

LEPROSY CONTROL IN PAKISTAN: FIFTY FIVE YEARS OF COMMITMENT AND DEDICATION

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ABSTRACT

Leprosy Control in Pakistan was achieved in 1996, four years ahead of the target set by the World Health Organization (WHO). That it was achieved in a country with minimal health resources is nothing short of a miracle. The credit goes entirely to the commitment, vision and leadership of one individual, Dr. Ruth Pfau, who devoted her entire life to this marginalized group of society. The main points highlighted in this review are the clinical signs and symptoms of the disease that have led to the social stigma; motivation and training of both the health providers and patients for compliance with treatment; development of a nationwide network in partnership with the Government of Pakistan; scientific research that have contributed to treatment and rehabilitation of the patients within the society; and lessons learnt for challenges ahead towards the goal of elimination and eradication of leprosy in the coming decades.

Keywords: *leprosy, diagnosis, treatment, control*

1. INTRODUCTION

The seeds of Leprosy Programme in Pakistan were planted in 1956 when a group of *determined nuns started treatment of leprosy patients in a leper colony in Karachi, Pakistan*, and the harvest was gathered in 1996 by bringing leprosy under control in Pakistan. 'Lepers' as the leprosy patients were called in biblical times, whom no one wished to treat, carried a huge social stigma, and were largely ostracized from society (Gussow, 1989). Dr. Ruth Pfau, a German physician and nun, who stopped in Karachi in transit to India, was affected by the plight of this radicalized group, and decided to stay in Pakistan and has been here for the last 55 years. In 1963 this project was moved to a hospital in the heart of Karachi despite vehement opposition from both the medical community and the civil society. This hospital became the nerve center of this Programme and was named Marie Adelaide Leprosy Center (MALC). In 1965, the first Leprosy Technicians course was started. In 1968 the first proposal for a National Leprosy Control Programme was submitted to the Government of Pakistan. The plan to achieve Leprosy Control in Pakistan by 2,000 was conceived in 1983, and launched from this Center in 1984. The target was achieved in 1996, four years ahead of goal set by WHO, to become the first country to achieve this target in the WHO Eastern Mediterranean Region. According to WHO, control is

achieved when the number of active cases is less than one per million population, as this threshold level no longer constitutes a public health threat. Pakistan reported an incidence of 0.7 per million population, in 1996.

However, control is not elimination or eradication of a disease which requires every last patient to be treated and rehabilitated, and this challenge has yet to be met. This challenge is monumental because the leprosy-causing bacteria can survive for long periods (more than 30 years) in a human body in a dormant state (Fine, 1982) and can activate if the host's immune system is compromised, thereby starting a new focus of disease if the case remains undiagnosed. Therefore, continued vigilance and training will be required for several decades to come. To keep this programme viable there is a need for diversification of the program within the communities using the basic skills and trained manpower already available or minimal re-training is required, keeping in mind the primary objective of moving towards leprosy elimination and eradication. Dr. Pfau has been recognized both nationally and internationally for her remarkable ability to gain trust and confidence at all levels of the community, and furthermore for effectively working in partnership with the Government of Pakistan, in the battle against the disease. We will discuss some of these challenges and strategies adopted to achieve the final goal and beyond in this review.

2. HISTORY OF LEPROSY

The earliest accurate description of leprosy was recorded in India as early as 600 BC. Chinese records of leprosy date a bit later (Wong, 1930). These descriptions probably encompass a variety of skin conditions. The description in Bible also does not conform to the clinical features of leprosy. It seems likely that leprosy reached the Mediterranean countries with the soldiers of Alexander the Great returning from India in 327 BC, and spreading the disease to the Greek and Roman empires. The first known leprosy hospitals were established by Christians in Rome in the 4th century AD. The disease reached epidemic proportions in Western Europe in the 12th-13th century and then slowly declined. Because of the slow evolution of the disease it was poorly documented, compared to the acute diseases, such as plague and typhus. Leprosy reached its peak in Norway in the 19th century and it was here that the

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Figure-1: Electron Microscopic Image of *M. leprae* (<http://www.kcom.edu>).
Note: *M. leprae* is a typical rod shaped bacilli which usually appears as clumps under microscope

first modern description of the disease was recorded by Danielssen and Boeck (1848). Armauer Hansen identified the bacteria (Hansen, 1880), which enabled reliable epidemiological research (Irgens, I. M., and Torbjerkedal, 1973). Leprosy has been eradicated in Europe with the exception of Iceland. At present, leprosy is present in Asia, Africa, Central and South America (Rao, P., 2014).

3. CLINICAL LEPROSY

Leprosy also known as Hansen's disease is defined as a chronic granulomatous disease, caused by a bacillus called *Mycobacterium leprae* (*M. leprae*). Under an electron microscope, *M. leprae* is a rod shaped bacilli (Figure-1). *M. leprae* preferentially grows in colder parts of the body, such as the extremities and primarily affects the skin and the peripheral nerves. It is the only known bacilli which has a predilection for peripheral nerves.

3.1. Clinical Presentations of Leprosy

Most pathogens of man double in minutes, while *M. leprae* has a doubling time of 12 days (Truman, Krahenbuhl, and Viable, 2001). This results in prolonged incubation period and a very slow evolution of disease. Because *M. leprae* is a slow growing organism, symptoms of leprosy are generally so slight that the disease is not recognized until a cutaneous

eruption is present. Ninety percent of the patients experience numbness first, sometimes years before the skin lesions appear. Temperature is the first sensation that is lost. Patients cannot sense extremes of hot or cold. The next sensation lost is light touch, then pain, and finally deep pressure. These losses are especially apparent in the hands and feet. The earliest sign of leprosy occurs as a skin lesion and a hypo-pigmented macule is often the first cutaneous lesion. From this stage, most lesions evolve into one of the leprosy types (localized or disseminated) depending on the appropriate activation of the immune system. The various clinical presentations of leprosy are shown in Figure-2 and 3. Ridley and Jopling have classified leprosy into six different categories based on the clinical and histo-pathological findings (Ridley, and Jopling, 1962) that are largely used by researchers and are as follows:

3.1.1 Indeterminate Leprosy (IL)

This is the earliest and mildest form of the disease. Few numbers of hypo-pigmented macules (small, flat cutaneous lesions) may occur. Loss of sensation is rare. Most cases progress into a later form, although patients with strong cell-mediated immunity may clear the infection on their own or persist in this form without progressing.

3.1.2 Tuberculoid Leprosy (TT)

This form usually presents with skin lesions (hypo-pigmented and erythematous macules) which are anesthetic. A skin lesion of tuberculoid leprosy is usually single, but there may be two to five. It can be a flat macule or a raised plaque, anywhere on the skin except the warmer areas like the scalp, axillae or groin. Macules or patches are hypo-pigmented in dark skin and erythematous in light skin, well demarcated with a dry, hairless and insensitive surface. Plaques are erythematous, with a dry and sometimes scaly surface. The edges are raised, well-defined and there is often a central flattening. Hair growth is absent or deficient over the lesion and touch, temperature, pain sensation is impaired.

M. leprae is the only bacilli, which preferentially grows in peripheral nerves (Figure-2). A thickened nerve is usually palpable near the lesion, e.g. an ulnar nerve if the lesion is near the elbow. Infected nerves often thicken and lose function. Progression can occur which can lead to borderline-type leprosy and, in rare instances when the patient goes untreated for years, more severe form of the disease can develop (described in the following sections). Bacilli are mostly absent in the skin.

3.1.3 Borderline Tuberculoid (BT)

In this type of leprosy, the immunity is unstable, and in most countries where leprosy cases are found, including Pakistan, this is the most common type seen among patients.

Skin lesions in the Borderline Tuberculoid (BT) type are less numerous, less shiny and smooth with more well-defined edges than those found in Borderline Lepromatous (BL) type. Impairment of hair growth and sensory loss inside lesions are more marked in BT than in BL. Bacilli are absent or scanty in BT.

3.1.4 Borderline Borderline Leprosy (BB)

In this form cutaneous lesions are also present but they are numerous and less well-defined than those in the tuberculoid form. Anesthesia is less severe than TT. In this form, the disease may regress, improve or stay the same.

3.1.5 Borderline Lepromatous Leprosy (BL)

As with Borderline Borderline Leprosy (BB), lesions (macule type) are numerous. However, in borderline lepromatous leprosy (BL) they may also consist of papules, plaques, and nodules. Punched-out-appearing lesions that look like inverted saucers are common. As with BB leprosy, the disease may remain in this stage, improve, or regress.

3.1.6 Lepromatous Leprosy (LL)

Typical features of a patient with Lepromatous Leprosy are shown in Figure-3. Early on, cutaneous lesions are small, diffuse and symmetric (consisting mainly of pale macules). Later, larger and deeper lesions form and these contain many bacilli. At this point, the skin texture does not change, and little or no loss of sensation occurs. The nerves are not thickened. Loss of eyebrows occurs, which then spreads to the eyelashes and then the trunk; however,

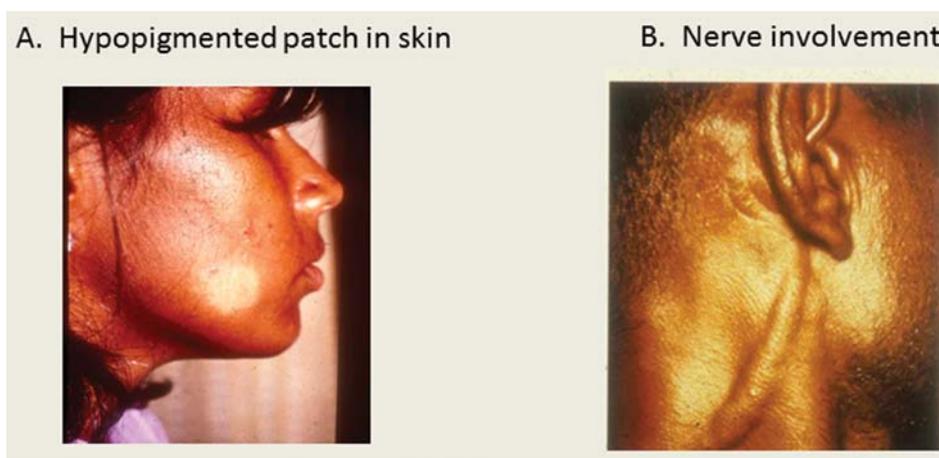


Figure-2: Clinical Presentations of Leprosy. *M. leprae* has a Predilection for Skin and Peripheral Nerves. (A) Early Hypo-Pigmented Skin Lesion. (B) Swollen Peripheral Nerve

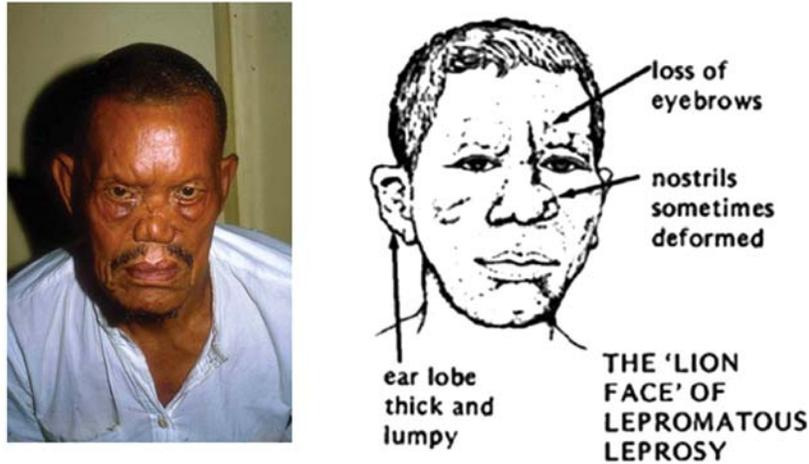


Figure-3: Clinical Presentation of a Patient with Lepromatous Disease.

Note: The typical features are swollen or collapsed nose and a schematic of typical leonine features present in lepromatous patient

scalp hair remain. Nasal infiltration can cause a saddle-nose deformity (Figure-3). Swelling (edema) of the legs is sometimes a late finding. Unlike other types of leprosy, LL cannot convert back to the less severe borderline or tuberculoid types of disease. LL patients are also the largest reservoir of the bacilli and pose the biggest challenge to Leprosy Control Programmes as they need effective treatment to stop further transmission, as well as rehabilitation within the community.

3.1.7 Complications of Leprosy

The development of cell mediated immunity in the initial stages is crucial to containment of disease. However, exaggerated immune response after the onset of disease can lead to complications or reactions. Some of the complications associated with leprosy are shown in Figure-4. Deformities due to trauma are a consequence of loss of sensation in the nerves and loss of digits may occur as a consequence (Figure-4A). Trauma also leads to secondary infections and subsequent ulceration (Figure-4B) which leads to further deformities. Eye complications are also commonly seen in leprosy (Figure-4C). The presence of *M. leprae* in the ocular tissues may lead to acute inflammation “red eye” during reactions. Ophthalmic branch of the trigeminal nerve is damaged resulting in anesthesia of the cornea and conjunctiva. Trauma is no longer felt and ulceration of the cornea develops. The occurrence of these reactions during treatment is one of the limiting factors in compliance to treatment as patients become apprehensive that the treatment is not effective and poses a major hindrance to control programs.

3.2 Diagnosis of Leprosy

The cardinal signs of leprosy, such as loss of sensation, skin lesion with absence of sweat and hair still remain the key diagnostic criteria. However, presence of *M. leprae* in scrapings from the dermis in skin is essential for determining the course of treatment as well as response to treatment. *Ziehl – Neelsen* staining shows acid fast bacilli which appear as red rods (Figure-5) inside the monocyctic cells. *Ziehl – Neelsen* can also differentiate live from dead bacteria that usually appear as broken rods (Figure-5). The density of bacteria in the skin is known as Bacterial Index (BI). This is based on the number of bacilli seen in an average microscopic field. The simplest system of recording the BI is: many bacteria (+++), moderate numbers (++) , few (+) and no bacilli (-) (Ridley, 1964). In case of localized disease (IL, TT, BT) there may be no detectable bacteria to a few in the skin (pauci-bacillary), but as the disease progresses (BB, BL, LL) the number of bacilli increases (multi-bacillary). The WHO treatment regimen is recommended on the basis of pauci- or multi-bacillary leprosy.

3.3 Mode of Transmission of Leprosy

Human being is the only known reservoir of leprosy infection, except for the fact that naturally occurring disease with organisms indistinguishable from *M. leprae* has also been detected among wild armadillos, in parts of the Southern United States (Walsh, Wayne, and Chapman, 1986).

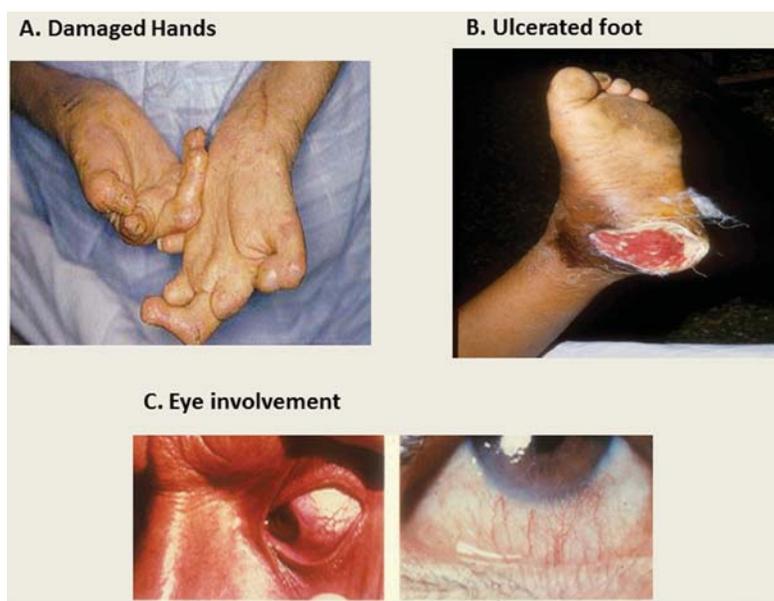


Figure-4: Complications Associated with Leprosy.

Note: Deformities as a result of loss of sensation leading to repeated trauma. Trauma also leads to secondary infections and subsequent ulceration which leads to further deformities. Eye complications in leprosy. i) Acute iridocyclitis. The presence of *M. leprae* in the ocular tissues may lead to acute inflammation "red eye" during type 2 reactions. ii) Damage to the ophthalmic branch of the trigeminal nerve. Trauma is no longer felt due to anesthesia of the cornea and conjunctiva leading to ulceration of the cornea

The exact mechanism of transmission of leprosy is not known. At least until recently, the most widely held belief was that the disease was transmitted by contact between cases of leprosy and healthy persons through skin contact. More recently the possibility of transmission by the respiratory route is gaining ground. What is clear is that a majority of individual remain disease-free even after prolonged contact indicating a robust immune system against this organism.

3.4 Factors Determining Clinical Expression after Infection

3.4.1 Susceptibility

About 90% of the population is not susceptible to the infection. Children are more susceptible than adults. Immunologic and epidemiologic studies suggest that only 10-20% of those exposed to *M. leprae* will develop signs of indeterminate disease; only 50% of those with indeterminate disease will develop full-blown clinical leprosy. Spontaneous healing also has been reported in tuberculoid leprosy. An earlier study in India had shown that over a period of 20 years, the extent of spontaneous regression among children with localized leprosy was about 90% (Noordeen, 1998). A later study in South India involving long-term follow-up of a high endemic population showed that among

newly detected cases, the rate of inactivation was 10.9% per year, the bulk of inactivation in the study being spontaneous (Noordeen, 1975). Therefore, genetic susceptibility may play an important role in disease onset after exposure.

3.4.2 Host Immunity

Leprosy was the first disease to show a distinct clinical spectrum which directly relates to the activation of the host's immune system (Myrvang, et al., 1974). As the disease progresses, *M. leprae*-specific cell mediated immunity diminishes and *M. leprae*-specific antibodies increase with a direct correlation of bacterial load with antibodies (Hussain, et al., 1990), indicating that antibodies play very little or no role in resistance against the disease while a robust cell mediated immunity is key to protection against the disease. If the individual has good cell mediated immunity, organisms are contained and TT disease occurs. In subjects with moderate immunity, a battle occurs and results in borderline types of leprosy. In persons with poor immunity, LL occurs. Interestingly, *Bacillus Calmette-Guiren* (BCG) is more protective against leprosy than tuberculosis, for which BCG vaccine was produced (Ponnighaus, et al. 1992).

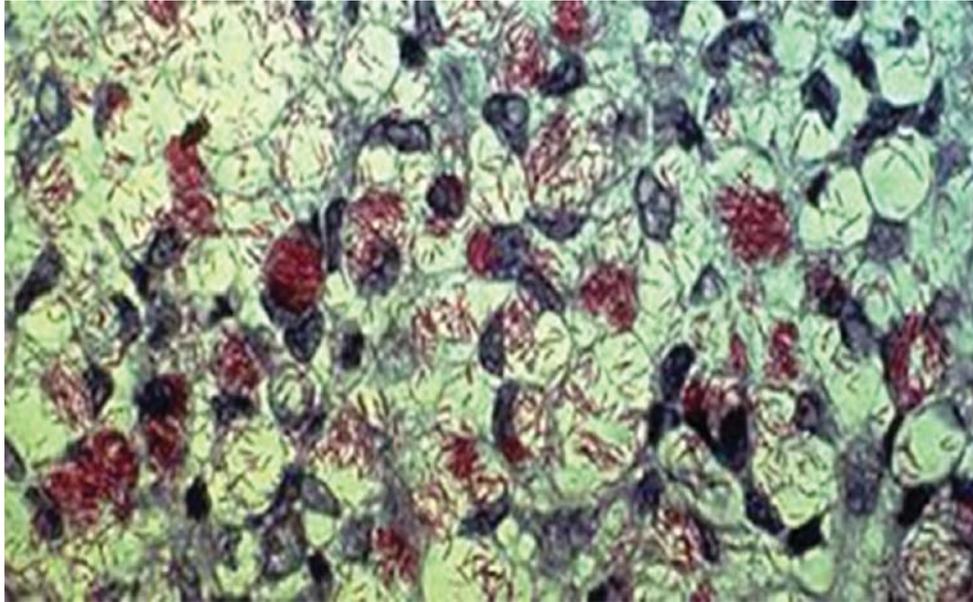


Figure-5: Hematoxylin & Eosin (H&E) and Zeihl-Neelsen Staining of Skin Smears from the Skin of a Lepromatous Leprosy Patient. *M. Leprae* Appear Under the Light Microscope as Clumps of Red Rods Inside the Monocytes which are Stained Blue. Broken Rods Indicate Dead *M. Leprae*

3.5 Incubation Period

The incubation period for leprosy is variable and difficult to define. The onset of leprosy is usually insidious in nature. TT usually develops over 3 or more years post exposure, and LL over 8 or more years. Incubation periods of as long as 30 years have been reported among war veterans, who were in areas of endemic infection during military service but otherwise resided in non-endemic areas (Fine, 1982). On the other hand, incubation periods as short as just a few weeks have been observed in the occurrence of leprosy among young infants, where cell-mediated immunity is not fully developed.

3.6 Treatment

For treatment purposes in control programmes, WHO recommends the classification of leprosy into either pauci-bacillary or multi-bacillary. Multidrug Therapy (MDT) as recommended by WHO includes two different regimens, for pauci-bacillary (smear-negative TT and BT) and multi-bacillary leprosy (all types with smear-positive TT, BT, BB, BL and LL). The former consists of 6 month treatment with daily Dapsone and once monthly Rifampicin. Multi-bacillary leprosy is treated with daily Dapsone and Clofazimine, and once monthly Rifampicin, together with the first two as a supervised dose. The duration of treatment with multidrug therapy (MDT) has now been reduced

from two years to one year for most cases of MB leprosy.

4 LAUNCH OF NATIONAL LEPROSY CONTROL PROGRAMME IN PAKISTAN

Leprosy work in Pakistan was started in 1956 in a beggar colony in Karachi, by a group of determined nuns. These first pioneers ventured into doing the seemingly impossible; their determination against all odds enabled the National Leprosy Control Programme to gradually take shape and develop into the present successful countrywide organization. The programme was funded by German Leprosy Relief Association (GLRA) that continues to be a major donor for the programme. The evolution of the programme started with a move to establishing a hospital in 1963, initiation of leprosy technician course and the first proposal was submitted in 1968 to the Government of Pakistan for funding, which was approved. The main objective was to treat the patients in their respective communities. In order to carry this out, two important targets were set. The first was to overcome the stigma of the disease so that household contact survey could be achieved and the second one was to establish a network of field clinics.

4.1 Training of Leprosy Technicians

From the outset, it was evident that leprosy patients,

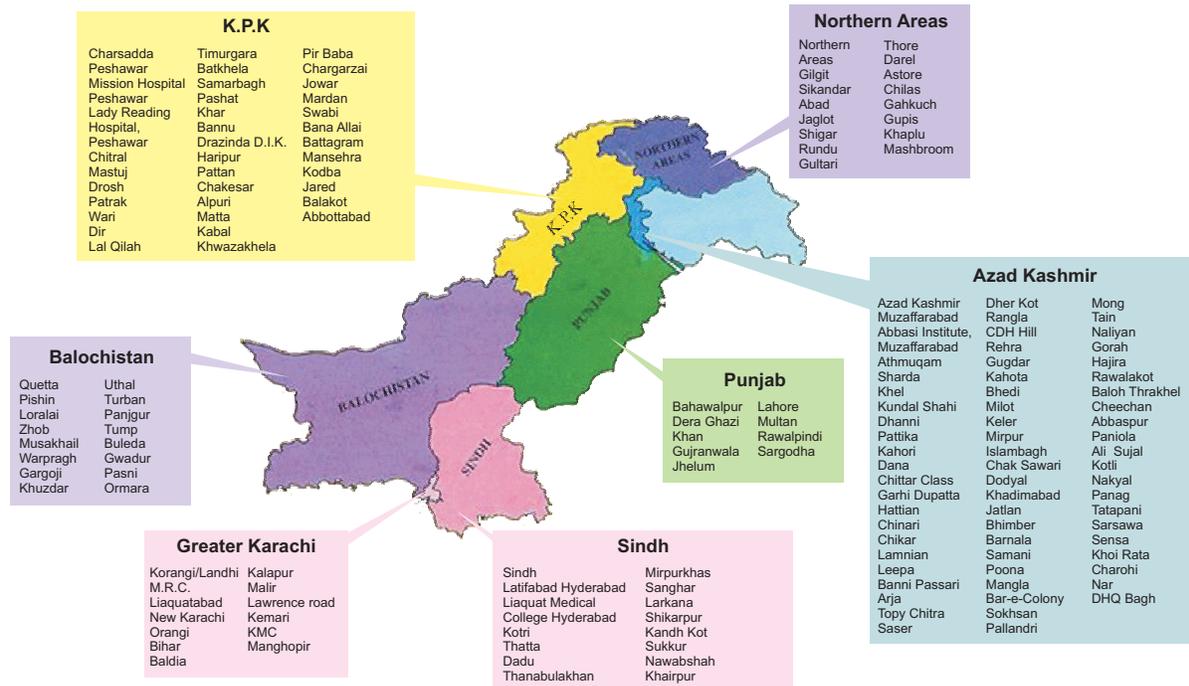


Figure-6: Leprosy Field Units throughout Pakistan

Note: There are 175+ Control Units Each with a Leprosy Field Officer and a Team of Dedicated Leprosy Technicians Who Monitor Chemotherapy and Carry Out Body Checks on All Household Contacts of Leprosy Patients Annually

due to the attached stigma, tend to hide their disease either by not showing it to the available medical facility or by living in remote areas. Thus, a need of a special group of field workers was identified who could go out into most remote areas of the country in search of leprosy patients and follow them until their complete recovery. This group was later identified as 'Leprosy Technicians'. In 1965, the first batch of 16 candidates from various parts of the country started their training at MALC. The duration of this course was 6 months. Till 1973 two more courses were held through affiliation with Punjab medical faculty. From 1974 the Institute got affiliation with Sindh Medical faculty, and, in 1983, National Institute of Health in Pakistan recognized MALC as the National Training Institute (NIH) for Leprosy. Initially, the course was designed for the beginners but as the work progressed and workers were absorbed in provincial health services, advance courses were created to qualify the leprosy technicians for promotion into higher grades. This was carried out by training leprosy technicians from indigenous areas and gaining trust from the community. Several cured leprosy patients were later inducted in the programme, which further helped in gaining patients' confidence that leprosy is curable and that such treated patient can become a viable part of the community. But above all, the personal

involvement and caring of Dr. Pfau for the patients and their families resulted in a wide-spread recognition of the programme.

4.2 Establishment of Field Units

After the establishment of a modern leprosy hospital in Karachi city in 1963, Dr. Pfau embarked upon the mission to extend leprosy care in different provinces of the country. In this context, initial steps were taken in Sindh, but NWFP (presently Khyber Pakhtunkhwa) became the first province where leprosy work was started at Pir Baba (Buner) in 1965. In 1967, leprosy control services were started in Azad Jammu and Kashmir and Northern Areas (Gilgit-Baltistan). In 1971, leprosy control measures were started in Makran, Balochistan. By late 70s and early 80s, Leprosy Control Programme was fully established throughout the country in collaboration with provincial and federal health services. The Leprosy Control Programme is an example of a successful public-private partnership.

There are a total of 175 Leprosy Control Units across the country (Figure-6). Out of these 157 units are sponsored by MALC in Sindh, Baluchistan, Khyber Pukhtunkhwa, Azad Kashmir and Gilgit-Baltistan. The

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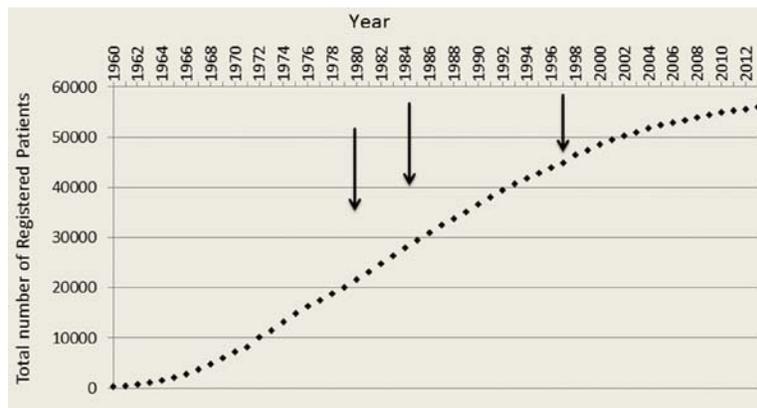


Figure-7: Total Number of Leprosy Patients Registered Between 1960-2013.

Note: This figure shows the number of patients since the initiation of the programme. Leprosy patient registration started in 1st January 1960. As the programme was established throughout Pakistan the numbers increased. As indicated by arrows, the first credible statistics for leprosy in Pakistan were reported in 1980 and multidrug regimen was introduced throughout Pakistan in 1984. Control of leprosy was achieved in 1996

remaining 18 units are sponsored by a sister NGO, Aid to Leprosy Patients (ALP), and are located in Punjab and Hazara Division of Khyber Pukhtunkhwa Provinces. The catchment area of each centre varies from 25,000 to 400,000. Annual field surveys are carried out in these sites by the relevant field centers.

Most of the field units are located inside Provincial Government health facilities and are staffed by paramedical workers who are paid by the provincial governments. Training in leprosy management is conducted at MALC Training Institute. Logistics, specific anti-leprosy medicines, financial incentives and supervised monitoring are the responsibility of the respective NGOs, namely MALC and ALP in their

respective areas. In addition, there are 2 major leprosy hospitals with in-patient facilities for leprosy cases in Karachi and Rawalpindi. Annual field surveys are carried out at these sites by the relevant field clinics.

5. EPIDEMIOLOGY OF LEPROSY IN PAKISTAN

Indigenous leprosy is found in markedly focal patterns. The main reasons for this focal pattern may be that in Pakistan, the disease has been brought into the country in waves by the migrants; first at the time of partition in 1947, and subsequently at the independence of Bangladesh in 1971, and recently from Afghanistan by war-displaced individuals. Pakistan has been the host to nearly one million war-

Table-1: Distribution of Leprosy at the Start of MDT Regimen (1984) throughout Pakistan

	Pakistan	Sindh/KHI	Baluchistan	Punjab	Khyber-Pakhtunkwa	Gilgit Baltistan	AJK
Population per million	76.60	15.09/5.72	4.33	36.29	13.25	4.67	1.40
CDR per million	2.12	3.95/8.93	2.01	0.28	1.75	3.21	5.93
RPR/10 ⁵	2.29	3.22/11.9	1.52	0.33	2.45	5.67	6.56
New cases registered	1,627	596/511	87	103	232	15	83
Deformity rate	23%	24%/23%	33%	16%	21%	13%	18%
Child rate	16%	10%/30%	7%	4%	12%	0%	4%

Note: The case detection rate (CDR) varies from the lowest in Punjab (0.28/million population) to highest in Sindh (3.95/million population); Karachi which has the highest population density is shown in brackets in the same column as Sindh.

Table-2: Changing Profiles of Leprosy Post-MDT

Year	1984	1996	2013
New cases registered	1,627 (100%)	1,076 (100%)	431 (100%)
Mutli-bacillary (MB)	976 (60%)	785 (73%)	348 (81%)
Pauci-Bacillary (PB)	651 (40%)	291 (27%)	83 (19%)
Children with leprosy	127 (12%)	127 (12%)	47 (11%)
Patients with deformities	373 (23%)	272 (25%)	66 (15%)

Note: The figures are given for 1984 when MDT was implemented, 1996 when control was achieved and latest figures as of December 2013. Breakdown of patients according to bacterial Index (BI) into pauci-bacillary and multi-bacillary (MB) is for purposes of treatment. Number of children with leprosy and percentage in relation to reg. cases and number of and percentage of patients with deformities over time is given. The increase in percentage of MB indicates identification and early treatment of PB patients decreasing the overall percentage of PB patients. Although the numbers have dropped, the impact of MDT on % children with leprosy has been marginal. Deformity rates are still unacceptably high.

displaced individuals. This has been the biggest challenge for the Leprosy Control Programme.

Registration and documentation of leprosy patients at MALC started in 1960. Figure-7 shows the total number of leprosy patients registered between the years 1960-2013, who required comprehensive care. As the programme network increased in strength and the credibility of the programme was established there was a dramatic increase in patient numbers. The landmarks achieved were the first credible statistics reported for leprosy in Pakistan in 1980; implementation of multidrug therapy (MDT) throughout Pakistan in 1984; and achieving leprosy control in 1996. However, active surveillance continues and new cases are still being registered to date.

Province-wise distribution of leprosy in Pakistan at the start of MDT is given in Table-1. Statistics for Karachi are also given as this is the most densely populated city in Pakistan. No part of the country was free of leprosy in 1984. However, Sindh province has the highest burden of leprosy in Pakistan (60%) and, Karachi contributes highest to the province's disease burden (80%). This may be due to higher rate of migration to the area as well as a high population density.

6. IMPACT OF MULTIDRUG REGIMEN ON LEPROSY IN PAKISTAN

6.1 Impact on Leprosy Patients on Chemotherapy

In 1983, MDT was introduced in the control programme which was expanded throughout Pakistan

by 1984. In 1984, the number of registered leprosy patients on chemotherapy was 27,959 (Figure-8). With the shortened regimen of drug treatment with MDT, there was a dramatic fall in the number of patients on chemotherapy. In 2013, the number of patients on chemotherapy has dropped from 19000+ to 660. These patients are under continuous surveillance for complications or reactivation of the disease.

6.2 Impact on Leprosy Patient Profile

Analysis was also carried out to determine the effect of MDT on the rate of leprosy in children, leprosy associated deformities, and type of the disease in patients. Table-2 shows the breakdown for 1984, 1996 and 2013. With decreasing patient load, the proportion of patients with MB shows an increase from 51 to 81%. These results suggest that identification and early treatment of PB patients decreases the overall percentage of PB patients, with resulting proportional increase in MB patients who require longer treatment than PB. The impact of MDT on children with leprosy has been marginal over a decade and is still hovering at 11% deformity rate, which is also unacceptably high (15%).

Figure-8 shows a picture of multi-bacillary patient at the start of MDT treatment and a picture one year later taken from almost the same angle. The important message is that even severe leprosy is a highly treatable condition, particularly if the treatment regimen is duly adhered to. Compliance is one of the most important issues for Control Programmes in leprosy. MALC has been able to achieve more than 95% drug compliance under this programme.

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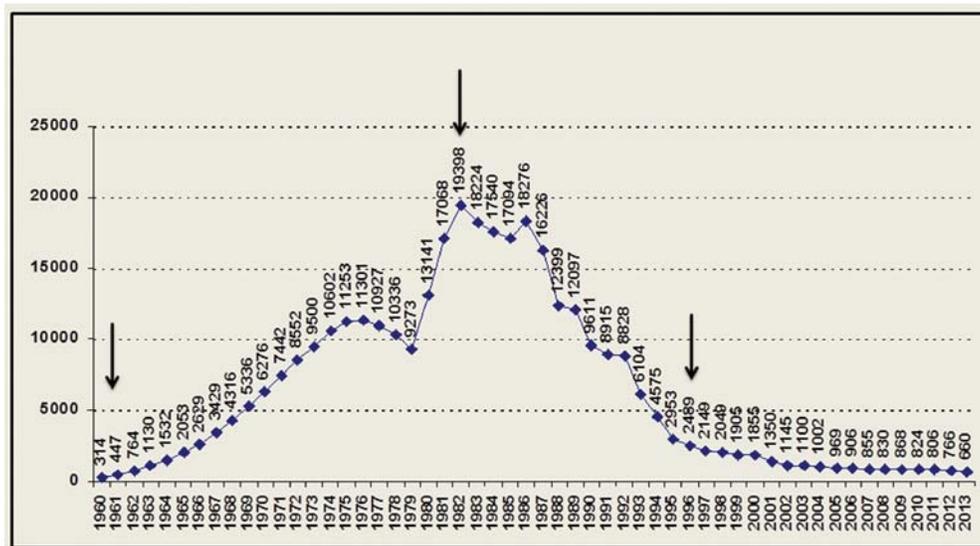


Figure-8: Impact of MDT on Leprosy in Pakistan

Note: Multi Drug Treatment (MDT) was implemented in 1984 and leprosy was brought under control in 1996 as indicated by arrows. With the initiation of MDT there was a dramatic fall in patients on chemotherapy. However these patients are under continued surveillance for complications or reactivation of the disease. The number of patients on chemotherapy has dropped from 19000+ to 660 in 2013

6.3 Current Situation of Leprosy Control Programme in Pakistan

The statistics, as of December 31, 2013, for the Leprosy Control Programme in Pakistan are shown in Table-3. The number of field units stand at 175 since 2003, although the population has more than doubled. The incidence rate continues to go down and stands at 0.22 per million population; similarly, prevalence rate is 0.03/10⁵ population, and the number of patients under treatment are 660 patients indicating successful Leprosy Control.

7. NEW CHALLENGES AND GOALS

As leprosy work declined with the control over the

disease in 1996, the organization combined other health disciplines to utilize the free capacity of leprosy technicians, thus ensuring their presence in the field for the next 2-3 decades that would be required due to prolonged and variable incubation period of the bacilli. The organization took the initiative of combining the leprosy/TB control activities in Azad Jammu and Kashmir and Gilgit-Baltistan; leprosy/blindness specialties were combined in Sindh, Balochistan and Khyber-Pakhtunkwa. These activities led to renaming all leprosy control centers in 2002 as Leprosy Elimination, TB and Blindness Control Centers, a strategy termed as 'TRIPLE MERGER'. To meet this challenge, short and long courses are being arranged in reputed institutions like Pakistan Institute of Community Ophthalmology in Peshawar, Jinnah

Table-3: Leprosy Elimination, TB and Blindness Control Programme (As of December 31, 2013)

Area	796,095
Population	197,683,559
Control Unis	175
National Training Institutes	1
Total Registered Patients	56015
Patients under Treatment	660
Prevalence Rate per 10 ⁵	0.03
Incidence Rate per 10 ⁶	0.22



Figure-9: Recovery of a Leprosy Patient after MDT Treatment.

Note: This patients was registered at MALC with borderline lepromatous disease. Patient was treated with MDT for 1 year. This picture shows the lesions pre-treatment and one year post MDT treatment

Postgraduate Medical Centre (JPMC), ISRA Al-Ibrahim Eye Hospital, Ojha Institute of Chest Diseases and Civil Hospital in Karachi to enable the workers to maintain the high standards set by leprosy control programme. Currently, community-based rehabilitation (CBR) has been introduced, which is offered to non-leprosy patients families as well, thus effectively utilizing the skills and training of the leprosy technicians, while keeping the surveillance of leprosy as an integral part of the programme. The key element in success of this programme was training and retraining of leprosy paramedics, drug compliance and contact tracing. To improve the outreach of medical expertise, feasibility of a tele-health facility at the referral center connected to remote areas with minimum medical facility is currently under way in collaboration with the Commission on Science and Technology for Sustainable Development in the South (COMSATS). The objective would be the provision of medical advice within reachable distance.

The overall goal of this institution is to provide trained and motivated field workers in Leprosy Elimination along with TB / blindness control and CBR at primary level. It aims at enhancing the knowledge and skills through constant learning by arranging regular update courses for workers; improving the diagnostic and management capabilities of medical students and doctors against leprosy by providing rotation in different centers; and hands-on training in leprosy diagnosis and management.

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