Prevalence of Leprosy in Agra District (U.P.) India from 2001 to 2003[1]

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ABSTRACT

Leprosy prevalence has reportedly declined all over the world, but six countries, including India, are still endemic for the disease. India alone contributes about 60% to the world's leprosy case load, with the major share from its northern states. The present study done in Agra district was based on a randomly-selected sample of over 10% of the population, spread across 300 villages and 16 urban units of the district. A house-to-house survey was conducted from July 2001 to July 2003 in all the 26 selected panchayats (300 villages), all the 11 block headquarters which have an urban component, and 5 (out of 20) localities in Agra city.

A population of 361,321 persons was examined for leprosy. A total of 592 leprosy cases [new and cases yet to complete a full course of multi-drug therapy(M.D.T.)] were found, giving a prevalence rate of 16.4/10,000 population. Although the overall prevalence was found to be similar in both rural and urban areas, there were pockets with high prevalence. More cases were detected in the eastern side of Agra (31.4/10,000 in Fatehabad and 28.5/10,000 in Bah Tahsils). Overall, the multibacillary (MB) leprosy rate was 22.3% and the child leprosy rate 8.4%.

Of the 592 cases, 523 (88.3%) were new untreated cases, giving a new case detection rate of 14.5/10,000. The MB rate was 17% (89/523), and the child leprosy rate was 8.4% (44/523) among the new patients. The grade 2 deformity rate was found to be 4.8% (25/523) among these cases. The duration of disease among new cases was 32.3 months as compared to 48.1 months among prevalent (registered) cases (i.e., patients who had been diagnosed earlier and had yet to complete a full course of M.D.T.). The large number of undetected cases found in this survey suggests the need for continued intensive health education campaigns and case detection activities.

This study highlights the fact that a large number of leprosy cases go undetected in the present integrated system which is mainly based on voluntary reporting of cases.

RESUME

Il est rapporté que la prévalence de la lèpre est en diminution partout dans le monde. Cependant six pays, l'Inde y compris, sont encore endémiques pour la maladie. A elle seule, l'Inde contribue pour environ 60% des nouveaux cas à l'échelle mondiale, avec la partie la plus importante dans les états du Nord. La présente étude, réalisée dans le district d'Agra, fut réalisée sur un échantillon pris au hasard de plus de 10% de la population, s'étendant à travers plus de 300 villages et 16 unités urbaines du district. Une enquête de maison en maison fut menée entre juillet 2001 et juillet 2003 dans l'ensemble des 26 panchayats sélectionnés (300 villages), l'ensemble des 11 centres urbains et 5 (parmi 20) localités de la ville d'Agra.

Un échantillon de 361 321 personnes fut examiné pour la présence de la lèpre. Un total de 592 cas de lèpre [nouveau ou des cas n'ayant pas encore complétés leur PCT] fut détecté, donnant un taux de prévalence de 16,4 cas pour 10 000 habitants. Bien que la prévalence globale fut déterminée être similaire entre les zones urbaines et les zones rurales, des poches de prévalence importante furent découvertes. Plus de cas furent détectés dans les quartiers Est de la ville d'Agra (31,4/10 000 à Fatehabad et 28,5/10 000 à Bah Tahsils). Globalement, le taux de lèpre multibacillaire (MB) était de 22,3% et le taux de lèpre pédiatrique de 8,4%.

Parmi les 592 cas, 523 (88,3%) étaient des nouveaux cas n'ayant pas encore été traités, se traduisant par un taux de détection de nouveaux cas de 14,5/10 000. Le taux de lèpre MB était de 17% (89/523), celui de lèpre des enfants de 8,4% (44/523) parmi les nouveaux patients. Parmi ces cas, le taux de déformations de grade 2 était de 4,8% (25/523). La durée de la maladie parmi ces nouveaux cas était de 32,3 mois, comparé à 48,1 mois parmi les cas

prévalent déjà enregistrés (c.-à-d. les patients qui ont été diagnostiqués auparavant mais qui n'ont pas encore terminés leur traitement de PCT). Le nombre important de cas non détectés dans cette étude d'épidémio surveillance suggère qu'il existe encore un besoin important de campagnes intensives d'éducation sur la santé et la lèpre et d'activités de détections de nouveaux cas.

Cette étude stresse qu'un grand nombre de cas de lèpre reste non détectés après la mise en œuvre du système actuel intégré, qui repose principalement sur la déclaration volontaire des cas.

RESUMEN

La prevalencia mundial de la lepra ha disminuido notablemente en los últimos años pero 6 países, incluyendo la India, se mantienen con alta endemia. La India sola contribuye con cerca del 60% de los casos de lepra en el mundo y su mayor aportación proviene de sus estados norteños. El presente estudio, realizado en el distrito de Agra, se hizo sobre una muestra seleccionada al azar que incluyó a más del 10% de la población de Agra distribuida en 300 poblaciones rurales y 16 comunidades urbanas. La encuesta, casa por casa, se realizó de julio del 2001 a julio del 2003 en las 300 poblaciones rurales, en 11 municipios y en cinco (de 20) localidades de la ciudad de Agra.

Se examinaron 361, 321 personas, encontrándose un total de 592 casos de lepra [casos nuevos y casos que debían completar su tratamiento con PQT-OMS], con una tasa de prevalencia de 16.4/ 10,000 habitantes. Las tasas de prevalencia en las regiones rural y urbana fueron similares pero se detectaron focos de alta prevalencia. La mayoría de los casos se detectaron en el lado oriental de Agra (31.4/ 10,000 habitantes en Fatehabad y 28.5/ 10,000 en Bah Tahsils). La tasa global de lepra multibacilar (MB) fue del 22.3% y la tasa de lepra en niños fue del 8.4%. De los 592 casos de lepra, 523 (88.3%) fueron casos nuevos no tratados, lo que significa una tasa de detección de 14.5/ 10,000. Entre los pacientes nuevos, la tasa de lepra MB fue del 17% (89/ 523) y la tasa de lepra infantil del 8.4% (44/ 523). También en estos casos, la tasa de deformidad de grado 2 fue del 4.8% (25/ 253). La duración de la enfermedad entre los casos nuevos fue de 32.3 meses en promedio, mientras que en los casos prevalentes registrados ésta fue de 48.1 meses. El gran número de casos nuevos descubiertos en esta encuesta, sugiere la necesidad de continuar con las campañas de educación y de detección de casos de lepra. Por otro lado, el estudio subraya la baja eficiencia en la detección de casos del programa integrado actual, el cual se basa principalmente en el reporte voluntario de los casos.

Until the 1980s, leprosy continued to affect a major part of the world, especially the developing and under developed countries. With the world wide introduction of multidrug therapy (M.D.T.) and intensive control efforts six countries now account for about 90% of the caseload. Of this, India alone contributes about two-thirds of the leprosy patients ([1, 7]). Though there has been considerable decline in the overall prevalence rate in India, pockets of high endemicity still exist, especially in the northern states. Our earlier reports ([2, 3]) had indicated that some areas in Agra had a high leprosy prevalence, suggesting a need for proper and statistically valid estimates. We have undertaken a systematic survey of the region to get an actual case load of leprosy in rural and urban areas of Agra district with an aim to assess if there was any under-reporting in the present system of voluntary case detection as practiced in the integrated setting.

METHODS AND MATERIALS

Agra district has 6 Tahsils (talukas)—5 predominantly rural and 1 mainly urban. Each of the rural Tahsils is divided into blocks. These blocks are subdivided into *nyay panchayats* (judicial units) and each *nyay panchayats* (referred to as panchayats in the text) has a cluster of villages under its jurisdiction. About 65% of the 3.3 million in the total population of Agra district lives in the urban areas, while the remaining 35% live in villages. Of the 65% of the population living in urban areas, 50% live in Agra city and the rest 15% reside in smaller towns, mainly the block headquarters (urban) of the rural tahsils. Within Agra city, almost three quarters of the population live in underdeveloped or semi-developed crowded colonies with minimal open space and poor civic amenities.

The rural part of the Agra district is comprised of 94 panchayats spread over 13
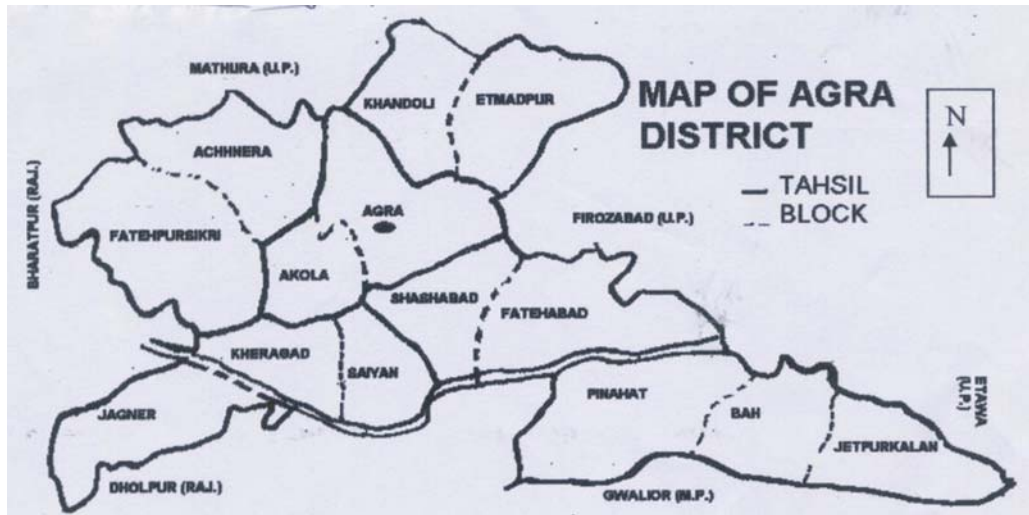
THE FIGURE.   Map of Agra, India.

blocks in 6 tahsils. For the purpose of this study, 2 panchayats from each block were randomly selected and all the villages and households in the selected panchayats were included for the survey. In addition, the urban population from 11 blocks headquarters (in the remaining 2, there being no town) and 5 (out of 20) localities in Agra City have likewise been surveyed. In all 361,321 persons—128,819 (35.7%) in rural and 232,502 (64.3%) in urban areas—were examined for leprosy.

A house-to-house survey was conducted between July 2001 and July 2003. All the members present in each of the households at the time of survey were shown picture cards and briefed about early symptoms and signs of leprosy and then physically examined by a trained paramedical worker (PMW). The population examined included all those who were present. Experienced supervisors and medical doctors confirmed the suspect cases later. The coverage (examined population) was about 70% of the total population living in these areas.

Once the patient was diagnosed as having leprosy, all the skin lesions and thickened nerves including cutaneous nerves were counted. Patients were classified as paucibacillary (PB) if they had ≤5 skin patches with or without 1 to 2 thickened major cutaneous nerves [2,3,4]. Patients were labeled as single skin lesion (SSL) cases if they had only one skin lesion with no detectable nerve thickening. Patients with ≥6 patches and/or >2 thickened nerves and those with infiltrations with or without papules or nodules were classified as multibacillary (MB) [2,3] cases. Only visible deformity (grade ≥2) was recorded. All the newly detected patients were put on World Health Organization (W.H.O.) recommended M.D.T. according to the type of disease. A new case was defined as one "who had not been diagnosed earlier and had no history of treatment for leprosy in the past." Patients with active disease found during the survey, with a history of having received some anti-leprosy treatment but had not completed the entire course (defaulters) were recorded as prevalent cases. Period prevalence and New Case Detection Rate (NCDR) were computed per 10,000 population examined. X^2 test of significance [5] was used for comparison.

RESULTS

Period prevalence. Examination of the 361,321 population across the district over a 2 year survey period (2001 to 2003) revealed 592 patients with active leprosy, giving an overall prevalence of 16.4/10,000 population. Of the 26 selected Panchayat in the district, the prevalence rate (PR) varied from zero in Naya Bans and Kachura in Kiraoli Tahsil located in the western part of the district (see the Figure), to 46.9 in Nagla

TABLE 1.   *Leprosy prevalence in selected panchayats in Agra district.*

Tahsil (location in the district)	Blocks	Panchayats	Prevalence/10,000 (cases/population)
1. Kiraoli (West)	1. Fatehpur Sikri	1. Samra	2.6 (1/3923)
		2. Naya Bans	0 (0/2875)
	2. Achhnera	1. Kachaura	0 (0/3141)
		2. Raibha	8.7 (4/4576)
2. Agra (Central)	1. Akola	1. Malpura	0.9 (1/10,595)
		2. Jarua Katra	9.7 (6/6176)
3. Etmadpur (North west)	1. Khandoli	1. Hazipur Kheda	14.5 (10/6899)
		2. Dhaurra	13.6 (13/9569)
	2. Etmadpur	1. Chamraula	3.4 (2/5948)
		2. Chawli	19.2 (9/4678)
4. Kheragar (South west)	1. Jagner	1. BasaiJagner	0 (0/3147)
		2. Richhauha	6.3 (1/1589)
	2. Kheragar	1. Digrauta	4.5 (1/2218)
		2. Kheragar	5.3 (1/1885)
	3. Saiyan	1. Saiyan	14.3 (8/5616)
		2. Iradatnagar	7.0 (2/2848)
5. Fatehabad (East)	1. Shamsabad	1. NaglaPatam	46.9 (31/6611)
		2. Siktara	34.8 (19/5454)
	2. Fatehabad	1. Nagarchand	14.9 (15/6707)
		2. TarauliGujar	13.7 (4/2919)
6. Bah (East)	1. Pinahat	1. Baraura	15.9 (4/2518)
		2. Ratauti	10.2 (6/5867)
	2. Bah	1. Jarar	21.2 (24/11,308)
		2. Bamrauli	28.9 (7/2424)
	3. Jetpur kalan	1. Karanpura	49.3 (18/4060)
		2. Chitrahat	38.0 (20/5268)
Total			16.1 (207/128,819)

Patam under Fatehabad Tahsil, and 49.3 in Karunpura in Bah Tahsil situated in the astern side of the district (Table 1).

At block level in rural areas, a high prevalence (per 10,000) was found in Shamshabad (41.4), and Jetpur Kalan (40.7), and low (1.5) in Fatehpur Sikri, and (2.1) in Jagner blocks. In the urban areas, a high prevalence of 67.5 was recorded in Jetpur town of Bah Tahsil, and zero prevalence was recorded in Kiraoli town (Table 2).

At Tahsil level (rural and urban combined), a prevalence of 31.4/10,000 was noted in Fatehabad, followed by 28.5 in Bah. Kiraoli Tahsil, situated on the western side of Agra, had the lowest PR of 7.2. Among the rural areas, the highest prevalence was recorded in rural parts of Fatehabad (31.8), and the urban area Bah Town had the highest prevalence (39.9). Similarly, the lowest prevalence was recorded in the rural areas of Kiraoli (3.4) and the urban areas if Kheragad (9.7) (Table 3).

Prevalence of leprosy by age gradually increased from 4.6/10,000 in 5 to 14 years age group, to 53.8/10,000 in the age group 45 to 54 years. Age-related prevalence (patients detected in the age group/10,000 population examined) in both rural and urban areas showed similar trends (Table 4). Prevalence was higher among rural males (17.8 vs. 14.9, $\chi^2_1 = 9.9$, p <0.002), and in the urban females (18.0 vs. 14.9, $\chi^2_1 = 10.6$, p <.001) in comparison to their counterparts. However, in the total population, males and females were equally afflicted with leprosy (16.8/10,000 in females and 15.9/10,000 in males).

New case detection rate (NCDR). Of the 592 active leprosy cases detected, 523 (88.3%) patients were detected for the first time, and had never taken any treatment for leprosy, giving a NCDR of 14.5/10,000 population in the district (Table 5). The proportion of new cases to total cases found ranged from 79.5% in Bah to 92.3% in Kiraoli Tahsil, indicating a high percentage of cases having remained undetected.

Duration of disease and deformity grade

TABLE 2.   *Leprosy prevalence in selected rural and urban blocks of Agra district.*

Tahsil	Rural Agra		Urban Agra	
	Blocks (No. of Panchayats)	Prevalence* (Cases/Population)	Urban unit	Prevalence (Cases/10,000 Population)
1. Kiraoli	1. Fatehpur Sikri (7)	1.5 (1/6798)	Kiraoli Town	0 (0/863)
	2. Achhnera (7)	5.2 (4/7717)	Achhnera Town	30.2 (8/2648)
2. Agra	1. Akola (3)	4.2 (7/16,771)	1. Jamuna Kinara	16.9 (68/40,169)
			2. Shah Ganj	23.9 (153/63,910)
			3. Lohamandi	13.1 (49/37,547)
			4. Taj Ganj	5.0 (25/49,886)
			5. Dhanoli	4.7 (6/12,749)
3. Etmadpur	1. Khandoli (8)	14.0 (23/16,468)	Khandoli Town	21.4 (7/3278)
	2. Etmadpur (8)	10.4 (11/10,626)	Etmadpur Town	39.8 (12/3017)
4. Kheragar	1. Jagner (5)	2.1 (1/4736)	Jagner Town	18.1 (4/2211)
	2. Kheragar (7)	4.9 (2/4103)	Kheragar Town	3.4 (1/2960)
	3. Saiyan (9)	11.8 (10/8464)	Nil	Nil
5. Fatehabad	1. Shamsabad (8)	41.4 (50/12,065)	Shamsabad Town	22.4 (5/2231)
	2. Fatehabad (10)	19.7 (19/9626)	Fatehabad Town	35.9 (9/2507)
6. Bah	1. Pinahat (6)	11.9 (10/8385)	Pinahat Town	23.9 (12/5020)
	2. Bah (8)	22.6 (31/13,732)	Bah Town	47.0 (10/2127)
	3. Jetpur Kalan (8)	40.7 (38/9328)	Jetpur Town	67.5 (16/2379)
Total	(92)	16.1 (207/128,819)	All Urban	16.6 (385/232,502)

≥2. About a third of the patients had the disease of recent origin (<1 year), while in 25%, the initial symptoms had been noticed more than 4 years earlier. Although the median duration of disease, both in rural and urban areas, was 24 months; the mean was slightly higher in rural areas. The duration of disease in newly detected cases was 32.3 months, significantly lower that 48.1 months in prevalent cases (p <0.05). The difference in median duration of disease for the two groups was 12 months (Table 6).

Among newly detected cases, the deformity rate of Grade ≥2 was found to be 1.8% (8/436) in paucibacillary (PB) leprosy, and 19.5% (17/87)—significantly higher—in the multibacillary (MB) leprosy (p <0.05). In the district as a whole, it was also found to be significantly higher in rural populations, 8% (14/175) against 3.2% (11/348) among the urban population ($\chi^2_1 = 5.9$, p <0.05). As expected, the deformity rate was 4.8% (25/523) among new cases, significantly less than 17.4% in prevalent cases or defaulters (p <0.05).

DISCUSSION

The findings reveal that the prevalence of leprosy in the Agra district is 16.4/10,000 (592/361,321), and is nearly equal in the rural and urban areas (16.1 and 16.6/10,000, respectively). More than 88% (523/592) of

TABLE 3.   *Prevalence (PR) by tahsil and rural/urban status, Agra district.*

Tahsil	Rural		Urban		Combined	
	Population (cases)	PR/10,000	Population (cases)	PR/10,000	Population (cases)	PR/10,000
1. Kiraoli	14,515 (5)	3.4	3,511 (8)	22.8	18,026 (13)	7.2
2. Agra	16,771 (7)	4.2	203,261 (301)	14.8	220,032 (308)	14.0
3. Etmadpur	27,094 (34)	12.6	6,295 (19)	30.2	33,389 (53)	15.9
4. Kheragar	17,303 (13)	7.5	5,171 (5)	9.7	22,474 (18)	8.0
5. Fatehabad	21,691 (69)	31.8	4,738 (14)	29.5	26,429 (83)	31.4
6. Bah	31,445 (79)	25.1	9,526 (38)	39.9	40,971 (117)	28.5
Total	128,819 (207)	16.1	232,502 (385)	16.6	361,321 (592)	16.4

TABLE 4.   *Leprosy prevalence by age, sex and clinical type.*

Characteristics		Rural (128,819)		Urban (232,502)		Combined (361,321)	
		Cases	Prevalence[a]	Cases	Prevalence[a]	Cases	Prevalence[a]
Age:	0–4	0	0	1	0.3	1	0.2
	5–14	17	5.0	32	4.4	49	4.6
	15–24	20	9.2	57	11.8	77	11.0
	25–34	31	18.7	80	25.6	111	23.2
	35–44	41	36.0	67	30.2	108	32.2
	45–54	43	56.0	66	52.5	109	53.8
	55–64	30	54.4	43	60.8	73	58.0
	>64	25	41.3	39	63.0	64	52.3
Gender: Male		96	17.8	164	14.9	260	15.9
	Female	111	14.9	221	18.0	332	16.8
Type:	PB	153	11.9	307	13.2	460	12.7
	(SSL)	(56)	(4.3)	(89)	(3.8)	(145)	(4.0)
	MB	54	4.2	78	3.4	132	3.7
	ALL	207	16.1	385	16.6	592	16.4

[a] Per 10,000 population examined.

leprosy cases had not received any leprosy treatment, as they had never been detected and diagnosed as having the disease earlier. The observed prevalence in this study is significantly higher than the state figure (0.9/10,000), which is based on the leprosy elimination campaign (LEC) [6] conducted in the year 2000. The official prevalence of leprosy in Agra during 2002 has been reported to be even lower (0.5/10,000) (unpublished report, 2002, District Leprosy Officer, Agra). The higher prevalence in the present study is possibly a result of more intensive and supervised work undertaken by a team, which has resulted in the detection of large numbers of hidden cases.

As in the case elsewhere in the country, the distribution of leprosy patients is not uniform; some areas and tahsils of the district have a much higher prevalence than the others (Table 3). Geographically, Fatehabad and Bah Tahsil, which have the highest leprosy prevalence of almost 30/10,000, border with Firozabad and Etawa district in which high endemicity is officially acknowledged [6]. Within these tahsils, there were also pockets (panchayats and villages) with prevalence as high as 40/10,000 in rural and 67/10,000 in urban areas, while some of their adjoining areas had a fairly low case load. Though age-specific prevalence revealed that cases have been detected at all ages and the prevalence increased with age (Table 4), it is significant

that over 8.0% of patients were children (age ≤ 15). This indicates that active transmission of disease is still occurring. This correlates well with the observation that most of the active cases had remained undetected for almost 3 years (mean duration of disease) and may have been the source of infection. In the present study, more female patients were detected. This could be due to examination of larger female populations. As the survey was done during the daytime, large number of male members had gone out to work leaving females at home. On the whole, there was not much difference in the prevalence between male and female (15.9 vs. 16.8, respectively).

Overall, 78% (460/592) of cases had PB leprosy, with SSL accounting for 24.5% (145/592), and significant proportion (22%)

TABLE 5.   *New case detection rate (NCDR) by tahsil in Agra district; 2001–2003.*

Tahsil	Leprosy cases			New case detection rate (NCDR)/10,000
	Total	New	%New	
1. Kiraoli	13	12	92.3	6.7
2. Agra	308	282	91.6	12.8
3. Etmadpur	53	46	86.8	13.8
4. Kheragar	18	16	88.9	7.1
5. Fatehabad	83	74	89.2	28.0
6. Bah	117	93	79.5	22.7
Total	592	523	88.3	14.5

TABLE 6.   *Duration of disease by case status.*

Duration of disease (months)	New cases (523)		Prevalent cases (69)	
	Cases	Percent	Cases	Percent
0–6	99	18.9	2	2.9
7–12	93	17.8	3	4.3
13–24	119	22.8	17	24.6
25–48	89	17.0	24	34.9
49–72	76	14.5	9	13.0
>72	47	9.0	14	20.3
Mean	32.3	–	48.1	–
Median	24.0	–	36.0	–

had MB disease. Among the newly detected patients, a relatively low prevalence of deformities of grade ≥2 was noted [4.8% (25/523), 1.8% among PB and 19.5% in MB patients). A higher prevalence of deformities was observed among prevalent patients (17.4%). The difference appears to be due to a relatively longer mean duration of disease in prevalent cases (48.1 vs. 32.3 months) than in new cases. Of all the patients with deformities of grade ≥2, about 76% had paralytic problems in hands and/or feet (figures not shown). Since none of the patients complained of any initial symptoms related to these deformities, the frequency of silent nerve damage appears to be high.

In conclusion, this survey, representing all the areas in Agra, indicates that leprosy continues to be a significant problem in both rural and urban areas with a larger patient load in tahsils located on the eastern side of the district. The undetected pool of infection has possibly continued to spread infection in the community as suggested by the observation of a child leprosy rate of 8.4%. In view of these findings, there is a need for reappraisal of leprosy elimination campaign activities to make these more effective, so that in the future new patients themselves report at treatment centers on suspicion of the disease. In addition, continued case detection activities, throughout the district, need to be undertaken to detect and treat hidden cases as this is important for achieving the goal of eliminating leprosy as a public health problem.

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