Myanmar International collaboration in Combating Tuberculosis (TB) in Mandalay Region (2006-2010)

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Abstract

Tuberculosis (TB) is one of three major diseases and remains a major health problem in Myanmar. Myanmar is one of 22 TB high burden countries, one of 27 MDRTB countries and one of 41 TB/HIV countries. In eliminating TB, government expenditures gradually increased but it was not enough. Myanmar needs international assistance to take effective measures for TB control in Myanmar. Therefore, Myanmar government has collaborated with International Non-Governmental Organizations (INGOs) trying to eliminate TB effectively. This paper explains how Mandalay Region Health Department tried to combat TB in the region between 2006 and 2010 and discussed the challenges it faced in eliminating TB. The qualitative research method is used in doing this paper. Data were collected from the Mandalay Region Health Department as well as the official data of non-governmental organizations concerned. The Researcher also conducted some interviews with important government officials of Health Department in Mandalay region as well as some responsible persons from INGOs such as the WHO, The Union, PSI. Some challenges in combating TB in Mandalay region are the difficulties to sustain the management capacity and efficiency of the NTP and ensure routine high-quality programme supervision and implementation; to ensure that trained and motivated health workers are available at all levels of the health system; to find the huge proportion of undetected TB cases in poor urban communities; to expand community involvement in TB control activities; to ensure additional case-finding and improved treatment success rates; and to have enough finding for TB control activities.

Keywords: TB, INGOs, NTP, MDRTB, WHO, Mandalay Region Health Department

Introduction

Myanmar is administratively divided into 14 States and Regions, consisting of 67 districts and 330 townships. The population of Myanmar is over 51millions according to the 2014 Census. The area of Mandalay Region is 37955 sq. km. Its total population is 6165723 according to 2014 Census. The literacy rate of Mandalay Region is 93.8% higher than theUnion literacy rate of 89.5%. Tuberculosis (TB) remains a major global health problem. TB is the second serious cause of death in the world after Human Immune Deficiency Virus (HIV). For Myanmar TB is a serious health problem. Myanmar is one of 22 TB high burden countries identified by the World Health Organization (WHO). Myanmar is also one of 27 countries that account for 85% of the global Multi-Drug Resistant TB (MDR-TB) problem. WHO estimates that 180,000 new TB cases emerge in the country each year, along with 9,000 MDR-TB cases and 20,000 cases co-infected by TB and HIV. In 2007, the TB incidence rate was 171 per 100,000 Population. According to the national TB prevalence survey conducted in 2009-2010, TB prevalence was higher in male than female, higher in urban than in rural area and higher among the elderly than among young adults.

In 2009, 134,023 TB cases were notified in Myanmar. The most affected age group was between 25-54 years which represents the most active socio-economic age group. Therefore, some questions are raised; (1) How did Mandalay

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Region's Health Department endeavor to control TV in the region from 2006-2010? (2) What were the challenges of Mandalay Region's Health Department in eliminating TB? The qualitative method is used in doing this paper. Data are collected from the Department of Health in Mandalay Region and nongovernmental organizations concerned. The Researcher also conducted some interviews with some government officials of Health Department in Mandalay and some respective persons from WHO, The Union, PSI in Mandalay Region.

Findings and Discussion

Policies and Strategies of National Tuberculosis Programme (NTP)

Since independence, Myanmar established campaigns to fight against major infectious diseases. In 1964, the government of Myanmar signed an agreement with WHO and The United Nations International Children's Emergency Fund (UNICEF) to develop a National TB Programme. In 1966, the National TB Programme (NTP) started its activities. Later, these campaigns or vertical programmes were integrated with the primary health care system in the People's Health Plan and the National Health Plan. In 1978, the NTP became an integral part of the basic health services under the primary health care system. In 1991, short course chemotherapy for TB was introduced by the Myanmar Essential Drug Programme.[1] In 1993, the Ministry of Health formed a central supervisory committee for prevention and control of TB. In 1994, the standard regimen containing injection Streptomycin and Isoniazid was replaced and the NTP introduced with Short Course Chemotherapy in 18 townships and 8 State and Divisional TB Centers. In 1995, Short course chemotherapy was expanded to 126 townships with anti-TB drugs supplied by five sources, Central Medical Store Department, WHO, United Nation Development Programme (UNDP), Sasakawa Foundation and Myanmar Essential Drug Programme. In 1995, NTP was expanded to a total of 144 townships. In 1996, NTP rapidly expanded short course chemotherapy to 153 townships but no further expansion in 1997 and 1998.[2]

The NTP started the Private-Public partnership for Direct Observation Treatment Strategy (DOTS) in 1997 under the recommendation of WHO with the Myanmar Medical Association.[3] According to the plan, private sector was involved in TB control. Three schemes of Public Private Mixed (PPM DOTS) were also developed. The three schemes were:

1. Health education and proper referral
2. Health education, proper referral and act as a DOT provider
3. To run an affiliated DOT clinic.[4]

At the beginning, DOTS was introduced in all 153 townships. In 1999, DOTS was expanded to another 15 townships to a total of 168 DOTS townships and covered 64.9% of country population in 168 townships implementing DOTS

[1]National Strategic Plan for Tuberculosis control (2011-2015), Nay Pyi Taw, Department of Health, Myanmar 8 (Henceforth: NSPT (2011-2015))

[2]Myanmar National Tuberculosis Plan Annual Report 2010, Ministry of Health/WHO,2010, p. 1 (Henceforth: Annual Report 2010)

[3]Myanmar National Tuberculosis Plan Annual Report 2009, Ministry of Health/WHO, 2010, p. 1 (Henceforth: Annual Report 2009)

[4]NSPT(2011-2015), p. 18

strategy through primary health care approach, in co-ordination with the other governmental sectors and non- governmental organizations such as Myanmar Women Affairs Federation (MWAF), Myanmar Maternal and Child Welfare Association (MMCWA), Myanmar Medical Association (MMA) and Myanmar Red Cross Society (MRCS) etc. In 2000, DOTS was expanded to another 55 townships to a total of 223 DOTS townships and its coverage extended up to 71% (covered 231 out of 324 townships).

In 2001, DOTS was expanded to another 36 townships to a total of 259 DOTS townships and covered (80% out of total townships).The national TB reference laboratory in Yangon was established. In 2002, DOTS was expanded to another 51 townships to a total of 310 DOTS townships. Since the end of 2003, 325 townships were covered with DOTS strategy (100% coverage).[1]In March 2009, the NTP and WHO published *Operational Procedures for the DOTS-Plus Pilot Sites for Multidrug Resistant TB Management in Yangon and Mandalay Divisions*. In July 2009, the DOTS-Plus pilot project was launched in 10 townships in Yangon and Mandalay Regions, in close collaboration with WHO and Medecins Sans Frontieres (MSF).[2] Three nationwide drug resistant surveys were carried out.The first drug resistant surveillance survey (2003-2004) was completed and showed 3.9% MDR-TB among new cases and 15.5% MDR-TB among re-treatment cases. The second nationwide drug resistant TB survey was conducted in 2007 and showed 4.2% MDR-TB among new cases and 10.0% MDR-TB among re-treatment cases.[3]The third nationwide drug-resistant TB survey was conducted in 2008 and completed in 2013.[4]TB control activities were implemented according to 5-year National TB Strategic Plan and 'Stop TB Strategy' to achieve the global targets within the framework of Millennium Development Goals (MDGs).

The Stop TB Strategy, which was recommended by WHO in 2006 has been initiated in Myanmar since 2007 to achieve the MDGs, 2015[5]. In 2007, Myanmar adopted the Stop TB Strategy. There were six components in the Stop TB Strategy and they were as follows[6]:

- Pursuing high-quality DOTS expansion and enhancement
- Addressing TB/HIV, MDR-TB and other challenges
- Contributing to health system strengthening
- Engaging all care providers
- Empowering people with TB, and communities
- Enabling and promoting research

The Myanmar government has adopted the Millennium Development Goals (MDG). The goal is to reduce dramatically the morbidity, mortality and transmission, in line with the MDGs and the Stop TB Partnership targets, until it

[1]*Annual Report 2010*, p. 1
[2]*Guidelines for the Management of Multi Drug-Resistant Tuberculosis (MDR-TB) in Myanmar*, Ministry of Health, Myanmar, May 2013,pp.ix-x (Henceforth: *Guidelines for MDR-TB)*
[3]*Guidelines for MDR-TB, p.* 7
[4]*NSPT(2011-2015), p.* 8
[5]*Annual Report 2009*, pp. 1-2
[6]*Annual Report 2010*, p. 2

no longer poses a public health threat in Myanmar.[1] The general objectives of NTP are as follows:

- To reduce the mortality, morbidity and transmission of TB, until it is no longer a public health problem (2050)
- To prevent the development of drug resistant TB
- To have halted by 2015 and begun to reverse incidence of TB.

The specific objectives are set towards achieving the MDGs, 2015. They are

- To reach the interim targets of having TB deaths and prevalence by 2015 from the 1990 situation. (MDGs, Goal 6, Target 6.C, Indicator 6.9)
- To reach and thereafter sustain the targets - achieving at least 70% case detection and successfully treat at least 85% of detected TB cases under DOTS (MDGs, Goal 6, Target 6.C, Indicator 6.10)[2]

The activities of NTP are as follows:

1. Intensification of health education by using multi-media to increase community awareness about TB
2. BCG immunization to all children under one year
3. Implementing Directly Observed Treatment (DOT) up to grass-root level
4. Early case detection through direct sputum microscopy of chest symptomatic patients attending health services and contact tracing
5. Regular supervision and monitoring of NTP activities at all levels
6. Strengthening partnership
7. Capacity building
8. Promotion of operational research[3]

Structure and Organization of the National TB Control Programme

The Ministry of Health is responsible for raising the health status of the people and accomplishes this through provision of comprehensive health services by promoted, preventive, curative and rehabilitative measures. The Ministry has seven functioning departments: Department of Health Planning, Health, Medical Science, Medical Research (Lower Myanmar), Medical Research (Upper Myanmar), Medical Research (Central Myanmar) and Traditional Medicine. Under the supervision of the Director-General and three Deputy Director-Generals, there are 12 Directors.[4]The Department of Health is responsible for providing health care services to the entire population in the country.

The State/Regional Health Department is responsible for state/regional planning, coordination, training and technical support, supervision, monitoring and evaluation of health services. The township health department forms the backbone for primary and secondary health care, covering 100,000 to 200,000 people. Urban health center, school health team and maternal and child health center take care of

[1] *NSTP(2011-2015),* p. 21
[2] *Annual Report 2009,* p. 1
[3] *Annual Report 2009,* p. 7 *Health in Myanmar 2010,* p. 69
[4] *NSTP(2011-2015),* p. 20

the urban population. Each RHC has four to eight sub-centers covered by a midwife and public health supervisor grade 2 at the village level. In addition, there are voluntary health workers (community health workers and auxiliary midwives) in outreach villages providing primary health care to the community. In 2009-2010, there were 11,158 public doctors, 23,746 nurses, and 26,375 basic health staff (BHS) working in the public sector.

National Health Committee was established on 28 December 1989 as part of policy reforms. It is a high-level inter-ministerial and policy-making body concerning health matters. The National Health Committee takes the leadership role and gives guidance in implementing the health programmes systematically and efficiently. The high-level policy-making body is instrumental in providing the mechanism for inter-sectoral collaboration and coordination. It also provides guidance and direction for all health activities[1].A National Health Policy was developed with the initiation and guidance of the National Health Committee in 1993. The National Health Policy has placed the Health for All goals as a prime objective using the Primary Health Care approach. The Ministry of Health is systematically developing health plans, aimed at the Health for All Goal. Existing health development plans include: Myanmar Health Vision 2030 (2001-2002 to 2030-2031); and National Health Plan (2001-2002 to 2005-2006).[2]Ministry of Health is the major provider of comprehensive health care in Myanmar.

In order to plan, implement and monitor the MDR-TB Programme, the National MDR-TB Programme has established a number of committees.[3] A National Committee for MDR-TB Management was established in September 2006 by the Ministry of Health to oversee the response to the MDR-TB situation in the country. The National Expert MDR-TB Committee was also established in 2006.[4] In 2007, National Guideline for Management of DRTB was developed and applied to Green Light Committee and approved in 2008.[5]The Regional/State Committees for MDR-TB Management oversee direct enrolment and care of MDR-TB patients.Thecommittee provides an opportunity for physicians to get the highest possible consultations regarding complicated cases and to share the responsibility when making decisions in unclear situations[6]

For the purpose of monitoring and evaluation, a National Health Plan Monitoring and Evaluation Committee were established at the central level. Built-in monitoring and evaluation process is undertaken at state/divisional and township levels on a regular basis. Implementation of the National Health Plan at various levels is carried out in collaboration and cooperation with health related sectors and NGOs.[7]An expansion plan for the programmatic management of drug-resistant resistant TB has been developed and formed part of the Five Year National Strategic Plan for TB Control 2011-2015.

National guideline for management of drug-resistant TB (DR-TB) was also developed. The pilot phase included 5 townships from Mandalay Region

[1]*NSTP(2011-2015),* p. 20
[2]*NSTP (2011-2015), p.* 21
[3]*Guidelines for MDR-TB, p.* 7
[4]*Guidelines for MDR-TB, pp.* 1-2
[5]*Health in Myanmar 2010, p.* 71
[6]*Guidelines for MDR-TB,* p. 4
[7]*NSTP (2011-2015),* p. 21

(Aungmyaythazan, Chanmyathazi, Chanayethazan, Mahaaungmyay and Pyigyita gon). The clinical management of MDR-TB (DR-TB) patients is based at Patheingyi TB hospital.[1] NTP organization structure was expanded according to the requirement. There was only State/Regional TB Centers in 1982 and expanded to 14 state/regional TB centers in 2007. In line with the human resource development plan, NTP is conducting several trainings on "Management of TB at district level" for Township Medical Officer (TMOs) and TB coordinators, "Management of TB for Health Facility Staff" for BHS, "Leadership and Management" training for Township Medical Officers (TMO) and TB team leaders, "prepared kit training" for TMO and TB coordinators, new recruit training for sputum smear microscopy and Quality Assurance (QA) training for laboratory supervisors.The facility for culture and drug sensitivity testing is upgraded in Upper Myanmar TB laboratory, Mandalay with the support of FIND, USAID3DF and UNION.[2]

TB pilot phase in Mandalay Division was conducted in 2006 Research on "Factors for defaulting anti-TB treatment among new pulmonary TB patients in Amarapura township" was conducted in 2008 with the support of Major Infectious Diseases Control Project (MIDCP, JICA).[3]Second Nation-wide Drug Resistant TB TB Survey (DRS) (2007-2008) was conducted and planned to conduct national TB prevalence survey in 2009. Preparation for National TB prevalence survey was carried out in early 2009 and survey was conducted since June 2009, started from Meikhtila Cluster. Total (70) clusters were to be conducted up to April 2010 with funding supports of MOH, WHO, 3DF, JICA, JATA, USAID/PSI, Bill and Melinda gates foundation. Operational researches depending on the problems are conducted as necessary in collaboration with Department of Medical Research and academic Institutions.[4]

Government budget was only 14 million Kyats in 1995-1996, but it increased to (626.199) Million Kyats in 2010-2011.[5] It can be shown in the following (table 1and table 2):

Table 1. Government Expenditure for TB Control from 2006 to 2010

Year	Regular Budget (kyats in Thousands)	Drugs purchase (kyats in Thousands)	Total (kyats in Thousands)	Budget (in US $)
2006-2007	361974	55000	416974	333579
2007-2008	373126	74770	447826	358261
2008-2009	400146	74770	474846	376174
2009-2010	465190	90000	555190	394983
2010-2011	506199	120000	626199	414732

Source: *Annual Report 2010***,** 88, *NSTP (2011-2015),* 12

In implementing NTP, Ministry of Health coordinates with local NGOs such as MMCWA, MWAF,MMA and MRCS, as well as INGOs such as Pact Myanmar Japan Anti-Tuberculosis Association (JATA), International Union Against Tuberculosis and Lung Disease (IUATLD), AHRN, Population Services

[1]*Annual Report 2010,* p. 4
[2]*Annual Report2010, pp.* 4-5
[3]*Annual Report 2009, p.* 28
[4]*Annual Report 2009, p.* 28
[5]*NSPT(2011-2015), p.* 12

International (PSI), Japan International Cooperation Agency (JICA), UNION, WHO and Global Fund/ Three Diseases Fund (3 DF).MWAF, MMCWA, MMA and MRCS in DOTS implementation as well as INGOs such as Union, MSF (Holland), PSI, JATA, World Vision, Pact Myanmar, Malteser and IOM. JICA is supporting the NTP activities in some townships as a bilateral co-operation agency.[1]

Collaboration with NGOs and INGOs to Control TB

For the capacity building, NTP is carrying out various kinds of trainings at different levels covering laboratory aspect, data management, MDR-TB management and TB/HIV collaborative activities. In doing so, NTP has coordinated with national NGOs such as MWAF, MMCWA, MMA, MRCS and MHAA in DOTS implementation. In addition, INGOs in co-operation with NTP are the UNION, PSI, International Organization for Migration (IOM), Pact Myanmar, Malteser, World Vision, Merlin, Asian Harm Reduction Network (AHRN), MSF (Holland), MSF (Switzerland), Cesvi, Family Health International (FHI-360), Medecin Du Monde (MDM), Progetto, Medical Action Myanmar (MAM), JATA)and JICA, Major Infectious Disease Control Project (MIDCP).[2]While the NTP has undertaken considerable efforts to build the capacity of health staff over the past several years, the knowledge and skills of staff requires to be regularly updated and new staff need to be trained in a number of technical and Programme areas.

The NTP provided the training to staff at the various levels. Mandalay Region Health Department has taken measures of training for TB and control activities under the NTP. In 2006, training on "Management of TB for health facility staff" was given in Mandalay.[3] The potential DOT providers including BHS, members of the NGOs are gathered and given DOTS training by trained TMOs and TB coordinators. Training for GPs on PPM-DOTS was also given in collaboration with MMA. The training on TB/HIV prevention and control activities were given to District TB Officers and team leaders from HIV/STI teams. Refresher training for lab technicians and new recruit trainings were given as required. Regular training on TB control was given at Institutes and Training Schools of MWs and LHVs.

In 2007, Training on Leadership and management, Laboratory trainings, District level TB control management training and Workshop on TB counseling, Childhood TB management, National framework for MDR-TB management and Dissemination Seminar on Childhood TB management were also conducted under 3DF (Bridge fund)[4]. In 2008, Training on Leadership and Management, Laboratory trainings, Township level TB control management trainings were conducted under the funding of 3DF. NTP providedtrainings funded by WHO, 3DF, CERF and JICA. Childhood TB Management, National framework for MDR-TB Management and Dissemination Seminar on Childhood TB management with the

[1] *Annual Report 2009*, p.28

[2] *Myanmar National Tuberculosis Plan Annual Report 2007*, Ministry of Health/WHO,2008,p.24 (Henceforth: *Annual Report 2007*)

[3] *Myanmar National Tuberculosis Plan Annual Report 2008*, Ministry of Health/WHO,2009,p.22 (Henceforth: *Annual Report 2008*)

[4] *Annual Report 2008*, p. 24

support of 3DF[1].In 2009, Training on Leadership and Management, Laboratory trainings, Township level TB control management trainings were conducted under the funding of 3DF, WHO and JICA. NTP provided trainings funded by 3DF, WHO, and JICA.[2] In order to take the measures of combating TB effectively, Mandalay Region Health Department has conducted training with local NGOs and INGOs.

Table 2. External Fund for TB Control in Myanmar (2006-2010)

Funding Source	Budget (in US $)				
	2006	2007	2008	2009	2010
JATA		8480	8480	9054	9054
JICA	93000	92000	92000	133942	0
MSF-Holland	150000	170000	120000	100000	100000
PACT	57385	63762	71076	73204	78515
Population Services International			1044876	1538936	1662582
Three Diseases Fund	717547	903295	1806589	2076589	4806589
UNION	250000	450000	650000	650000	650000
WHO	253700	68000	236900	79800	236900
World Vision	30000	108870	319009	515090	415000

Source: *NSTP (2011-2015)*, 12-13

UNICEF Myanmar implemented successive country programmes for the realization of children's rights through a range of programmatic and legislative measures in the areas of child survival, growth, development, protection and participation with a special focus on the poor, the marginalized and the hard-to reach.The current Country Programme of Cooperation covers a range of areas and HIV/AIDS and Children, and Child Protection. The goal is the reduction of infant and child mortality, promote and enhance equity and help create a protective environment for children to grow up and reach their full potential. UNICEF collaborates primarily with government ministries and departments to advance programmes for children. It also partners with NGOs to implement humanitarian as well as development programmes for children, women, families and communities.
UNICEF's high level goals for the HIV programme are:

1. Accelerate or "fast track" the HIV response by 2020 for pregnant women, mothers, children and adolescents, which are most closely related to the Sustainable Development Goal (SDG) 3: "ensure healthy lives and promote well-being for all at all ages." SDG 3 calls for ending the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combating hepatitis, water-borne diseases and other communicable diseases by 2030.
2. Support governments and communities in overcoming HIV service inequities among pregnant women, mothers, children and adolescents and reducing gender, age and socio-economic vulnerabilities associated with HIV.

[1] *Annual Report 2009*, p. 26
[2] *Annual Report 2009*, p. 28

UNICEF's four operational areas of focus are:

1. Context-specific priorities and interventions
2. Integration of HIV prevention and treatment
3. Strengthened and leveraged partnerships
4. Innovation and knowledge leadership

The objectives of WHO's collaboration with NGOs are to promote the policies, strategies and programmes derived from the decisions of the Organization's governing bodies; to collaborate with regard to various WHO programmes in jointly agreed activities to implement these strategies; and to play an appropriate role in ensuring the harmonizing of intersectoral interests among the various sectoral bodies concerned in a country, regional or global setting.

WHO in Myanmar provides leadership and technical support to the Ministry of Health and other health partners working in the country. The mission of WHO is to attain the highest possible level of health among the people of Myanmar. WHO core areas are (a) communicable and non-communicable diseases (i.e. HIV/AIDS, TB, malaria and diabetes, cancer, cardiovascular and chronic respiratory diseases); (b) strengthening health systems and promoting universal health coverage ; and (c) improving preparedness and surveillance mechanisms for emergencies, epidemics and natural disasters.

WHO has worked jointly with Myanmar's Ministry of Health through a coherent Country Cooperation Strategy (CCS) which aligns closely with the priorities of the National Health Policy, Strategies and Plans .The current CCS is from 2014 to 2018 and its strategic priorities are:

(1) Strengthening the health system.

(2) Enhancing the achievement of communicable disease control targets.

(3) Controlling the growth of the non-communicable disease burden.

(4) Promoting health throughout the life course.

(5) Strengthening capacity for emergency risk management and surveillance systems for various health threats.

In addition WHO has actively cooperated with Myanmar on any other public health challenges. WHO works closely with all health stakeholders in Myanmar for the development of National Health Plans – looking at effective strategies and planning, resource mobilization, implementation and monitoring processes – and provides technical advice for the development of the health sector in the Country. WHO is the leading agency in the health sector and it actively collaborates in all development processes and capacity building of the health system. WHO coordinates the Humanitarian Health Cluster operating in Myanmar. The Health Cluster is responsible for implementing life-saving activities in crisis-affected areas: from supporting mobile clinic in hard-to-reach areas to overseeing the work of rapid response teams and the distribution of health kits during emergencies and disasters.

The WHO and UNAIDS carried out an in-depth review of the current status of Tuberculosis and HIV in Myanmar and of the collaborative activities implemented to address these diseases. The review was conducted in close collaboration with the National Tuberculosis and AIDS Programmes of the Ministry of Health, and with financial support from USAID and the Global Fund

against AIDS, Tuberculosis and Malaria. Myanmar has made impressive progress in the fight against HIV and TB, being successful in halting and reversing the spread of the diseases in line with the 2015 Millennium Development Goals. However, despite these progresses, tuberculosis and HIV remain two major public health threats, condemning many to premature death, unnecessary suffering and economic losses. If then these two diseases infect patients at the same time, the physical and economic burden can be unavoidable and the mortality rates increase dramatically.

Public-Private Mix DOTS is implemented with Myanmar Medical Association (MMA), Population Services International (PSI) and JICA, Major Infectious Diseases Control Project (MIDCP). Some general practitioners (GP) use the scheme I which educates about TB and refer the TB suspected patients to TB center and some prefer to use the scheme II. PPM-DOTS Scheme I was also supported by MIDC Project and implemented in PyinOoLwin Township, Mandalay Division (started since January 2007). Pyigyitagon Township in Mandalay Region was extended in 2007. Population Services International (PSI) started the collaboration with NTP in March 2004. PPs and lab technicians were trained in TB control and they are running the clinics providing Anti-TB treatment in the community. PSI organizes the PPs and running the "Sun Quality Clinics" as a DOT unit from 2007 to 2010. PPM-DOTS (MMA) contributed 13% of smear positive TB patients and 7% of PPM-DOTS (JICA) contributed 20% of smear positive.[1]

When Mandalay Region Health Department has implemented to combat effectively the Tuberculosis from 2006 to 2010, it has pursued the National Health Policy and guidelines and instructions laid down by Ministry of Health, and cooperated with INGOs such as JATA, IUATLD, AHRN, PSI, JICA, UNION,WHO and Global Fund/ 3 DF in addition to local NGOs such as Myanmar Maternal and Child Welfare Association MMCWA, Myanmar Women Affairs Federation (MWAF), Myanmar Medical Association (MMA) and Myanmar Red Cross Society (MRCS). Mandalay Region Health Department has implemented the following TB control activities with these local NGOs and INGOs[2]. Nonetheless, Mandalay Region Health Department took the TB control activities in the region from 2006 to 2010 and it was indicated by the following tables (3, 4 and 5) in the form of the whole region as well as individual townships.

Table 3.TB Control activities in Mandalay Region (2006-2010)

Year	Population	Dx Examined	Dx(+)	Total TB cases	CDR	Positivity Rate	TSR
2006	7707228	17120	3902	11023	63%	23%	86%
2007	7929368	19275	4018	12299	65%	21%	87%
2008	6940848	18824	3733	12299	70%	19%	86%
2009	6983424	16787	3746	11996	80%	22%	87%
2010	6398695	18198	3771	11303	92%	21%	84%

[1]*Annual Report*, 2009, p. 26
[2]*Annual Report*, *2009*, p. 27

Source: *TB Control Activities Mandalay Region (2006-2015)*

According to the above table 3 year by year, it is found that the control activities in Mandalay region was successful because there was regular progress in both Dx Examined, and Dx(+), from 2007 to 2009 except 2010. But in both CDR and TSR, there was regular progress but stable from 2007 to 2010.

Table.4 Case Detected Rate (CDR) Rank in Townships of Mandalay Region (2006 -2010)

Sr	Township	2006/Rank	2007/Rank	2008/Rank	2009/Rank	2010/Rank
1	Pyigyitagun	1	3	1	4	3
2	Chanmyatharzi	3	1	10	1	1
3	Maharaungmyay	5	5	3	7	6
4	Chanayetharzan	9	10	11	10	5
5	Aungmyaytharzan	7	6	2	6	4
6	Thabeikkyin	2	2	7	3	7
7	Sintgu	4	4	5	2	8
8	Pyinmana	6	8	9	5	2
9	Kyaukse	8	7	4	14	12
10	Madaya	14	12	15	21	17
11	Amarapura	16	15	16	8	9
12	Patheingyi	12	9	6	13	15
13	Mogoke	13	15	24	12	11
14	Kyaukpadaung	11	11	8	9	14
15	Lewe	15	13	17	11	13
16	Wundwin	10	19	22	23	27
17	Myinggyan	17	17	12	15	10
18	Myitthar	18	14	23	19	24
19	Sintgaing	19	23	21	20	27
20	NyaungU	20	18	14	23	25
21	PyinOoLwin	21	25	13	18	23
22	Tharzi	22	20	18	16	22
23	Taungthar	23	27	28	28	21
24	Pyawbwe	24	26	25	29	20
25	Tatkone	25	24	27	17	16
26	Yamethin	26	22	19	24	30
27	Tadaoo	27	21	26	25	19

Sr	Township	2006/Rank	2007/Rank	2008/Rank	2009/Rank	2010/Rank
28	Mahlaing	28	28	29	30	26
29	Nahtogyi	29	29	31	31	31
30	Ngazun	30	31	20	26	29
31	Meikhtila	31	30	30	27	18

Source: *TB Control Activities in Mandalay Region (2006- 2015)*

According to the above table, it can be concluded that among 31 townships in Mandalay Region, Pyigyitagon, Chanmyatharzi, Mahaaungmyay, Chanayetharzan and Aungmyaytharzan stood within the top ten CDR but Chanayetharzan had the rank of 11 in 2008. Especially, Pyigyitagon and Chanmyatharzi were mostly in the rank of 1 to 3 but Pyigyitagon was in the rank of 4 in 2009 and Chanmyatharzi in the rank of 10 in 2008. The reason why Pyigyitagon, Chanmyatharzi and Mahaaungmyay took the top position in CDR in Mandalay Region may be due to the population density and the large number of poor workers.

Table 5. Treatment Success Rate (TSR) in Individual Township of Mandalay Region (2006-2010)

Sr	Township	2006(%)	2007(%)	2008(%)	2009(%)	2010(%)
1	Pyigyitagun	87	84	90	82	84
2	Chanmyatharzi	90	91	89	90	92
3	Maharaungmyay	92	90	86	90	92
4	Chanayetharzan	89	86	89	83	84
5	Aungmyaytharzan	91	88	-	88	85
6	Thabeikkyin	77	76	88	85	72
7	Sintgu	90	94	69	99	92
8	Pyinmana	85	86	88	76	78
9	Kyaukse	79	85	88	85	76
10	Madaya	82	76	98	76	73
11	Amarapura	89	81	85	88	81
12	Patheingyi	91	91	79	87	83
13	Mogoke	79	89	86	90	81
14	Kyaukpadaung	84	85	91	85	82
15	Lewe	89	81	84	95	93
16	Wundwin	91	77	75	87	82
17	Myinggyan	84	86	86	86	84
18	Myitthar	88	84	82	88	79
19	Sintgaing	30	86	93	92	91

Sr	Township	2006(%)	2007(%)	2008(%)	2009(%)	2010(%)
20	NyaungU	89	89	81	85	84
21	PyinOoLwin	80	73	88	95	90
22	Tharzi	98	96	88	100	96
23	Taungthar	87	94	84	93	84
24	Pyawbwe	82	99	84	90	82
25	Tatkone	76	83	89	80	59
26	Yamethin	89	95	73	88	82
27	Tadaoo	91	84	89	77	74
28	Mahlaing	92	95	84	86	75
29	Nahtogyi	87	84	99	81	84
30	Ngazun	100	97	92	86	87
31	Meikhtila	66	76	87	75	83

Source: *TB Control Activities in Mandalay Region(2006- 2015)*

According to the above mentioned table, it can be seen that Treatment Success rate regarding with top CDR townships in Mandalay Region was good. Thus it can be concluded that TB control activities in Mandalay Region was successful and effective to some extent. Mandalay Region Health Department had collaborated with INGOs to eliminate TB effectively under National Tuberculosis Program (NTP). However, there are many challenges in combating for TB in Mandalay Region. They are to sustain the management capacity and efficiency of the NTP and ensure routine high-quality programme supervision and implementation; to ensure that trained and motivated health workers are available at all levels of the health system; to find the huge proportion of undetected TB cases in poor urban communities and to expand community involvement in TB control activities to ensure additional case-finding and improved treatment success rates and to have enough fund.

Conclusion

Since independence, Myanmar established campaigns to fight against major infectious diseases. In 1964, the government of Myanmar signed an agreement with WHO and UNICEF to develop a National TB Programme. In 1966, the National TB Programme (NTP) developed and started its activities. In 1997, NTP adopted WHO recommended" Directly Observed Treatment Short Course" (DOTS) strategy. In 2007, Myanmar government adopted the" Stop TB Strategy". In July 2009, the" DOTS-Plus" pilot project was launched in 10 townships in Yangon and Mandalay Regions. Under the National guideline for management of drug-resistant TB (DR-TB), the pilot phase included 5 townships from Mandalay Region (Aungmyaythazan, Chanmyathazi, Chanayethazan, Maharaungmyay and Pyigyitagon). The clinical management of MDR-TB (DR-TB) patients is based in Patheingyi TB hospital. In order to combat TB effectively under the NTP, Mandalay Region Health Department has pursued the National Health Policy under the guidance of Ministry of Health and coordinated with local NGOs and INGOs. Therefore the efforts of Mandalay Region Health Department in

collaboration with INGOs in eliminating TV have been effective, progressive and successful to some extent but there remain some challenges.

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