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Original Research Article

Success of the Control of Tuberculosis in Nigeria: A Review

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Abstract

Tuberculosis (TB) has emerged as the single leading cause of death from any single infectious agent and has continued to be a major public health problem all over the world. Of the over 14 million cases worldwide reported by World Health Organisation (WHO) in 2008, Nigeria ranked fifth in terms of incidence. Depending on the prevailing social factors such as socio-economic status of the people, malnutrition, crowded living conditions, incidence of HIV/AIDS, level of development of health infrastructures, quality of available control programmes, degree of drug resistance to anti-tuberculous agents, etc, prevalence, patterns of presentation, and outcomes of treatment from TB can vary from one country to another and from one region of a country to the other. Attempts to deal with the problems of the disease led to the development of Directly Observed Treatment Short Course (DOTS) by WHO in 1995, and more recently the Stop TB strategy in 2006. In Nigeria, the DOTS programme has been implemented in all States and local government areas in the country and 3,000 DOTS centres have been operating across the country since 2006. This article reviewed the available information on the success of the control of TB in Nigeria has observed a significant improvement in TB detection and treatment. However, neither the set target for the detection rate nor the cure rate have been achieved nationally as several challenges have militated against the effective implementation of the DOTS programme.

Keywords: Tuberculosis control, treatment success, DOTS programme, Stop TB strategy.

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Introduction

In the midst of poor economy, corruption and political instability, infectious diseases have become one of the greatest disease burdens in Africa. Of all the population threatening disease burdens, Tuberculosis (TB) has emerged as the single leading cause of death from any single infectious agent and has continued to be a major public health problem all over the world. TB is caused by *Mycobacterium tuberculosis* and occasionally by *Mycobacterium bovis* and *Mycobacterium africanium* [1]. *M. tuberculosis* is a gram positive acid fast, slender-straight rod. The organism is a strict aerobe and thrives best in organs with relatively high oxygen tension. As such, apices of lungs, renal parenchyma and growing end of bones are common metastatic foci sites. In most cases, it is the causative organisms for the disease. On the other hand, *M. bovis* is a pathogen in the complex of bacteria that includes *M. tuberculosis* and its clinical characteristics is indistinguishable from *M. tuberculosis* TB in most cases [2].

The bacteria that cause TB (*M. tuberculosis* and *M-bovis, M-africanai)* are responsible for lesions called *tubercle* in patients with TB, hence the organisms are known as tubercle bacilli. They are also known as acid-fast bacilli (AFB) [3]. The causative organism is transmitted exclusively by inhalation of infective droplets from patients with open pulmonary tuberculosis through coughing, sneezing, talking or spitting [4]. Concentration of droplet nuclei in contaminated air, length of time a person breaths in air and level of immunity (susceptibility to infection) are some of the factors which determine an individual's risk of exposure. Once infected with TB causing bacteria, a person can stay even for a life time and not develop the disease but in this healthy, asymptomatic but infected individual, the development of disease can be triggered most importantly by weakening of immune system especially by HIV infection [1-2]. Overcrowding, substandard living, poor nutrition and interaction with other diseases increase risks to the TB disease and also results in high rates of re-infection as well as high morbidity and mortality in patients. People infected with tuberculosis very often originate from the most vulnerable sectors of society. These include those living in poverty, prisons and in poor working conditions. A reduction in stress, exposure to environmental pollution, overcrowding, poverty with better nutrition and interaction with health care workers reduces the risk of infection and the progression of the disease. After 5 years without treatment, 50% of primary TB patients often die, 25% will remain ill with chronic infectious TB and the remaining 25% will be spontaneously remitted by strong immune defenses without treatment [1].

The status of the TB epidemic and progress in control of the disease since 1990 have been reported by World Health Organisation (WHO) annually since 1997. The assessment often included estimates of incidence, prevalence and mortality. More recently, it has also included assessment of progress towards the newer impact targets related to incidence, prevalence and mortality that have been set within the framework of the Millennium Development Goals (MDGs) and by the Stop TB Partnership. The global targets and indicators for TB control have been developed within the framework of the MDGs, Stop TB Partnership and WHO's World Health Assembly (Table 1) [5]. These were developed to halt and reverse TB incidence by 2015 and to halve prevalence and death rates by 2015 compared with a baseline of 1990. The outcome targets were to achieve a case detection rate of at least 70% under Directly Observed Treatment Short Course (DOTS) and to reach a treatment success rate of at least 85% in DOTS cohorts.

Overview of Global TB Burden

The prevalence, patterns of presentation and mortality from TB have been known to vary from one country to another and from one region of a country to the other. This variation depends on prevailing social factors

Table 1: Goals, targets and indicators for TB control

MDG reference	Indicator
MDG 6: Combat HIV/AIDS, malaria and other diseases:	
Target 6.C	Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases
Indicator 6.8	Incidence, prevalence and death rates associated with tuberculosis
Indicator 6.9	Proportion of tuberculosis cases detected and cured under DOTS (the internationally recommended strategy)
Stop TB partnership targets:	
By 2005	At least 70% of people with sputum smear-positive TB will be diagnosed (i.e. under the DOTS strategy), and at least 85% cured. These are targets set by the World Health Assembly of WHO
By 2015	The global burden of TB (per capita prevalence and death rates) will be reduced by 50% relative to 1990 levels
By 2050	The global incidence of active TB will be less than 1 case per million population per year

MDG, Millennium Development Goal

such as socio-economic status of the people, malnutrition, crowded living conditions, incidence of HIV/AIDS, level of development of health infrastructures, quality of available control programmes and degree of drug resistance to antituberculous agents among other factors [6-7]. Based on surveillance and survey data, there were an estimated 14.4 million cases of TB out of which 9.2 million new cases of TB occurred globally in 2006 (139 per 100,000). These numbers include 4.1 million (62 per 100,000) new smear-positive cases (Tables 2 and 3) and around 709,000 (7.7%) HIV-positive TB cases. In terms of incidence cases, India, China, Indonesia, South Africa and Nigeria rank first to fifth, respectively. In all these global cases, Africa accounts for 31% while Asia (South-East Asia and Western Pacific regions) accounts for 55%. As in 2007, the African Region accounted for most HIV-positive cases, being 85% in 2006. Most of the remaining cases were in the South-East Asia Region, mainly in India. Some African countries account for a strikingly large number of cases relative to their population. South Africa, for example, has 0.7% of the world's population but 28% of the global number of HIV-positive TB cases and 33% of HIV-positive cases in the African Region [5].

With the number of new incident TB cases in 2006, there were an estimated 14.4 million prevalent cases (219/100 000) on average (Table 2). An estimated 1.7 million people (25/100 000) died from TB in 2006, including those co-infected with HIV (231,000). The sequence of annual estimates up to 2006 suggests that all three major indicators of impact – incidence, prevalence and mortality per 100 000 population – are falling globally. In WHO assessment, prevalence was already in decline by 1990, mortality peaked before the year 2000 and incidence began to fall in 2003 (Figure 1). TB prevalence continued to fall globally between 1990 and 2006 because, in Africa, the HIV epidemic caused a smaller increase in prevalence than in incidence or mortality.

The principal WHO measure of case detection is the rate of case detection for new smear-positive cases in DOTS programmes, i.e. the number of new smear-positive cases detected by DOTS programmes divided by the estimated number of incident smear-positive cases. In 2006, according to WHO, DOTS programmes detected 2,496,478 new smear-positive cases (99% of all new smear-positive cases that were notified) out of an estimated 4.1 million new smear-positive

Table 2: Estimated epidemiological TB data in 22 high TB burden countries and WHO regions in 2006

Country	Population 1000s	Incidence[a] per 100,000 persons per year		Prevalence per 100,000 persons (All forms)	Mortality per 100,000 persons per year (All forms)	HIV prevalence in incident[b] TB cases %
		All forms	Smear-positive			
India	1,151,751	168	75	299	28	1.2
China	1,320,864	99	45	201	15	0.3
Indonesia	228,864	234	105	253	38	0.6
South Africa	48,282	940	382	998	218	44
Nigeria	144,720	311	137	615	81	9.6
Bangladesh	155,991	225	101	391	45	0.0
Ethiopia	81,021	378	168	641	83	6.3
Pakistan	160,943	181	82	263	34	0.3
Philippines	86,264	287	129	432	45	0.1
DR Congo	60,644	392	173	645	84	9.2
Russian Federation	143,221	107	48	125	17	3.8
Viet Nam	86,206	173	77	225	23	5.0
Kenya	36,553	384	153	334	72	52
UR Tanzania	39,459	312	135	459	66	18
Uganda	29,899	355	154	561	84	16
Brazil	189,323	50	31	55	4.0	12
Mozambique	20,971	443	186	624	117	30
Thailand	63,444	142	62	197	20	11
Myanmar	48,379	171	76	169	13	2.6
Zimbabwe	13,228	557	227	597	131	43
Cambodia	14,197	500	220	665	92	9.6
Afghanistan	26,088	161	73	231	32	0.0
High-burden countries	**4,150,313**	**177**	**79**	**286**	**32**	**11.0**
AFR	773,792	363	155	547	83	22
AMR	899,388	37	18	44	4.5	6
EMR	544,173	105	47	152	20	1.1
EUR	887,455	49	22	54	7.0	3.0
SEAR	1,721,049	180	81	289	30	1.3
WPR	1,764,231	109	49	199	17	1.2
Global	**6,590,088**	**139**	**62**	**219**	**25**	**8**

[a] *All estimates include TB in people with HIV*
[b] *Prevalence of HIV in incident TB cases of all ages*
AFR, WHO African Region; AMR, WHO Region of the Americas; EMR, WHO Eastern Mediterranean Region; EUR, WHO European Region; SEAR, WHO South-East Asia Region; WPR, WHO Western Pacific Region [5].

Table 3: Estimated epidemiological data of TB in Nigeria as at 2008 [8-9]

Characteristics	Nigeria
Incidence (all new cases)	449,558
Incidence (all new cases per 100,000 population	311
Incidence (new sputum smear positive [ss+] per 100,000 population)	137
Prevalence (per 100,000 population, incl HIV-positive)	615
TB mortality (per 100,000, population, incl HIV-positive)	81
HIV prevalence in incident TB cases	10%

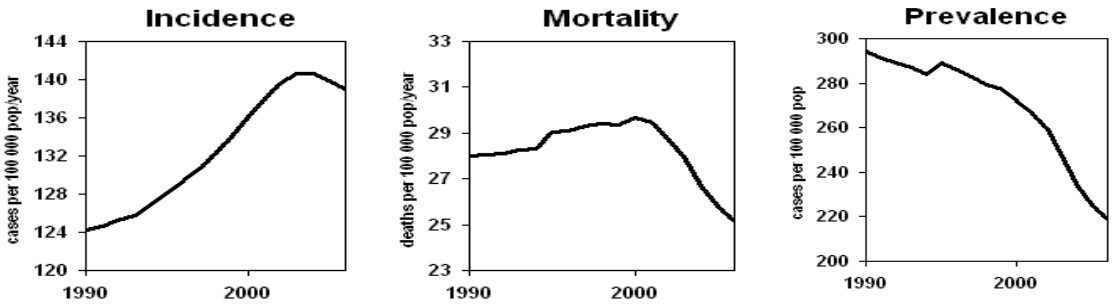

Figure 1: Estimated global prevalence, mortality and incidence rates, 1990–2006 [8]

cases, giving a case detection rate of 61%. The point estimate of a 61% case detection rate for 2006 is still below the 70% target set for 2005. New smear-positive case detection rates by DOTS programmes in 2006 were lowest in the African (46%) and European (52%) regions and highest in the Western Pacific Region (77%), the South-East Asia Region (67%) and the Region of the Americas (69%). The Western Pacific is still the only region to have exceeded the 70% target, although the Americas (69%) and the South-East Asia regions (67%) fall just short on 2006 estimates.

TB Treatment Strategies

Despite the often reported high morbidity resulting from TB infection, milestones in developing effective anti-tuberculosis drugs, TB continued to be a major public health problem all over the world [1]. The reasons for this deterioration in increased TB prevalence include improper diagnosis and treatment, poor adherence to medication, increased travel and migration, presence of multi-resistant TB and lately to the pandemic of HIV/AIDS [10]. As an attempt to reduce TB prevalence, WHO advocated the use of Directly Observed Treatment Short Course (DOTS) strategy [11]. The strategy for TB control was launched by the World Health Organisation in 1995. It was designed to ensure that a trained health worker or supervisor provides the prescribed TB drugs and watches the patient swallow every dose [1]. The five key components of DOTS are:

1. Political commitment with increased and sustained financing,
2. Case detection through quality-assured bacteriology,
3. Standardized treatment with supervision and patient support,
4. An effective drug supply and management system, and
5. Monitoring and evaluation system and impact measurement

DOTS includes delivering the prescribed medication, checking for side effects, watching the patient swallow the medication, documenting the visit, counseling and answering patient questions. The strategy,

although based around short course treatment regimens for a minimum of six months, also includes tenets such as political commitment, good management practices, sputum smear microscopy for diagnosis, and the direct observation of doses to ensure adherence. In addition, it includes registration of each patient detected, followed by standardized multi-drug treatment, with a secure supply of high quality anti-TB drugs for all patients in treatment, individual patient outcome evaluation to ensure cure and cohort evaluation to monitor overall programme performance. A degree of patient co-operation is required because they may conceal tablets in the mouth or try to avoid taking medications therefore careful vigilance is required by the person administering therapy through out the whole treatment period. Implementing DOTS appropriately requires investments in strengthened health systems including trained personnel, an effective procurement and drug distribution system, and an effective monitoring and surveillance system.

In Nigeria, the DOTS strategy was adopted nationally following the Abuja Declaration in 2001, and is now being implemented in all states of the federation, and in virtually all the local government areas. As at the end of 2007, there were currently over 3000 DOTS centres in Nigeria [12].

In 2006, WHO developed a new six point **Stop TB Strategy** which builds on the successes of DOTS while also explicitly addressing the key challenges facing TB. Its goal is to dramatically reduce the global burden of tuberculosis by 2015 by ensuring all TB patients, including for example, those co-infected with HIV and those with drug-resistant TB, benefit from universal access to high-quality diagnosis and patient-centered treatment. The strategy also supports the development of new and effective tools to prevent, detect and treat TB. The Stop TB Strategy underpins the Stop TB Partnership's Global Plan to Stop TB 2006-2015. The six components of the Stop TB Strategy are:

1. **Pursuing high-quality DOTS expansion and enhancement.** Making high-quality services widely available and accessible to all those who need them, including the poorest and most vulnerable, requires DOTS expansion to even the remotest areas. In 2004, 183 countries (including all 22 of the high-burden countries which account for 80% of the world's TB cases) were implementing DOTS in at least part of the country.
2. **Addressing TB/HIV, Multi-drug Resistant TB (MDR-TB) and other challenges.** Addressing TB/HIV, MDR-TB and other challenges requires much greater action and input than DOTS implementation and is essential to achieving the targets set for 2015, including the United Nations Millennium Development Goal relating to TB.
3. **Contributing to health systems strengthening.** National TB control programmes must contribute to overall strategies to advance financing, planning, management, information and supply systems and innovative service delivery scale-up.
4. **Engaging all care providers.** TB patients seek care from a wide array of public, private, corporate and voluntary health-care providers. To be able to reach all patients and ensure that they receive high-quality care, all types of health-care providers are to be engaged.
5. **Empowering people with TB, and communities.** Community TB care projects have shown how people and communities can undertake some essential TB control tasks. These networks can mobilize civil societies and also ensure political support and long-term sustainability for TB control programmes.
6. **Enabling and promoting research.** While current tools can control TB, improved practices and elimination will

depend on new diagnostics, drugs and vaccines.

DOTS remains at the heart of the Stop TB Strategy, The strategy is to be implemented over the next 10 years as described in the Global Plan to Stop TB, 2006-2015. The Global Plan is a comprehensive assessment of the action and resources needed to implement the Stop TB Strategy and to achieve the following targets:

a) By 2015: reduce TB prevalence and death rates by 50% relative to 1990
b) By 2050: eliminate TB as a public health problem (1 case per million population).

Outcomes of treatment in DOTS programmes

Before the implementation of DOTS, TB treatment in many resource poor settings was chaotic, non-standardised, and poorly monitored and consequently had little epidemiological impact on the incidence of TB [13]. Worldwide, the introduction of the DOTS strategy has led to improvements in treatment outcomes for many patients [5]. For many years, WHO has reported the success rate of DOTS in cohorts of patients in terms of 'Died', 'Failed', 'Defaulted', 'Transferred', and 'Not evaluated' (Table 4). As at 2005, the cure rate among cases registered under DOTS worldwide was reported to average 77.6%, and a further 7.1% completed treatment (no laboratory confirmation of cure), giving a reported overall treatment success rate of 84.7%. Of the smear-positive cases estimated to have occurred in 2005, only 49% were treated successfully by DOTS programmes. Nevertheless, the success rate has reached or exceeded the WHO target of 85% in 10 countries with Afghanistan, Bangladesh, Cambodia, China, Indonesia and Viet Nam reported to be 90% or more in cohorts of varying sizes. This success rate varies from 71% in Europe and 76% in Africa, to 87% in South-East Asia and 92% in the Western Pacific [5]. Despite the continued high death and default rates among cohorts of DOTS patients in Africa (one or other of these indicators exceeded 10% in Mozambique, Nigeria, South Africa, Uganda and Zimbabwe), treatment success has been increasing in Africa, although in the region continue to have high death and default rates.

Despite being assessed as cured, patients can develop recurrent disease

Table 4: Treatment outcome definition for Tuberculosis patients under evaluation

Category	Definition
Cure	Completed treatment according to DOTS protocol [16] and has sputum smear test is negative at 8 months and on at least one previous occasion while completing treatment with anti-TB medications
Treatment completed	Completed treatment according to DOTS protocol
Died	Died for any reason during the course of treatment
Treatment default	Treatment was interrupted for than 2 consecutive months for any reason
Treatment failure	Patient's sputum smear test is positive at 8 months and on at least one previous occasion while completing treatment with anti-TB medications Treatment is also considered to have failed if a clinical decision has been made to terminate treatment early due to poor response or adverse events.
Transfer out	Transferred to another reporting and recording unit (care or treatment centre) and the treatment outcome is unknown

some time after completing treatment. This was thought to be caused solely by relapse of the same infection. Although we now know that re-infection with a different strain of *Mycobacterium tuberculosis* is an important cause of tuberculosis recurrence [14-15], recurrent disease is still considered to be an important measure of the efficacy of tuberculosis treatment and also has a major impact on patients.

DOTS and Stop TB Programmes in Nigeria

Nigeria is now considered the world's fifth largest TB burden with nearly 450,000 estimated new cases annually [8-9]. The public Health burden posed by TB is becoming increasingly important as the country's HIV/AIDS epidemic unfolds. There has been rapid progress in DOTS expansion in 2003, with relatively high treatment success. Unfortunately, political commitment has not yet been translated into strong support for the health system, and much of the approved government funding for health care has not been released for use in health programmes. This situation has discouraged a number of external donors, who are reluctant to provide additional funds while government funding is very limited. Although Nigeria has an extensive national Health infrastructure, it lacks the resources needed to function effectively.

With over 3000 DOTS centres and all the States of the federation and local governments being covered, 75% of the Nigeria's population is currently under the DOTS programme [12]. Although the case notification rate of TB in Nigeria has increased over the years, recent figures put the DOTS detection rate of new sputum smear positive to be very low (20%) while the treatment success of new sputum smear positive still falls below the WHO target of 85% [5].

WHO has always included the data TB epidemiological data in their annual reports. According to the reports, treatment outcomes in Nigeria are typical of countries in Africa with many patients dying while on treatment or are reported as having defaulted. Most of these reports are based on estimates as accurate data are hardly available due to poor documentation and reporting systems that have existed in the health sector in Nigeria for decades. For example, there are indications that patients who have actually died are being reported as defaulted [5]. Although there are studies in some parts of the country, many of them are only reported in local journals that are not widely accessible and often involve small cohorts of TB patients. Some of the available studies are summarized in Table 5. While the cure rate of some western states is similar to the national average, very low rates have been reported in Ile-Ife and some relatively rural parts of Edo State. The extremely high death rate (36.4%) and failure rate (17.1%) reported in Ile-Ife between 1991 and 2000 is not consummate with other available data.

The failure to detect a huge number of active TB cases which are primarily responsible for the spread of the infection has been identified in an earlier study [17]. Default from treatment has been reported to be highest during the continuation phase of treatment generally while HIV-positive patients had twice the risk of default during the intensive phase of the treatment than HIV-negative individuals. Also men were more likely to default than women [18].

Dealing with Treatment Problems in Nigeria

The treatment of TB has constituted a major problem in Nigeria for several reasons. First, a lot of people with TB are still not detected and they are not able to access the treatment. Second, the number of new cases of TB is increasing in the country because of the epidemic of HIV/AIDS. Third, getting the TB programme to provide drugs and other TB services to all the communities has been

Table 5: Literature data of success of DOTS programme in Nigeria

Year	Study location in Nigeria	Completed treatment* or cured (%)	Default rate (%)	Died (%)	Failed treatment rate (%)	References
1997-2003	West (Sagamu, Ogun State)	_	23	_	_	Daniel et al [18]
2001-2003	West (Sagamu, Ogun State)	76.8	17	5.1	1.1	Daniel & Alausa [24]
2005-2006	Mid-West (Irrua, Edo State)	34*	24	_	9	Salami et al [21]
1991-2000	West (Ile-Ife, Osun State)	37	26	36.4	17.1	Erabhor et al [20]
1999-2005	West (Ile-Ife, Osun State)	49	22.4	4.1	_	Akinyoola et al [19]
2000-2004	West (Osogbo, Osun State)	76.3	14.4	_	3	Egbewale et al [25]

facing strong challenges despite the efforts of government and non-governmental organisations. Fourth, awareness among the communities, especially the leadership of the communities and the citizens about TB, its manifestation, its causes and modalities for treatment is poor. Fifth, low socio-economic status, overcrowding, malnutrition, poor ventilation and contact with people with already infected people are still a major identifiable risk factors in development of pulmonary TB in this environment [12,19]. Sixth, poor adherence to medication and treatment is a major issue like in all other parts of the world [12,20]. Long distance to the hospitals which limits the chances of patients' financing their treatment, lack of facility for home visit in most cases and poor supervision in under-aged children are some of the contributing factors for high treatment default rate which often results in the development of multidrug-resistant TB [21]. HIV/TB co-infected patients are more likely to default from treatment as they experience progressive deterioration in their health status when compared to other patients [18]. Okeke and Aguwa [22] has found out that the private practitioners in Nigeria do not often effectively implement the DOTS programme, particularly in areas such as political commitment, case detection through sputum smear microscopy, standardized treatment for 6-8 months, uninterrupted drug supply and standardized recording and reporting system. Delay in seeking treatment has been reported to occur in as much as 83% of patients in Lagos [23]. This is dangerous since it has been estimated that every case of TB can infect about 12 to 15 other citizens [12]. Anecdotal evidence indicates that the free drugs for TB patients do not often reach many patients in the northern part of the country due to corruption in the implementation of DOTS. In addition to the above problems, many States in the northern part of the country have peculiar problems. Qualified pharmacists are not directly involved in the distribution of drugs to the patients in some States and

the health professionals engaged in the distribution frequently divert the drugs to patent and propriety medicine store license holders for sale.

Despite the various short comings in the implementation of DOTS programme in Nigeria, improvement in treatment success has been recorded in the last couple of years. According to WHO [25], TB case detection rate has increased from 15.3% in 2001 to 27% in 2005. The treatments success rate for new smear-positive cases treated under DOTS which declined from 65% in 1994 to 32% in 1996 has remained above 72% since 1997 even though the success rate in Nigeria is still lower than those in some African countries including Ethiopia, Kenya, Mozambique, and DR Congo [5].

One of the major advantages of DOTS programme in Nigeria is that treatment (including the diagnoses and the drugs) is provided free of charge to identified patients. Although Nigeria receives huge support from some donor agencies including WHO and UNDP, there is a wide gap between the resources needed and what is provided. Across the 22 high TB burden countries (Table 2) in 2008, governments was expected to cover 73% of the total costs of TB control while grants will cover 13% (including US$ 200 million from the Global Fund). Reported funding gaps totaling 14% of total costs has been reported across 17 of the countries which include Nigeria but exclude Bangladesh, Ethiopia, India, Indonesia, and South Africa [WHO, 2008]. Proper education of politicians and those in government is needed in the control and allocation of funds. Also, there is the need to mobilize the political class both at the federal, states and local governments to provide the financial and human resources to expand the health care services so that TB patients can be identified and treated. Political commitment will also be required to mobilize the community to educate the people and encourage them. The current DOTS centres in Nigeria need expansion to increase access to care within a limited distance to the affected patients. Although private and public partnership is applied in DOTS programme in Nigeria, there is apparent lack of understanding that over an estimated 70% of the primary health care in the country is mainly controlled by traditional healers, patent and propriety medicine vendors and registered pharmacists. Adequate education of these categories of health care providers, especially in the referral system, is needed to increase the case detection rate and reduce the spread of the disease.

The emphasis on passive case finding in contrast with the identification of cases through screening [27-28] is a welcome development. This strategy is based on the expectation that passive detection of individuals, who is ill enough to seek medical attention, is far more cost-effective than population-based screening, and that the compliance will be higher in those who have identified themselves as symptomatic [27]. However, the failure of national TB programmes to detect the vast majority of new infectious cases suggests that active screening strategies should be reevaluated in an attempt to improve case detection and, thereby, increase access to TB treatment [29]. Therefore, DOTS expansion will require, at least, screening of close contacts of the treated individuals. Invariably, this will reduce the number of both the latent and the infectious individuals.

Conclusion

Although TB is a worldwide problem, Nigeria is one of the five countries in the world with the highest prevalence rate. The best way to prevent the spread of the disease in any community is to treat the cases immediately to prevent it from infecting other members of the community. If most of those infected are detected early and provided effective treatment, they will go back to the community and society, and be economically productive. With the implementation of DOTS programme in Nigeria, there has been an improvement in treatment success recorded in the last couple of years. Nevertheless, the treatment success so far recorded fall short

of the WHO set target in terms of case detection and treatment cure rate.

Several challenges, including education and funding, are currently facing the DOTS programme in Nigeria. While it is intended that every community within five kilometers in Nigeria has access to a DOTS centre in the country, and the target is that by the year 2010, about 5,000 health facilities will be providing DOTS services, adequate financial support and political will is needed from local, state and federal governments in order for this goal to be achievable because of the reasonable gap between the resources currently accessible and the actual fund needed [5]. With implementation of the Stop TB Strategy, adequate resource mobilization and effective spending are needed to achieve any success.

References

1. World Health Organisation (WHO). Group at risk. WHO's Report on the Tuberculosis Epidemics. The Organisation, Geneva, 1996;42-55.
2. Zeind CS, Gourley GK, Corbett CE. Tuberculosis. In: HerfindaL ET (ed). Textbook of Therapeutics, Drug and Disease Management. Williams & Wilkins Publishers, Maryland USA, 1996; p1283-1297.
3. Harries A, Maher D. Diagnosis and treatment of pulmonary tuberculosis in adults. Postgrad Doctor Afri 1995;17:90-95.
4. Johnston RE, Wildrick KH. "State of the art" Review. The impact of chemotherapy on the care of patients with tuberculosis. Am Rev Resp Dis 1974;109:636-664.
5. World Health Organisation (WHO). Global Tuberculosis Control. WHO Report 2008. The Organisation, Geneva, 2008.
6. Delock K. The new tuberculosis. Afri Health 1994; 16:8-10.
7. Cancroff ET, Montorfano D, Wadhwa N. Pulmonary tuberculosis: A resurgence of an old disease. Postgraduate Radiology 1993;13:198-217.
8. World Health Organisation (WHO). Global TB database and Country Profiles. 2009. Available from: http://www.who.int/tb/country/global_tb_database/en/index2.html. Accessed 7 December 2009.
9. World Health Organisation (WHO).. Global Tuberculosis Control - Surveillance, Planning and Financing, 2008. Available from: http://www.who.int/tb/publications/global_report/en/ Accessed 7 Dec-ember 2009.
10. World Health Organisation (WHO). Tuberculosis and AIDS. Bull Int Union Tuberc Lung Dis 1989;64:21-29.
11. World Health Organisation (WHO). Framework for Effective Tuberculosis Control. WHO/TB/94.179. The Organisation, Geneva, 1994.
12. Umar A. Nigeria: Why Tuberculosis is On the Increase – Dr Mansur Kabir, 25 December 2008. Available from: http://allafrica.com/stories/200812250315.html. Accessed 7 December 2008.
13. Styblo K. Overview and epidemiological assessment of the current global tuberculosis situation: with an emphasis on tuberculosis control in developing countries. Bull Int Union Tuberc Lung Dis 1988; 63: 39-44.
14. Chiang CY, Riley LW. Exogenous reinfection in tuberculosis. Lancet Infect Dis 2005;5:629-636.
15. Verver S, Warren RM, Beyers N, Richardson M, van der Spuy GD, Borgdoff MW, et al. Rate of reinfection tuberculosis after successful treatment is higher than rate of new tuberculosis. Am J Respir Crit Care Med 2005; 171:1430-1435.
16. World Health Organisation/International Union Against Tuberculosis and Lung Disease (WHO/IUATLG). Anti-tuberculosis drug resistance in the world third global report. Publication WHO/HTM/TB/2004.343. The Organisation, Geneva, 2003. Available from: http://www.who.int/tb/publications/who_thm_tb_2004_343/en/index.html.
17. Okuonghae D, Korobeinikov A. Dynamics of tuberculosis: The Effect of Directly Observation Therapy Strategy (DOTS) in Nigeria; Mathematical modelling of natural phenomenon. Epidemiol 2007;2(1):101-113.
18. Daniel OJ, Oladapo OT, Alausa OK. Default from tuberculosis treatment programme in Sagamu, Nigeria. Niger J Med 2006;15(1).63-67.
19. Akinyola AL, Adegbbehingbe OO, Ashaleye MC. Tuberculosis of the spine in Nigeria: Has anything changed. Internet J Third World Med 2007;4(1). Available from: http://www.ispub.com/ostia/index.php?xmlFilePath=journals/ijtwm/vol4n1/spine.xml. Accessed 10 January 2009.
20. Erhabor GE, Adebayo RA, Omodara JA, Famurewa OC. Ten-year review of patterns of presentation and outcome of pulmonary tuberculosis in OAUTHC, Ile-Ife. Niger J Health Sci 2003; 3:34-37.
21. Salami TAT, Samuel SO, Eze KC, Oziogbe OE. Tuberculosis in a Nigerian Teaching Hospital: Incidence and Pattern of distribution; Trop J Health Sci 2007;14(2).26-30.
22. Okeke TA, Aguwa EN. Evaluation of the implementation of directly observed treatment short courses by private medical practioners in the management of tuberculosis in Enugu, Nigeria; Tanzania Health Res Bull 2006;8(2):86-89.

23. Daniel OJ, Alausa OK. Treatment outcome of TB/HIV positive and TB/HIV negative Patients on DOTS in Sagamu, Nigeria. Niger J Med 2006; 15(3):222-226.
24. Odunsanya OO, Babafemi JO. Patterns of delays amongst pulmonary tuberculosis patients in Lagos, Nigeria. BMC Public Health 2004;4:18. doi: 10.1186/1471-2458-4-18.
25. Egbewale BE, Taiwo SS, Odu OO, Olowu OA, Sobaloju SO. Tuberculosis treatment outcomes in State Hospital, Oshogbo, Southwest, four year review. Niger J Med 2007;16(2):148-155.
26. World Health Organisation (WHO). The stop TB strategy. Building on and enhancing DOTS to meet the TB-related millennium development goals. Report No WHO/HTM/STB/2006.37. The organisation, Geneva, 2006.
27. Becerra MC, Pachao-Torreblanca IF, Bayona J, Celi R, Shin SS, Kim JY, Farmer PE, Murray M. Expanding tuberculosis case detection by screening household contacts. Public Health Reports, 120, 2005.
28. Ravigilone MC, Pio A. Evolution of WHO policies for tuberculosis control, 1948-2001. Lancet, 359; 775-780.
29. Murray CJ, Salomon JA. Expanding the WHO tuberculosis Control Strategy: rethinking the role of active case-finding. Int. J Tuberc Lung Dis 1998;2(9 suppl): S9-15.