaïre	58	9
Madagascar	50	19
Côte d'Ivoire	40	14
Uganda	30	8
Mali	28	13
Cameroon	22	10
Chad	22	11
Subtotal	735	280
South-East Asia		
India	3000	1996
Myanmar	240	112
Indonesia	200	102
Bangladesh	150	25
Nepal	100	25
Thailand	54	13
Subtotal	3744	2273
Americas		
Brazil	270	260
Colombia	31	19
Argentina	26	16
Subtotal	327	295
Eastern Mediterranean		
Sudan	52	36
Egypt	50	7
Iran	50	14
Subtotal	152	57
Western Pacific		
Viet Nam	120	20
Philippines	47	39
China	40	30
Subtotal	207	89
Total (25 countries)	5165	2994
Total (all countries)	5511	3162

Discussion and conclusions

It is clear that, for planning purposes, there is a need to have estimates of leprosy patients at different levels, irrespective of the limitations and imperfections with regard to available information or methodologies. At the global level, there is an urgent need to update the figure particularly in view of the major changes that have taken place over the past 7 to 8 years as a result of the implementation of multidrug therapy and related activities. It is also important to recognize that a proportion of cured patients have deformities requiring rehabilitative support, and it is therefore necessary to estimate the deformity load in the community in addition to estimating the magnitude of the problem from the disease and chemotherapy perspective.

The current estimate of 5.5 million cases may be considered by some as an underestimate, particularly in relation to previous estimates. On the other hand, the current estimates, as derived from information on registered cases, may be considered as an overestimate, particularly in relation to the situation in some countries where the registered cases include a substantial proportion of inactive cases. As regard possible underestimation, it should be recognized that the previous estimates of 10–12 million were made several years ago and, since then, drastic changes have occurred in the leprosy situation. It should, therefore, be recognized that the present estimate reflects the outcome of successful leprosy control activities in recent years. It is also clear that the opportunity to further reduce prevalence through intensified control using multidrug therapy is very considerable, and the estimate may fall further in the future if the anticipated intensification of leprosy control materializes. In addition, there is a need to address the rehabilitative needs of the estimated 2 to 3 million deformed individuals by implementing existing technologies and developing better technologies and strategies and applying them widely.

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