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Epidemiology of Leprosy in Vietnam and the Effectiveness of Multidrug Therapy (MDT) in the Management of the Disease

Tran Hau Khang, Ngo Minh Thao and Le Huu Doanh

Abstract

Leprosy is a chronic infection caused by the acid-fast, rod-shaped bacillus *Mycobacterium leprae*. Leprosy can be considered connected diseases that primarily affect the superficial tissues, especially the skin and peripheral nerves. The social and psychological effects of leprosy, as well as its highly visible debilities and sequelae, have resulted in a historical stigma associated with leprosy. Vietnam has seen a highly significant decrease in the prevalence rate (PR) of leprosy since 1983. From 1983 onwards, with the introduction of multidrug therapy (MDT), the prevalence of the disease has dropped to less than one case per 10,000 individuals from 1995. After over two decades, a total of 109 cases were registered with a prevalence rate of 0.01 per 10,000 population in 2017. It is clear that over the past 35 years, the profile of leprosy in Vietnam has been changed significantly followed by the treatment with MDT. Leprosy has become a rare disease in Vietnam. This chapter presents the trend in the epidemiology of leprosy in Vietnam from 1983 to 2018 and also mentions the effectiveness of multidrug therapy (MDT) in the management of this disease. Based on individual records and annual reports, the prevalence of registered cases, the number of new cases detected yearly, their sex, age, classification (MB, multibacillary; PB, paucibacillary) and disability status are carefully presented.

Keywords: leprosy, multidrug therapy, relapse, prevalence, incidence, disability

1. Introduction

Vietnam, officially the Socialist Republic of Vietnam, is the easternmost country on the Indochina Peninsula which is a part of the Western Pacific Region. With another four countries, including China, Malaysia, Papua New Guinea and the Philippines, Vietnam contributed to 86% of the total prevalence, according to the WHO's report in 2010 [1]. While the lack of knowledge about leprosy in the lower socio-economic group is an important cause why most of patients with untreated leprosy end up with severe deformities and disfigurements, there has been a degree of stagnation and new approaches in leprosy control. Therefore, in 1991, the global leprosy control network was established. The WHO set the goal of elimination of leprosy as a public health problem in which the prevalence rate needs to be below

one case per 10,000 people [2]. Vietnam has achieved the national target in 1995 and succeeded in maintaining the elimination threshold, reaching that sub-nation at the end of the year 2000 [3]. However, based on the annual data collected from 2000 onwards, several new case detections have been reported [3, 4]. This requires continuing the implementation of the main principles of leprosy control in the nation, with a special focus on the five fields, such as timely detection of new cases, contact investigation, multidrug therapy (MDT) treatment, the treatment compliance and prevention of disabilities and also rehabilitation. The strategic directions are integration, early diagnosis and treatment which help to strengthen and sustain leprosy activities, quality patient care and reduction of the leprosy burden of physical, social and economic consequences. The introduction of MDT for the treatment of leprosy in 1983 was one of the important landmarks in combating the disease. In the past, many clinical trials of MDT have been implemented with high effectiveness and well toleration. The addition of ofloxacin to multidrug regimens has been developed to reduce the required duration of MDT possible. Moderate to marked clinical and bacterial improvement with minimal adverse effects has been observed [5, 6].

2. Network of leprosy control programme

Vietnam’s National Leprosy Control Programme was established in 1982 [7]. The present national framework for leprosy control is characterized by the integrated delivery of basic leprosy services, which are provided at the peripheral level. The leprosy control system is a part of the healthcare system which follows the administrative system (**Figure 1**). The National Hospital of Dermatology and Venereology (NHDV) is the leading institute responsible to the Ministry of Health (MOH) for skin diseases, sexually transmitted infections (STIs) and leprosy control in the

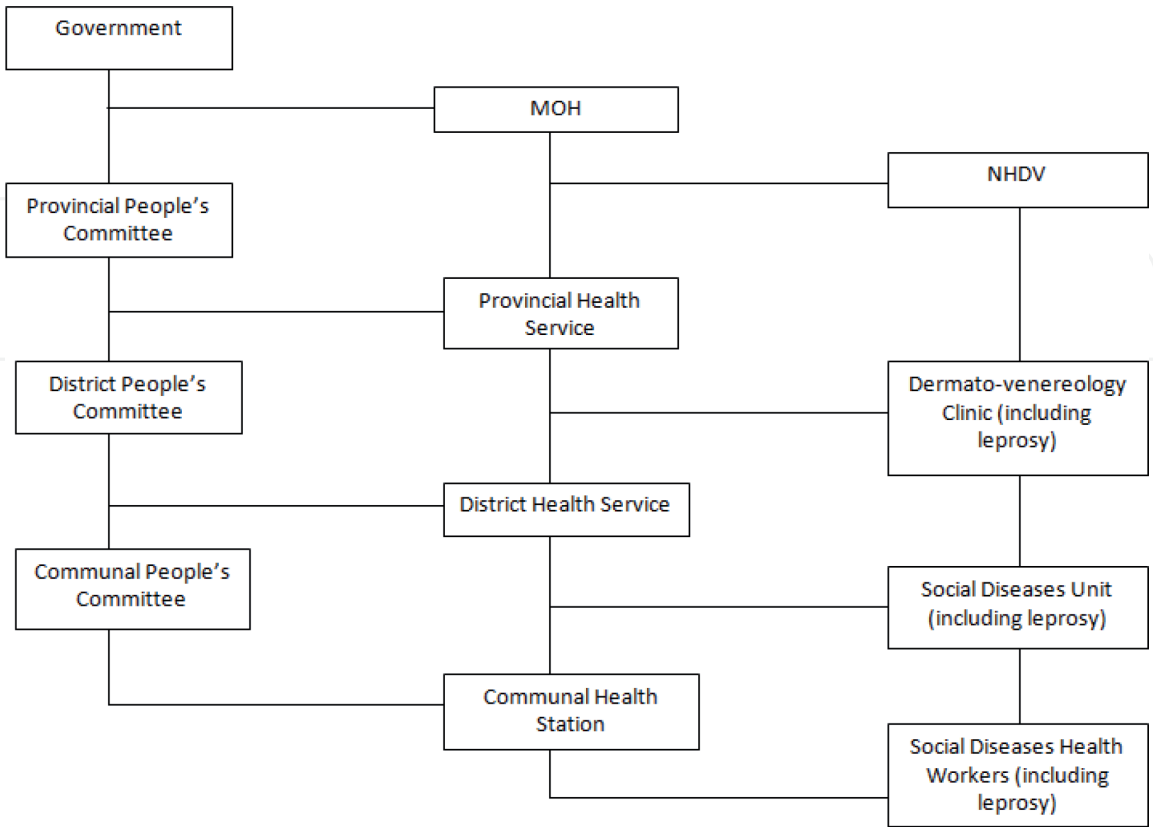


Figure 1.
Leprosy control system according to healthcare and administrative system.

whole country [4]. There are the supported systems, namely, Dermato-Venereology Clinic, vertically under NHDV in each province, covering these fields at provincial level. Dermato-venereological activities including leprology work are continuously separated into the leprosy programmes at district level. At the district's social diseases unit in endemic zones, several practitioners are specially trained to work exclusively in leprosy field, whereas in less endemic district, they are in charge of some contagious diseases, including leprosy, tuberculosis, malaria, HIV/AIDS, etc. In each commune that includes 2–5 villages with 1000–3000 people, leprosy and other social diseases are managed by one or two health workers. They are the specialized units with leprosy expertise at intermediate levels that provide the necessary technical guidance. Their main work is to refer suspect cases for diagnosis confirmation, to treat and to follow up confirmed cases. Antileprosy drugs are stored at any levels, from central to local. The leprosy programme plays a paramount importance to facilitate early case detection and reduce the disease burden further in all endemic areas because they encourage voluntary or self-reporting and help increase the capabilities of the peripheral general healthcare staff through training.

3. Epidemiology of leprosy

3.1 Before 1975

There is no exact data of this period because dermato-venereology profession network was just established in 1975, but the estimated prevalence rate of leprosy was 6–7/10,000 population in 1975 [4]. Most of patients are being congregated in places such as leprosy villages/colonies despite no segregation law.

3.2 From 1976 to 2018

The National Leprosy Control Programme (NLCP) was formed in 1982, and MDT was implemented 1 year later, in 1983 [7].

3.2.1 The trend in prevalence rate of leprosy

According to the annual data reported from 1983 to 2018, there was a decreasing trend in both prevalence rate and the annual newly detected cases (**Figure 2**). As a result of the long-term efforts, Vietnam, which was one of the first 15 countries in the region, had reached the goal of elimination at the national level in 1995 with the prevalence rate of 0.7 per 10,000 population [2]. At the end of the year 2000, the subnational target has been reported. In 2000, only 28 provinces reached Vietnam's 3 elimination criteria [3, 4]. But from 2001 to 2015, all the rest 36 provinces completed the WHO's elimination goal at the provincial level in the country (Vietnam's 4 elimination criteria) [7], and relatively high case detection rate was found in some area, particularly in the central highland and some southern provinces.

They were varied from 38,652 prevalent cases in 1983, corresponding a rate of 6.78 per 10,000 people, to 18,418 cases, corresponding of 2.71 in 1991 (see **Table 1**). During this period, the registered prevalence number was very high due to several main factors, such as retreated with MDT in patients previously treated with dapsone and managing the national leprosy by using 24-month regimen without ofloxacin. However, since 1992 onwards, the number of registered prevalence cases reduced dramatically (**Figure 2**). Starting from 9245 cases in 1992, it decreased to 96 in 2018 and the rate dropped continuously from 1.36 to 0.01 per 10,000

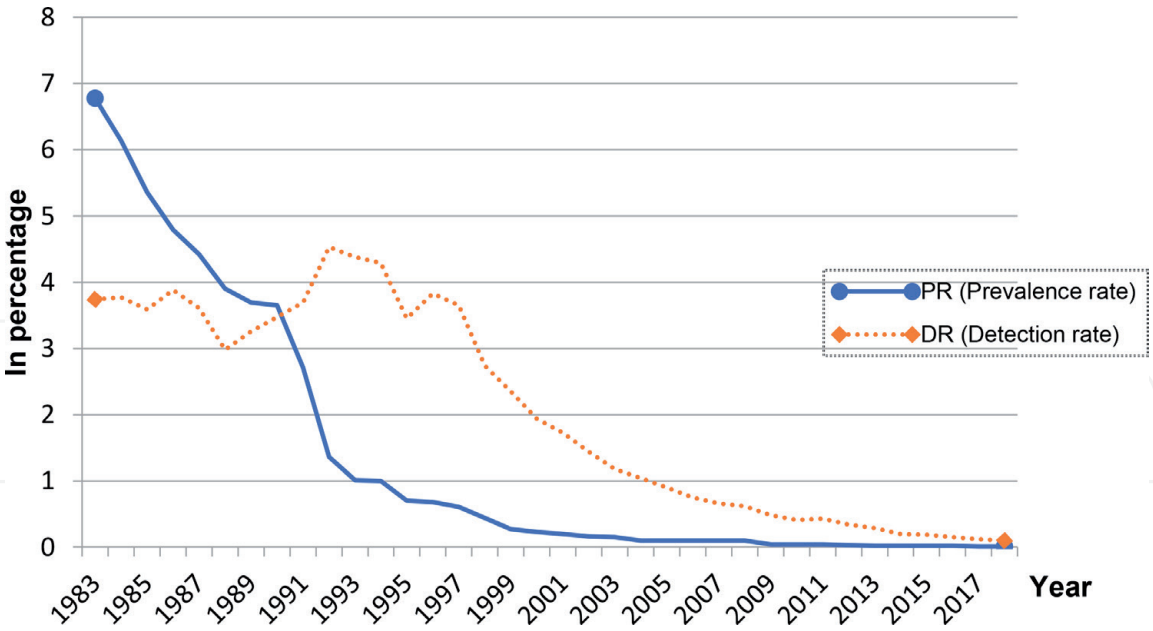


Figure 2. Prevalence rate (PR) and detection rate (DR) of leprosy (1983–2018) (detection rate (DR), proportion of new cases per 100,000 population; prevalence rate (PR), proportion of leprosy cases per 10,000 population).

population in the same period (**Table 1**). The main reasons were considered, such as disseminating MDT therapy in the whole country and introducing patients to 12-month regimen for shortening the required duration of MDT possible in 1998.

Analysis of a total data from 1983 to 2018 revealed that the prevalence rate has dropped significantly from 6.78 per 10,000 in 1983 to 0.01 per 10,000 in 2018 (**Table 1**). It is clear that over the past 35 years, the prevalence rate of leprosy has changed dramatically by around 99.9%. With this prevalence rate, it was believed that the transmission of *M. leprae* would be reduced and leprosy would naturally disappear. The post-elimination challenges in the future are sustaining high-quality leprosy programmes and reaching the target of district level. Although leprosy has become a rare disease in Vietnam, all activities of the NLCP are sustained from the national to grassroot levels. At the present, Vietnam has several provinces which achieved the goal of elimination at the district level.

3.2.2 Trend in case detection

The new cases include patients who are newly diagnosed during the calendar year. Due to the development of the leprosy network and acceleration of activities of health education, the number of new cases detected yearly was remarkably increased from 1991 to 1997 (**Figure 2**). A total of more than 32 special projects, namely, SAPEL, LEC and mini-LEC, were conducted in this period, during 1991–1997 [3]. The results, not only the new case detections but also the remaining undetected cases, especially in the high plateau areas and some places in southern provinces, were found out. During 1993–1998 the number of new cases detected annually increased. From 1999 up to now, the annual detection rate has declined (**Figure 2**). Only 77 cases were detected in 2018 with a rate of 0.1 per 100,000 inhabitants and a decrease from 1795 cases in 1999, corresponding to a rate of 2.35 per 100,000 population (**Table 1**). Compared with other countries in the region, Vietnam has significantly declined in the incidence cases. Between 2013 and 2014, while India alone accounted for 58.85% of the global Leprosy burden, with a total of 127,000 new cases detected, that number in Vietnam was only 521 new cases [8], <243.7 times. Because case detection is highly influenced by the intensity of

Year	Prevalence		Cases detected	
	n	Per 10,000	n	Per 100,000
1983	38,652	6.78	2021	3.74
1984	36,226	6.14	2103	3.77
1985	32,483	5.36	2062	3.59
1986	29,219	4.79	2292	3.88
1987	27,401	4.42	2183	3.61
1988	24,570	3.90	1847	2.98
1989	23,612	3.69	2073	3.26
1990	24,081	3.65	1995	3.47
1991	18,418	2.71	2500	3.69
1992	9245	1.36	3142	4.53
1993	7090	1.01	3185	4.38
1994	7104	1.00	3173	4.29
1995	5277	0.70	2591	3.45
1996	4827	0.68	2883	3.83
1997	4665	0.61	2808	3.65
1998	3482	0.44	2162	2.74
1999	2087	0.27	1795	2.35
2000	1718	0.23	1477	1.94
2001	1532	0.2	1336	1.73
2002	1269	0.16	1158	1.44
2003	1204	0.15	949	1.18
2004	828	0.1	858	1.04
2005	642	0.1	746	0.9
2006	572	0.1	666	0.75
2007	510	0.1	552	0.66
2008	540	0.1	530	0.62
2009	350	0.04	413	0.48
2010	318	0.04	359	0.41
2011	322	0.04	374	0.43
2012	265	0.03	296	0.34
2013	260	0.02	294	0.29
2014	187	0.02	227	0.2
2015	178	0.02	168	0.19
2016	138	0.02	153	0.15
2017	109	0.01	112	0.12
2018	96	0.01	77	0.1

Table 1.
Prevalence and case detection in Vietnam (1983–2018).

programme activities, such as service coverage, community awareness and the reporting system as well as sensitivity and specificity of diagnosis, the new case detection rate may not represent the true incidence and the degree of transmission of infection in the community.

3.2.3 Grade 2 disability proportion among new cases

Leprosy usually affects the skin and peripheral nerves. Visible disability, expressed as grade 2 disabilities, may be noted as the results of involvement damage of certain peripheral nerves [6, 7]. The proportion of grade 2 disabilities among new cases from 1983 to 2018 fluctuated a lot depending on the trend in case detection (see **Figure 3**). The highest rate was 40.82% in 1983 then decreased to 17.86% in 1993 (**Table 2**). The main cause may be related to shortening of timely diagnosis and treatment of cases, before nerve damage has occurred. Ensuring good treatment compliance of patients also led to reduce the visible disability rate. This decline reflected the efficacy of leprosy control activities. The grade 2 disability proportion between 1994 and 1997 increased related to the intensive case-finding efforts that were carried out in this period. The projects including LECs, mini-LECs and SAPEL have detected a large number of backlog cases, most of whom could suffer severe deformities and disfigurements as a result of delayed diagnosis. Additionally, some of old patients re-registered as new cases especially those with disabilities that also contributed to increasing the grade 2 disability proportion among new cases. On the other side, the high stigma and low awareness about the disease in the society

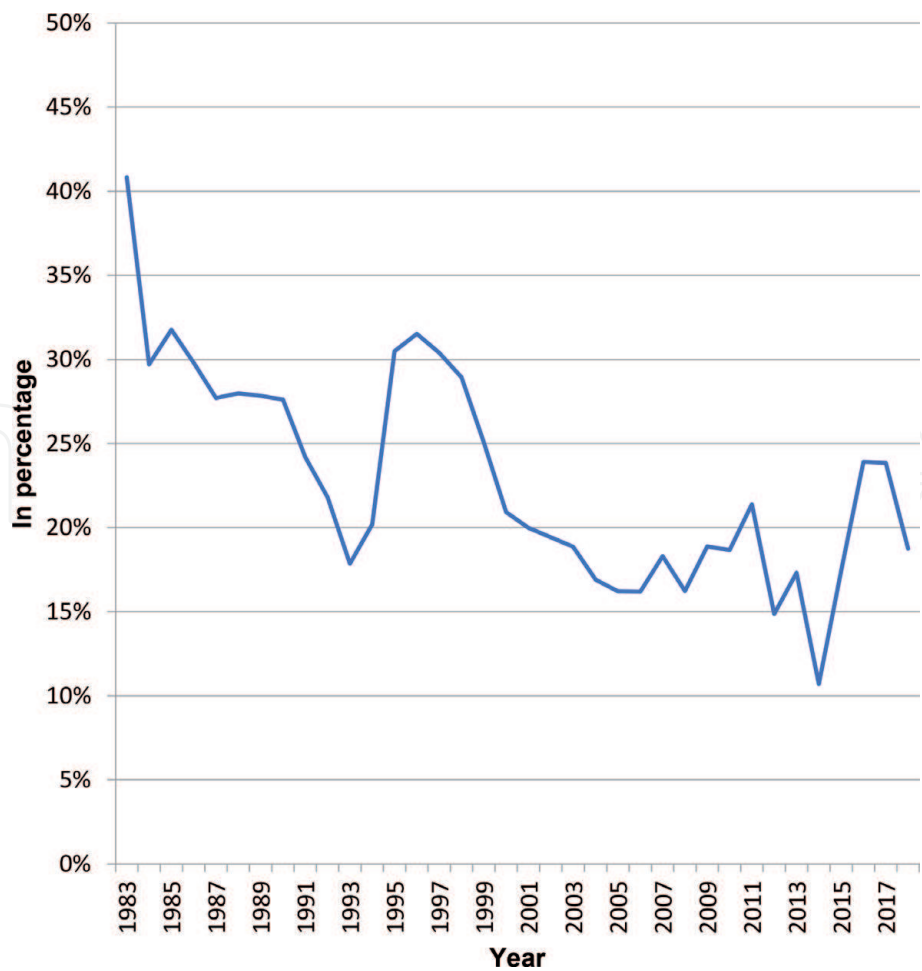


Figure 3.
Proportion of grade 2 disability among new cases.

Year	Grade 2 disabilities	
	Number	Proportion (%)
1983	825	40.82
1984	625	29.70
1985	655	31.77
1986	683	29.80
1987	605	27.70
1988	517	27.99
1989	577	27.83
1990	551	27.62
1991	606	24.20
1992	685	21.80
1993	569	17.86
1994	641	20.20
1995	789	30.50
1996	909	31.53
1997	854	30.40
1998	626	28.95
1999	450	25.07
2000	309	20.92
2001	267	19.99
2002	225	19.43
2003	179	18.86
2004	145	16.90
2005	121	16.22
2006	108	16.20
2007	101	18.30
2008	86	16.23
2009	78	18.89
2010	67	18.66
2011	80	21.39
2012	44	14.86
2013	45	17.31
2014	20	10.7
2015	31	17.42
2016	33	23.91
2017	26	23.85
2018	18	18.75

Table 2.
Proportion of grade 2 disabilities among new cases (1983–2018).

Year	Female		Children under 15 years old		MB cases	
	Number	Proportion (%)	Number	Proportion (%)	Number	Proportion (%)
1983	612	30.28	169	8.59	811	40.10
1984	622	29.50	83	3.95	651	31.13
1985	504	24.40	141	7.84	804	39.10
1986	646	28.20	185	8.07	802	35.20
1987	642	29.40	157	7.21	1009	46.24
1988	509	27.60	141	7.63	738	39.60
1989	466	22.50	120	5.79	932	45.56
1990	463	23.20	130	6.52	798	39.40
1991	494	19.80	120	4.96	1075	43.40
1992	739	23.50	241	7.67	1413	45.50
1993	1114	35.00	231	7.25	1496	47.20
1994	872	27.50	151	4.76	2062	65.20
1995	926	35.70	222	9.57	1632	62.68
1996	1017	35.20	211	7.32	1807	63.70
1997	1011	36.00	159	6.66	1687	59.11
1998	803	37.10	162	6.49	1189	54.67
1999	676	37.70	124	6.91	1071	61.27
2000	571	38.70	105	7.11	905	62.00
2001	497	37.00	77	6.00	822	61.74
2002	437	37.74	65	5.61	715	62.17
2003	339	35.72	52	5.48	616	65.27
2004	322	37.53	47	5.48	570	66.59
2005	269	36.06	39	5.30	492	66.71
2006	245	36.79	35	5.26	443	66.80
2007	178	32.25	25	4.53	377	68.30
2008	202	38.11	18	3.40	378	71.32
2009	144	34.87	12	2.91	295	71.43
2010	98	27.30	14	3.90	259	72.14
2011	121	32.35	11	2.94	269	71.93
2012	105	35.47	10	3.38	191	64.53
2013	82	31.54	14	5.38	180	69.23
2014	66	35.29	7	3.74	153	81.82
2015	53	29.78	5	2.81	143	80.34
2016	39	28.26	4	2.90	115	83.33
2017	38	34.86	2	1.83	91	83.49
2018	24	25.00	0	0	89	92.71

Table 3.
Proportions of female and children in MB patients among newly detected cases (1983–2018).

have contributed to the delay in case detection that affected high grade 2 disability proportion. Fortunately, the rate decreased again and reached a level of 18.75% in 2018 (**Table 2**). It requires that the healthcare system conduct retraining courses on leprosy at provincial, district and communal levels to sustain the effectiveness of the network of leprosy control programme for self-reporting and early treatment.

3.2.4 Female and children among new cases

The age-old stigma associated with the disease remains at least hundreds of years ago in Vietnam. The impact of stigmata attached to leprosy had effect not only on male but also on female and children [7]. Because of the fear of infecting the family members and being divorced, leprosy women were forced to be infertilized and kept themselves aloof. In the past, the children who were born by parental leprosy were not allowed to attend or study with other “normal” children. **Table 3** shows that the distribution of sex and age leprosy patients among new cases was not stable. The proportion of female leprosy detected from 1983 to 2018 was around 19.8–38% (**Figure 4**). This is convenient with other previous studies in some countries in the region such as Thailand, India and Myanmar [1, 2, 8–12].

Here the reported rate of children among new case detection decreased from 169 in 1983 to under 10 cases since 2014 (**Table 3**). From 9.57% in 2000, there is no case observed in 2018 (**Figure 4**). This is a good signal and could be related to success in completing the subnational target at the end of the year 2000 in Vietnam. Some tests have been conducted to make prognosis in high-risk children group, such as gelatin particle agglutination test (GPAT). This measurement tool helped dermatologists to easily assess the transmission of the disease in the community. Tran Hau Khang et al. reported that children with GPAT positive at high titer of more than 1:64 and whose mother/father is a leprosy patient can be considered as the highest risk group developing the disease [13]. As a result, GPAT has proven its important role in early detection of leprosy in children. This could partially explain why the decrease of transmission of the disease led to the reduction in the proportion of children among new cases.

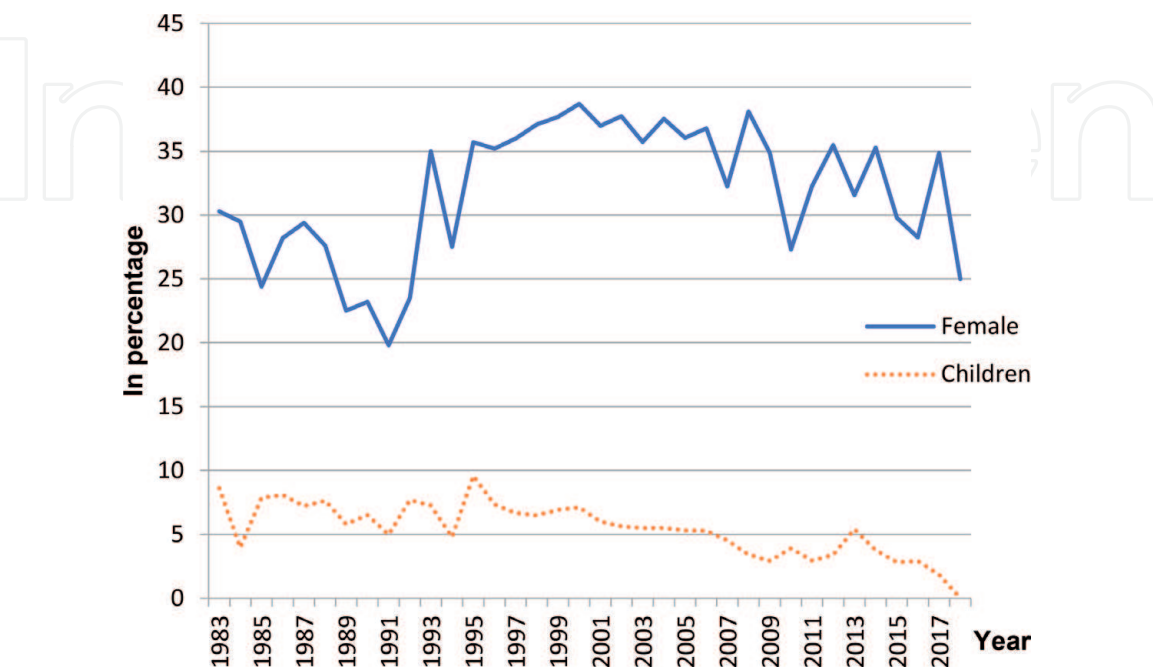


Figure 4.
Proportion of female and children among new cases.

3.2.5 Multibacillary (MB) among new cases

The proportion of MB leprosy among new cases is an important indicator of the magnitude of a potential source of transmission and risk for complications including reactions and neuritis that could lead to disabilities when not treated adequately. In Vietnam, there was the gradual elevation of MB patient rate among newly detected cases from 40.1% in 1983 to 47.2% in 1993. However, from 1994 onwards, the proportion increased significantly. More than 90% (92.71% in 2018) of new case detection were MB patients (**Table 3**). This could be explained by some factor, such as change in the criteria for classification and in the clinical presentations to some extent. Further studies in various countries in the long term are necessary to determine the relation between the operational and the epidemiological factors that are contributing to the increase in MB proportion.

4. Special leprosy projects

In order to enhance knowledge about leprosy which increases misconceptions about the disease's transmission and treatment and to widen case-finding activities in certain areas, several special projects were carried out, such as SAPEL, LECs, mini-LECs and health educational campaigns. A total of 32 activities were implemented from 1991 to 1997 covering over 3 million inhabitants. It comprised 8 LEC projects (1,100,200 populations), 6 SAPEL activities (872,000 individuals) and 18 other activities (1,030,000 people). The number of new cases detected was reported corresponding to these projects: 603, 154 and 663 cases [3, 7]. The total number of newly detected cases in 7 years (1991–1997) was 1420 related to these activities, corresponding to 7% out of total new cases in this period (20,282 cases). This reflected the effectiveness of the network of leprosy control programme. Besides that, the support of the Pacific Leprosy Foundation (PLF) as a partner member and the coordination meetings about leprosy activities that were held with government and local nongovernmental organizations (NGOs) assisted the strengthening of the national leprosy programmes in Vietnam. This ensured programme sustainability by promoting integration within the general health system and also emphasized the need for building and maintaining effective partnerships to improve quality leprosy services and reduce further the disease burden due to leprosy.

5. Effectiveness of MDT in management of leprosy

Leprosy is a long-lasting infection caused by bacteria that can be eliminated by antibiotics. Early diagnosis and treatment of cases can prevent or minimize the onset of further disabilities related to complications, including reactions and neuritis [5, 6, 14–17]. MDT implementation began in 1985 in the Western Pacific Region. It reached 10% coverage in 1988. By 1994, almost 100% MDT coverage was reached [1, 2, 9, 14]. Development and implementation of MDT was the most important achievement in the history of leprosy control in which the introduction of a single-dose treatment regimen for single lesion and 1 year duration for MB leprosy has contributed a great benefit to leprosy patients by shortening of the required duration of MDT. One of the most essential components of the leprosy programme is also ensuring that all new patients who start MDT complete the full course of treatment within the prescribed period of time. A completed treatment patient means that a PB leprosy patient completes 6 monthly doses of PB-MDT

within 9 months and a MB leprosy patient completes 12 monthly doses of MB-MDT within 18 months [1, 2, 5, 6, 9, 14]. Vietnam was one of many countries selected as a centre to perform the clinical trial of treatment of leprosy with ofloxacin containing combined drug regimens [5]. Both PB and MB patients undergo six new multidrug regimens containing ofloxacin in comparison with the standard WHO/MDT. The efficacy, tolerance and adverse side effects were considered.

The patients were diagnosed and classified based on bacteriological and clinical manifestations. Both MB and PB patients were randomly allocated to six regimens from A to F. All were examined and followed by the health worker. Individuals were seen daily in the first month and monthly during 5 consecutive months for PB and 23 consecutive months for MB. At the end of treatment, they were assessed once every 6 months for clinical change or any symptom of relapse for at least 10 years.

The results of this previous study showed that all patients treated with ofloxacin-containing regimens have reached moderate to marked clinical and bacterial improvement. However, relapse rate was very high among patients treated with regimen combining ofloxacin and rifampicin daily for 1 month [5, 6]. Several

Year	Complete MDT cases	Implement MDT cases
1995	3460	5277
1996	2831	4527
1997	2669	4665
1998	3229	3482
1999	3060	2077
2000	1820	1718
2001	1478	3044
2002	1362	2740
2003	1042	2258
2004	1209	2102
2005	943	1601
2006	768	1352
2007	640	1159
2008	528	1072
2009	604	976
2010	398	717
2011	339	662
2012	357	622
2013	294	519
2014	227	408
2015	168	342
2016	153	305
2017	112	246
2018	77	203

Table 4.
Number of patients who completed MDT (1995–2018).

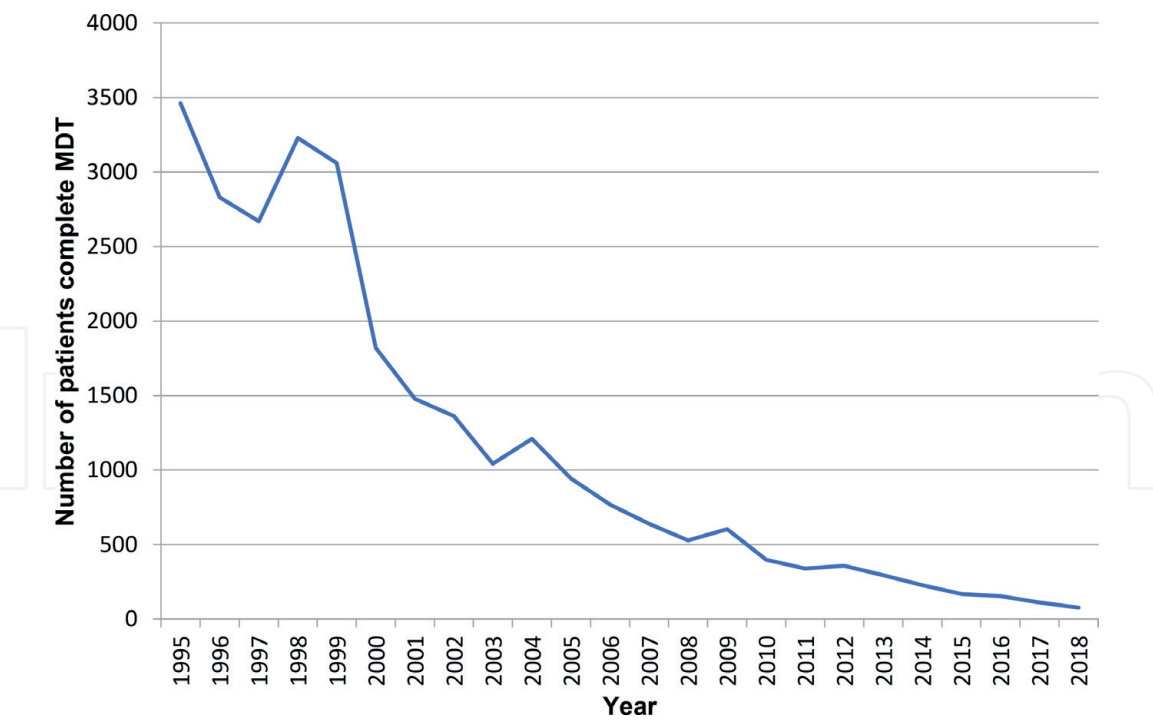


Figure 5.
Number of patients who completed MDT (1995–2018).

adverse side effects were observed, including itch, erythema and vomit, all of which resolved quickly within 2–3 days. Only 1.7% developed erythroderma and required hospitalization [5, 6, 15–17]. With these results, ofloxacin has proven to be a powerful bactericidal drug against *M. leprae*. The introduction of MDT therapy containing Ofloxacin reduced the prevalence rate down to under 0.5% since 1998.

High rate of MB leprosy treatment completion was reported. Nearly 24,000 patients implemented MDT with the completion rate of 100% from 2013 to 2018 (112/112 detected cases treated with MDT in 2017, 77/77 in 2018) (see **Tables 1** and **4**). It coincided with a continuous decline in the prevalence rate (see **Figures 2** and **5**). These results represent the effectiveness of expending efforts of healthcare system form national to grassroots levels. With the financial aid of the government, NGOs and WHO, leprosy patients are treated free of charge with MDT at their own home and can pursue a job suitable to their health. There is lack of data of relapse case during the conduct of MDT therapy from 2000 until now and therefore, the effectiveness of MDT in the management of leprosy in Vietnam over the recent 18 years could not exactly be concluded.

6. Conclusions

With the introduction of MDT in 1983 and the efficacy of leprosy programme activities, the epidemiology of leprosy in Vietnam has dramatically improved. Leprosy is becoming a part of skin neglected tropical diseases (NTDs), a diverse group of communicable diseases that prevail in tropical and subtropical countries, particularly in the easternmost country, Vietnam. At present, leprosy is one of 20 diseases formally recognized as NTDs worldwide. However, three out of five main strategies given to combat NTDs are particularly for leprosy. This means that even though leprosy is considered to be eliminated, the health system including the Ministry of Health and the leading institute, NHDV, in Vietnam are still focusing on sustaining quality leprosy services. Nowadays, majority of the patients are now able

to live normal lives in the community without being stigmatized and discriminated. MDT is still the cornerstone of the leprosy control programme in which the timely and regular supply of MDT and proper MDT drug management is very important in attaining the goal of sustaining quality leprosy services and further reducing the leprosy burden. Since 1995, the WHO has supplied MDT free of cost to leprosy patients in all endemic countries. Currently, with the efforts of leprosy network activities, all patients are receiving MDT free from local health facilities.

To maintain these great results, Vietnam set up the Vietnamese criteria for elimination of leprosy at subnational levels including province and district grade since 1997. From three criteria at the beginning, the Ministry of Health decided to set up to five criteria in 2002 [7], such as ensuring that the prevalent proportion in 3 consecutive years is below 0.2 cases per 10,000 people, that the newly detected case rate is under 1 per 100,000 populations and also that the grade 2 disability proportion among new cases is below 15% at the time of examination. The supply criteria were being added to ensure elevating the capacity of health staff worker. There was about 20% of total commune officers, who were randomly checked, who could correctly answer all the content of elimination of leprosy programme. In the future, all activities of the leprosy control programme need to be sustained at all levels, from the nation to the grassroots. With the introduction of the newly detected species of *Mycobacterium*, *Mycobacterium lepromatosis*, in both of MB and PB patients in Mexico in 2008, early detection of *Mycobacterium* which induces leprosy could be a challenge [18, 19]. Further serological tools and other tests on leprosy need to be developed in health service to identify, sequence and detect genes responsible for drug resistance of *Mycobacteria* [20, 21]. In recent years, a few studies in development to investigate the feasibility of a uniform multidrug therapy (U-MDT) regimen for PB and MB patients, with a fixed duration of 6 months, were recommended at the WHO's Technical Advisory Committee meeting in 2002 [22]. China, India, Bangladesh and Brazil were the first four countries performing U-MDT regimen [23–26]. The results showed that there was no statistical difference between the group that received WHO-MDT and those who received U-MDT and also in MB and or PB patients on the frequency of the first reaction occurrence, the mean reduction of BI and the recurrent rates [24–27]. However, in a controlled clinical study in India, from 2003 to 2005, it was observed that for MB patients, U-MDT regimen is not as effective as WHO-MDT with a 12-month duration [23]. Some difficulties related to the disease complexity, clinical trial development and in reproducing the in vitro findings in clinical practice are the obstacles to make the U-MDT regimen accessible to most patients. To this date, there is nothing in short period of time to replace MDT [28]. Recently, the recommendation of the WHO about the implementation of U-MDT among central strategies for leprosy control in the quadrennium 2017/2020 was published [29, 30]. In Vietnam, there was no controlled clinical study, comparing the efficacy of U-MDT and WHO-MDT for PB and MB patients. This advocates the need for new studies to access the effectiveness of U-MDT or new therapeutical regimens in the treatment and management of leprosy in the long term in Vietnam. Thenceforth, all endemic areas have the uniform regimen in the treatment and management of leprosy to sustain the disease in skin NTDs in the long run.

Conflict of interest

No conflict of interest.

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