

Full Length Research Paper

TB and HIV/AIDS in Bangladesh

Shakeel Ahmed Ibne Mahmood

Youth Wing, National AIDS Committee, Dhaka 1000, Bangladesh.

Bangladesh AIDS Prevention Society, Dhaka 1217, BAPS, Bangladesh.

AED-Center on AIDS and Community Health, Washington D. C. USA. E-mail: shakeel.mahmood@gmail.com.

Accepted 08 April, 2017

Tuberculosis (TB) is the major opportunistic infection of acquired immunodeficiency syndrome (AIDS) in developing countries. The objective of this paper is to exemplify and review the findings associated with TB in patients with AIDS. 80 TB/AIDS-focused articles from latest internet and literature, including 3 leading Bangladesh daily newspapers between 1999-2009 were analyzed. According to the data provided by a Bangladesh Sheikh Mujib University, the number of detected people living with HIV/AIDS reached 204 as of December 2002. Most of them died of TB indicating the relationship between AIDS and TB. Measures needed in the future, if TB and HIV/AIDS are to be eliminated in Bangladesh. Tuberculosis (TB) is at least as old as human kind, one of the world's deadliest diseases and the history of the disorder is intertwined inevitably with the history of civilization. Break down in health services, the spread of HIV/AIDS and the emergence of multi drug resistant TB causing organisms are contributing to the worsening impact of this disease. Physicians say TB is one of the major syndromes of HIV infection. About 74,000 Bangladeshi people go abroad for jobs every year, which might be the sources of spreading HIV/AIDS, when they come back to the country. It has been known for some time that TB and AIDS are bedfellows. But as the government and civil society still seem impervious to this state of affairs, when the pandemic hits our shores. The AIDS program in Bangladesh and possibly others elsewhere, could consider adapting this experience, to support NGOs serving communities at highest risk towards greater funding for and co-ordination of the national NGO response. Given the link between TB and AIDS, such TB program could also work more closely with AIDS program to absorb some of the HIV surveillance responsibilities of the AIDS program, integrate clinical training and build in cross-referral systems. TB and AIDS target the marginalized; we should all be able to visualize the scale of the problem we would face. If TB and HIV/AIDS are not taken seriously soon, it will ravage our society.

Key words: TB and HIV/AIDS, governmental policy and research.

INTRODUCTION

Tuberculosis (TB) is at least as old as human kind, one of the world's deadliest diseases on the planet after AIDS and ahead of malaria and the history of the disorder is intertwined inevitably with the history of civilization. According to the WHO, 2 billion people live with tuberculosis. (Stop TB, 2010c) and one-third of the world is infected with the TB bacillus, including 15 million Americans. Worldwide, 2-3 million people die every year due to TB and it is the leading killer of people with HIV/AIDS (Global Alliance for TB Drug Development, 2005; SEA-AIDS, 2007f). One in four tuberculosis (TB) deaths in the world are HIV-related, twice as many as previously thought, according to a new report by the

World Health Organization (WHO) (Partners Zambia, 2009). Statistically, there is 1 TB-related death that takes place every 18 seconds, and 1 HIV death every 16 second. The enormous public challenge posed by the combined epidemics of HIV and TB, is undoubtedly alarming. (Partners Zambia, 2010c)

About 10% of the 2 billion people carrying a latent form of the infection will develop an active form of the disease (Recer, 2002). Break down in health services; the spread of HIV/AIDS and the emergence of multi drug resistant TB causing organisms are contributing to the worsening impact of this disease (Accessed, 2000).

Of the 33 million people who are living with HIV

(2.7 million new HIV infections a year [Global Health, 2010]), only 20% know their status, and only a tiny fraction, 2% in 2007, were screened for TB according to the Global TB Control 2009 report (SEA AIDS, 2009). Michel Sidibe, head of the U. N. AIDS program, warned that double infections of HIV and TB could become the next new epidemic as he marked 2010 World TB Day. (AF-AIDS, 2010)

TB or not TB (when I die)

Tuberculosis (TB) is an ancient disease and the earliest archaeological evidence of spinal TB was found in Egyptian mummies dating back to 2000 BC (SEA-AIDS, 2010b) and that has affected humankind for more than 4,000 years (Zaman, 2010), while AIDS was first recognized as a disease in 1981 (Answers Encyclopedia, 2010). TB, the airborne disease is estimated to have killed more people than any other disease in history. TB is still a rampant killer (Global Link, 2002) and now the world's seventh-leading cause of death. It killed 1.8 million people worldwide in 2009, up from 1.77 million in 2007 (SEA-AIDS, 2010c). Approximately 1.86 billion people are infected with the bacterium that causes TB. No novel drug has been developed to fight against this disease in more than 30 years (Global Link, 2002). However, The Stop TB Partnership's Global Drug Facility (GDF) has delivered 16.5 million anti-tuberculosis (TB) treatments since its creation in 2001. GDF's 13th Progress Report mentioned that some 2.4 million treatments were delivered in 2009 alone (SEA-AIDS, 2010e).

2010 Global Report on Surveillance and Response, it is estimated that 440 000 people had MDR- TB worldwide in 2008 and that a third of them died (Stop TB, 2010a) and around 6 million people with active TB were treated by December 2009. At the moment, countries are on track to meet the international target of halving TB prevalence by 2015 (Global Fund, 2010). A study commented that African countries have the highest incidence of TB per population in the world; even at low levels of drug resistance the caseload of MDR -TB patients becomes very high. As a result, the rates of MDR-TB cases arising per 100,000 populations in some southern African countries are five to six times higher than those of China and India. (Partners Zambia, 2010b)

In fact, in the beginning of the 19th century, one out of every three people could expect to perish from the "white plague," much the same way modern society acknowledges heart disease and cancer as our leading causes of death. TB has never discriminated; its victims have included Eleanor Roosevelt, Ludwig van Beethoven, Chopin, and billions of others around the world. Every fifteen seconds a person dies from TB. Infecting one-third of the world's population, TB is spreading rapidly in developing countries, which account for 80% of the 8.4 million new cases each year. As the leading cause of

death among AIDS sufferers, its potential harm is particularly clear considered in relationship to the HIV/AIDS epidemic. To make matters worse, available cures for TB are expensive and cumbersome, requiring supervised treatments over 6 to 9 months, and they are proving increasingly ineffective against new drug-resistant strains (RTI, 2003).

In 1993, the WHO took an unprecedented step and declared TB a global emergency, so great was the concern about modern TB epidemic. It is estimated that between 2000 and 2020, nearly one billion people will be infected, 200 million people will get sick, and 35 million people die from TB if control on the disease is not further strengthened (WHO, 2005a).

Zambia: TB and AIDS

The spread of tuberculosis has been relentless in Zambia; southern Africa in the last thirty-seven years and the trend continues to date.

Facts emerging from the report showed that during the twenty years covering 1964 - 1984, 100 cases of TB were reported for every 100,000 people in Zambia. However, between 1985 to 2000, a twelve-fold increase was observed in the number of TB cases reported in the country. The increase completely wiped off all the gains achieved in controlling the disease during the 1960s and 1970s says the report.

In absolute number terms, new cases of TB increased from 8,246 in 1985 (124/100,000) to 38,863 (409/100,000) in 1996 and 52,000 (512/100,000) in 2000. A comparison of TB reported cases in Zambia with rates in neighboring countries of Zimbabwe, Malawi and Tanzania over the same period indicates that Zambia has one of the highest reported TB rates in the region. This suggests that Zambia, like many countries in Africa, is in the grip of a serious TB epidemic that is showing no signs of abating.

The raging HIV/AIDS epidemic and breakdown in TB control services are responsible for the relentless spread of TB in Zambia; concludes the study (Mwaba, 2003).

Methods of policy analysis

A systematic review was conducted from 1999- 2009. Information was retrieved from documents available mainly in electronic database and on the websites of specialized agencies, using the terms TB and HIV with other researchers work was also undertaken. Eighty documents were retrieved from the database (websites) of several national and international agencies were browsed. The most important being online collection of Afaids (afaids@forums.healthdev.org.), Partners Zambia (partnerszambia@forums.healthdev.org), SEA-AIDS (sea-aids@forums.healthdev.org) and RTI International News (RTI International News).

These sites housed a number of reports on quantitative and qualitative studies, estimates of HIV/AIDS cases, policy analysis of

the existing TB and HIV situation in Bangladesh public health, and government strategies.

Histological observations were carried out and a cross-sectional prevalence study of TB and HIV was also held. A search was carried out on the website of the international AIDS society, which indexed about 120 abstracts on HIV/AIDS and TB. A scrutiny of the abstract revealed that some presentation posted on the websites, which was presented in international conferences and few other presentations were published in journals (indexed in Medline). Collected documents were skim read to cases, whether they contained information on HIV in conjunction with TB

TB: Companion of HIV

TB is the leading infectious killer of people with HIV worldwide. HIV-positive individuals are 50 times more likely to develop TB in a given year (AFAIDS, 2007b). According to the WHO, 1.4 million of the 9.4 million new cases of TB registered in 2008 also had HIV. These factors encourage a TB-HIV stigma in countries with inaccurate or inaccessible public information on the disease. (Research for Development, 2010)

The two most deadly infectious diseases worldwide, HIV and TB claim the lives of nearly 10,000 people every day. Despite major advances in the treatment of HIV, the AIDS epidemic remains an unprecedented public health challenge. Although scientists discovered a cure for TB more than five decades ago, there is more tuberculosis in the world today than ever before. In tandem, HIV infection and TB create a deadly synergy. TB is the number one cause of death among people with HIV. HIV/AIDS has reignited the TB epidemic across the developing world, fueling increases in MDR-TB and XDR-TB as well. (Global Health, 2010)

The counter-productive separation of TB and HIV programming is undermining our ability to address these diseases and must come to an end. The global statistics are unacceptable 40 million people living with HIV, two billion infected with tuberculosis, and at least 13 million co-infected with TB and HIV (SEA-AIDS, 2007e) and without proper treatment, approximately 90 per cent of these people die within months of contracting TB (AFAIDS, 2007c). The death rate for people infected with both is five times higher than that for tuberculosis alone (AFP, 2007). An estimated one third of the world's population is infected with TB, therefore at least one third of people living with HIV are also infected with TB. Yet, standard TB is curable even in people living with HIV (SEA-AIDS, 2007e). On the contrary active tuberculosis boosts HIV replication. Can increase HIV level as much as 160 times. Viral load declines after successful antituberculous treatment (Lancet, 1996). The 2007 theme TB ANYWHERE IS TB EVERYWHERE emphasizes that although TB is a preventable and curable disease, it remains a global emergency. The theme reflects the chronically inadequate investment in TB control, surveillance, research and development as well as TB's deadly synergy with HIV. In 2007, the World Health Organization will report on whether the 2005 global TB control targets of 70% case detection and 85% treatment success have been achieved (AFAIDS, 2006).

TB, a chronic bacterial infection, causes more deaths worldwide than any other infectious disease. It mostly spread through the air via droplet infection and usually infects the lungs, although other organs are sometimes involved. Most people infected with *Mycobacterium tuberculosis* never develop active TB (Wrong Diagnosis, 2005). However, in people with weakened immune systems, especially those infected with the human immunodeficiency virus (HIV). TB organisms may overcome the body's defenses, multiply, and cause active disease (NIAD, 2002). One of the most important of these factors is HIV, HIV and TB forms a lethal combination, each speeding the other's progress. HIV weakens the immune system. Someone who is HIV positive and infected with TB is many times more likely to become sick with than

someone infected with TB while he is HIV negative. TB is a leading cause of death among people who are HIV positive. It accounts for about 15% of AIDS death worldwide. In Africa, HIV is the single most important factor determining the increased incidence of TB in the last ten years (WHO, 2005b). A case study "Understanding TB-HIV Related Stigma in Zambia" was done on TB patients in Zambia. The high death rate from TB due to AIDS has resulted in the illness being labeled 'Satan's disease' by traditional healers in Zambia. In a country where 70% of those infected with TB also have HIV, the TB-HIV stigma is extensive (Research for Development, 2010).

Table 1 shows how HIV and TB are connected. It depicts that TB is the leading killer among people infected with HIV and TB progresses faster in people who are HIV-positive. (AFAIDS, 2007e)

Currently TB is the leading killer of persons infected with HIV in sub-Saharan Africa, and it is killing mostly 25-44 year olds throughout the world. This leads not only to a loss of a viable work force for many countries, but is also leading to the breakdown of families all across the world. Millions of children have been orphaned because of the deadly HIV/TB combination that has killed their parents. As noted by UNAIDS in March 2000, usually only 10 percent of people with latent TB infection develop active TB; however, when healthy carriers of the TB bacterium become connected with HIV, their risk of developing active TB increases by a factor of more than 30 (Global Link, 2002).

TB, HIV/AIDS and Malaria

HIV/AIDS, TB and malaria together account for nearly 6 million deaths per year and cause immeasurable suffering and damage to families, communities and economies (AF-AIDS, 2002). TB is one of the three primary diseases that are closely linked to poverty, the other two being AIDS and malaria (SEA-AIDS, 2010c).

Executive Director of the New Jersey Medical School National TB Center outlined the way in which HIV/AIDS and TB are inextricably linked, highlighting the following points: TB is the first manifestation of AIDS in 50% of cases in developing countries. Around one third of HIV+ people have TB. There is a two-way relationship between the two conditions: HIV seropositivity increases the likelihood of reactivation of latent tuberculosis, and HIV positive people with tuberculosis have much higher viral loads (Goletti, 1996). And when TB is cured in an HIV positive person the onset of AIDS can be delayed by several years. Unlike HIV/AIDS, a low cost cure already exists for TB. Dr Hailyesus Getahun, Head of TB/HIV at the World Health Organisation, explained that less than one per cent of people living with HIV worldwide are being screened for TB, despite the fact that TB is the leading killer of people living with HIV (Health net, 2008).

Although the linkages between TB and HIV/AIDS are perhaps more self evident, they also exist between HIV and malaria. Dr Kakano from UNICEF described malaria as an opportunistic infection, which causes AIDS to become more severe and in turn seropositivity must be taken into account when administering dosages of anti-malarial drugs to patients. We should not view HIV in isolation from other bedfellow diseases, and addressing TB issues especially should not be relegated to a side event at a meeting on HIV/AIDS, for example. To partition these two diseases as if they develop independently of each other ignores the reality of their mutual reinforcement, leads to sub-standard care and does not make for sound public health policy (Stop TB, 2001).

Tuberculosis with HIV-Positive Patients

Researchers in Uganda have found that HIV-positive patients face greater risk from TB-related lung inflammations than do HIV-negative patients. H. Luzze of Uganda's National Tuberculosis Treatment Center and the Uganda-Case Western Reserve

Table 1. The HIV/TB connection.

1. TB is the leading killer among people infected with HIV*
2. Risk for drug-resistant TB is higher among people with HIV*
3. HIV-infected clients may not react to the tuberculin skin test *
4. TB is harder to diagnose in people who are HIV-positive. This is because HIV weakens the cells in the immune systems that are needed to fight TB. HIV promotes both the progression of latent TB infection to active disease and relapse of the disease in previously treated patients.
5. TB progresses faster in people who are HIV-positive.
6. TB in people who are HIV-positive is almost certain to be rapidly fatal if undiagnosed or left untreated.
7. Many HIV-positive people in developing countries develop TB as the first sign of the later stages of the disease.
8. The risk of developing TB disease is much greater for those infected with HIV and living with AIDS as compared to those who are not infected.

(AFAIDS, 2007e; *University of Maine, 2004).

Table 2. Global and regional incidence of TB.

1. One third of the world population is infected with TB.
2. More than 10 million people develop TB each year.
3. 3 million people die of TB each year.
4. TB is more prevalent in males than that of females.
5. Most cases of TB occur in the 15 - 45 age groups.
6. There is one new TB case at every 2 min.

(Source: Daily Star, 2005c).

University Research Collaboration at Kampala's Mulago Hospital and colleagues conducted a study to "compare clinical and radiographic presentation, and diagnostic methods, in adults with tuberculosis pleurisy who are negative and positive for [HIV]."

They found that patients connected with TB and HIV made up the vast majority of TB pleurisy cases, and they suffered more virulent forms of the condition than other patients. "HIV-positive patients with tuberculosis pleurisy had a more severe illness than HIV-negative patients," the researchers concluded (Procaare, 2001).

According to latest estimates, 10% of all new TB infections are resistant to at least one anti-TB drug. Multi-drug resistant (MDR) and extensively drug-resistant tuberculosis (XDR-TB) are currently in the news following recent reports indicating rates of drug resistance may be far higher than previously thought. Drug-resistant TB poses a grave global public health threat, especially in populations with high rates of HIV, and requires an immediate and urgent global response (AFAIDS, 2007a).

In another source it is mentioned that it has been widely acknowledged that the new deadly TB strain may have developed because of insufficient medication or because patients missed some of their treatments. This ignores the many factors known to have major impact on treatment adherence. These include social

and economic factors, as well as weaknesses in the health care system itself - all widespread in sub-Saharan Africa. This means that even 'compliant' patients are at a high risk of TB recurrence, as well as developing and transmitting drug resistant strains (Masimba Biriwasha, 2007).

Table 2 shows the global and regional incidence of TB. It illustrates that one third of the world population is infected with TB and each year, more than 10 million people develop TB and 3 million people die of TB (Daily Star, 2005c)

One third of the world's population carries the tuberculosis bacterium; nevertheless the disease remains latent in nine out of 10. HIV, on the other hand, changes the equation: Of those whose immune systems have been compromised by HIV, 10 percent will develop active tuberculosis each year, according to a report (AFP, 2007).

Table 3 shows the estimated TB occurrence and mortality in each of the WHO regions. It is estimated that 1.75 million deaths occurred from Tuberculosis in 2003. The highest number of estimated deaths is in the South-East Asia Region, and the highest mortality per capita is in the Africa Region, where HIV has led to rapid increases in the incidence of TB and increases the likelihood of dying from TB.

Table 3. Estimated Tuberculosis incidence and mortality, 2003.

WHO region	Number of cases (thousands)		Cases per 100 000 population		Deaths from Tuberculosis(including TB deaths in people infected with HIV)	
	All forms (%)	Smear-positive	All forms	Smear-positive	Number (thousands)	Per 100 000 population
Africa	2372 (27)	1013	345	147	538	78
The Americas	370 (4)	165	43	19	54	6
Eastern Mediterranean	634 (7)	285	122	55	144	28
Europe	439 (5)	196	50	22	67	8
South-East Asia	3062 (35)	1370	190	85	617	38
Western Pacific	1933 (22)	868	112	50	327	19
Global	8810 (100)	3897	140	62	1747	28

Source: WHO, 2005b.

However, the estimated incidence per capita in sub-saharan Africa is nearly twice that of the South-East Asia, at 350 cases per 100 000 population (WHO, 2005b).

There are approximately nine million new cases of tuberculosis in the world every year, according to the WHO. In 2005, the disease killed 1.6 million people. There were 4.3 million new infections in 2006 with 2.8 million (65%) of these occurring in sub-Saharan Africa. In 2006, 2.9 million people died of AIDS-related illnesses (AFP, 2007). The Global TB Control report noted that in 2007 there were an estimated 1.37 million new cases of tuberculosis among HIV-infected people and 456,000 deaths - almost double the figures published in previous reports. (Partners Zambia, 2009)

TB/HIV update

1. 90% or higher is the case-fatality rate in people living with HIV who contract extensively drug-resistant TB (XDR-TB).
2. 1% or less people living with HIV were screened for TB in 2006.
3. 0.08% of people living with HIV were put on isoniazid preventive therapy (IPT) in 2006, which prevents active TB (SEA AIDS, 2008).
4. 1.8 million TB/HIV services provided – a 150% increase since the end of 2008, contributing to the decline of TB prevalence and mortality rates in many countries (Global Fund, 2010).

TB in Asia

Hundred thousand more could die from Asian TB Catastrophe in five years up to three million more people in East Asia could become infected with TB, with 100,000 deaths over the next five years, because of a lack of funding to control the disease, the World Health Organization (WHO) warned (Agence France Presse, 2002).

Tuberculosis infects 3.5 million (SEA-AIDS, 2007c) and about 1,000 adults each day, or 365,000 people a year, die in the Western Pacific, said WHO (Agence France, 2002). The region has achieved a 2005 target of detecting at least 70% of TB cases and curing at least 85 percent of those detected, and to achieve full coverage with DOTS, the world health body's recommended strategy for TB control, the WHO said in a statement (SEA-AIDS, 2007d). Because each untreated patient can infect 10 to 15 others, the number of new cases could balloon to three million in five years. China alone is short in aid by nearly \$200 million over the next five years for treating TB, which accounts for 80% of all infectious diseases in the country, far more than HIV/AIDS and 16 times more than hepatitis B and C, the WHO said. Aid agencies have

committed about \$25 million for TB control in Asia, but participants at the meeting called for increased contributions to fight the problem. More expensive consequences could result, they said, if there is no resolution of the funding gap (Agence France, 2002).

TB and HIV/AIDS in Asia

About one-third of the world's population, or two billion people, is estimated to be infected by TB, although only five to ten percent, especially those with HIV/AIDS get sick. The medicine to fight TB, under the WHO's anti-TB regimen, known as "directly observed treatment, short-course"(DOT) costs as little as \$10 for a complete treatment, but only reaches one in four sick people (Agence France, 2002).

According to UNAIDS, India will have the largest number of people in the world infected with HIV/AIDS in a few years, overtaking South Africa, if steps are not taken to curb the deadly disease (Shohojogi, 2002). Indonesia is second only to India and China in its number of active TB cases, being home to 6 percent of the global TB burden. Approximately 150,000 people die each year of TB in Indonesia. According to headline news in Indonesia, "Its HIV/AIDS epidemic is among the fastest growing in Asia". The estimated number of people living with HIV (PLHIV) in Indonesia is 169,000 to 216,000 in the nation of 220 million. This is despite the considerable progress Indonesia has recently made in delivering TB and HIV services. Not surprisingly, the problem of drug resistant TB is also on the increase in the country (SEA-AIDS, 2007a).

"TB and HIV are often forgotten while the world's attention is now focusing on new emerging epidemics," according to the Health Minister of Indonesia, Dr Siti Fadilah Supari. Speaking on 2007 World AIDS Day, he added: "I strongly endorse the Call to Stop TB in Asia, and commit to ensuring that the recommendations within it are pursued with priority within Indonesia. The world is focusing on Indonesia for many competing health issues, with the danger that TB may be forgotten" (SEA-AIDS, 2007a).

TB in Bangladesh

TB remains a major cause of morbidity and mortality in Bangladesh (K. Zaman, 2007). According to the health ministry statistics, one person dies of TB every 10 min and one is infected every two minutes in the country (Daily Star, 2005a) . This severe situation has placed Bangladesh in the sixth position in the world in terms of burden of TB patients (Prothom, 2007a; Zaman, 2007, USAID,

Table 4. High burden countries.

S/No.	Countries
1.	India
2.	China
3.	Indonesia
4.	Nigeria
5.	South Africa
6.	Bangladesh
7.	Pakistan
8.	Philippine
9.	Russia Federation
10.	Ethiopia

Source: Prothom, 2007.

Table 5. Situation of TB in Bangladesh.

1.	50% adults are infected with TB (Financial Express, 2009).
2.	There are more than 300,000 expected new cases of TB per year (Zaman, 2007).
3.	The estimated number of TB carriers is around 223 per 1, 00,000 population (WHO Global TB Report 2009).
4.	70,000 estimated deaths are due to TB per year (Zaman, 2007).
5.	There is one TB death every 10 min (Daily Star, 2005c).
6.	There is 0.1% HIV positivity rate (Daily Star, 2005c).
7.	Bangladesh is one of the top 6 high TB burden countries in the world (Zaman, 2007).
8.	National TB case detection rate: 61% in 1995 (29.2% in 1993), while treatment success rate is 89% in 2004 (80% in 1998) (Prothom, 2007).

2009). A total of 70,000 TB infected persons die each year and 300,000 new TB cases are expected every year in the country (Zaman, 2007; Daily Star, 2005d). TB detection rate is 46 percent, while the rate of successful cure was 85% in 2004. The disease is more prevalent in males than in females, (Daily Star, 2005b) and the present TB detection rate is 71%, while the rate of successful cure was 91% in 2007. The disease is more prevalent in males than in females (Prothom, 2007b).

Table 4 shows the high burden countries, who are affected with TB. It portrayed that India is number one high burden countries of the world (Prothom, 2007) and even in 2008, the World Health Organization (WHO) ranked Bangladesh sixth among the world's 22 high-burden TB countries (USAID, 2009)

Table 5 shows the situation of TB in Bangladesh. It portrayed that described that in Bangladesh fifty percent or half of the adults are infected with TB ((Financial Express, 2009). Each year there are more than 300,000 expected new cases of TB (Zaman, 2007) and there is one TB death every 10 min (Daily Star, 2005c).

HIV and TB in Bangladesh

In Bangladesh, since 1950, this disease (TB) was popularly known as 'Khai roogue', means wasting disease. People had the superstition that once a person developed TB, he had to proceed gradually and inevitably towards death. People had also the false belief that it runs in the families, although TB is not a hereditary disease.

Health experts feared high prevalence of HIV/AIDS cases in the country as TB has been in a steady rise over the last few years. "A recent report in the newspapers that said increasing cases of TB might indicate increased of HIV/AIDS is of concern. If we are to fight this threat, we must awaken from our slumber. But the Government and civil society still seem to be firmly glued to the same state of denial over possible HIV epidemic as they were over a possible HIV epidemic as they were over arsenic poisoning. But unless we stop thinking that it can't happen here, we shall in no way be prepared for the onslaught when it does come." Physicians say TB is one of

Table 6. HIV/AIDS in Bangladesh.

Sex	HIV infected	AIDS	Death
Male	165	21	15
Female	39	0	0
Total	204	21	15

Source: Department of Virology, Bangabandhu Sheikh Mujib Medical University (BSMMU, 2002).

Table 7. Status of AIDS patients in Bangladesh till 1st June 2002.

Diseases	Number of AIDS patients	Dead
Diarrhoea	1	1
TB	12	6
Malaria	1	1
Encephalitis	1	1
Unknown	6	6
Total	21	15

Source: Department of Virology, Bangabandhu Sheikh Mujib Medical University (BSMMU, 2002).

the major syndromes of HIV infection. About 74,000 Bangladeshi people go abroad for jobs every year, which might be the sources of spreading HIV/AIDS when they come back to the country.

Health workers have not been trained nor have they been taught how to protect themselves from accidental infection. But because we are still under the delusion that HIV infection is confined to the 'high risk' groups, we are not concerned but what if, as is more likely to be the case, one partner is infected and he or she keeps the secret to his or herself? It will spread and, as it takes a long time before it becomes apparent, no one will ever be the wiser. This false sense of security is not only wrong but will invite trouble as it will prevent us from finding a way to control the spread of the disease, at least to some extent. Certainly it should not be left unbridled. (Bangladesh Observer, 2002)

RESULTS

Table 6 shows that as of June 2002, Department of Virology, BSMMU detected 204 (male: 165, female: 39) individuals living with HIV/AIDS in Bangladesh since 1989 (BSMMU, 2002).

A publication by SEA/WHO regional office estimated that, as of April 2001 there is about 13,000 adult living with HIV in Bangladesh, which also mentioned a rate of HIV infection 16 per 100,000 populations (WHO, 2001).

Table 7 shows the Status of AIDS patients in Bangladesh till June 2002. It illustrated that most of the AIDS patients (6 out of 15) died of TB. In the year 2001, two new cases of AIDS were reported, and both of them died before the cause of death was determined.

Most of them died of Tuberculosis indicating the relationship between AIDS and TB. In 2000 one HIV positive individual died by committing suicide (BSMMU, 2002).

However on Dec 1, 2003, the country has 363 people with HIV/AIDS (PHA) detected through passive case reporting as announced by the National AIDS/STD Program of the Government of Bangladesh. 67 PHA out of 363 visited the voluntary counseling and testing (VCT) Unit of ICDDR,B between April 2003 and June 2004, 47 had opportunistic infections, of whom six had TB (Alam et al., 2005).

HIV/AIDS update

According to government source mentioned that a total cumulative of 1500 cases of HIV/AIDS have been confirmed and reported in 2009, which was 1207 in 2007 and 1495 in 2008. The number of undetected cases is much higher. According to a recent survey, 50% of males who had HIV test at a hospital in the city are students and 80% of those infected, contracted the virus by mixing with prostitutes (New Nation, 2009).

TB and HIV in Bangladesh

Although TB is common in patients with AIDS, but it does not inevitably follow that HIV is common in TB patients. Earlier surveys conducted in Bangladesh to evaluate the prevalence of HIV in TB patients have shown insignificant levels (Pio et al., 1997; Salimullah et al., 2000).

In order to confirm this, the Government of Bangladesh decided to conduct two rounds of surveys to determine the prevalence of HIV infection among patients with TB in Dhaka (Alam et al., 2005).

Table 8. Characteristics of and HIV prevalence in Tuberculosis patients from two outdoor clinics and one hospital in Dhaka, Bangladesh during 1999 and 2000 - 2001.

Patient characteristics	Round 1 (1999)		Round 2 (2000 - 2001)	
	Outdoor clinics (n = 936)	Outdoor clinics (n = 959)	Outdoor clinics (n = 959)	Hospital (n = 887)
Age in years, median (25th - 75th quartiles)	28.0 (20.3 - 36.0)	26.0 (20.0 - 37.0)	26.0 (20.0 - 37.0)	35.0 (25.0 - 45.0)
Male, no. (%), 95% CI	594 (63.5), 60.3 - 66.6	583 (60.8), 57.6 - 63.9	583 (60.8), 57.6 - 63.9	691 (77.9), 75.0 - 80.6
HIV, no. (%), 95%	1 (0.1), 0 - 0.6	0	0	1 (0.1), 0 - 0.6

Source: Alam et al., 2005.

Among the 887 hospitalized patients (Table 8), one was found to be HIV-positive. The HIV-positive male patient was a 24-year of age. The patient was a new case of TB. The patient may have acquired the infection either in India or in Bangladesh, as the HIV subtype was related to strains from both India and Bangladesh (Alam, et al., 2005)

Confirming previous findings it is understood that HIV prevalence among TB patients in Dhaka is still low (Pio et al., 1997; Salimullah et al., 2000). While it is possible that TB will be a common outcome of patients with HIV/AIDS in Bangladesh, still it is too early in the epidemic to expect that many of the TB cases in Bangladesh will be linked with HIV/AIDS (Alam et al., 2005).

In another source (WHO) it was revealed that eighty-eight patients (1.8%) (Prothom, 2007b) have been recently detected with multi drug resistance (MDR) Tuberculosis (TB) and 17 of them are females (Prothom, 2007b), the extreme stage of the disease, giving rise to the fear of HIV/AIDS spread in the country, as TB patients are more vulnerable to HIV/AIDS. Dr Vikuarrunnessa, program manager of National tuberculosis control programme (NTP) mentioned in her paper that TB patients are 60% more vulnerable to HIV/AIDS than others. She urged social movement through media campaign in combating TB (Daily Star, 2007)

Policy issues

It has been known for some time now that tuberculosis and AIDS are bedfellows. But as the Government and civil society still seem impervious to this state of affairs, when the pandemic hits our shores. We shall not be prepared to handle it. But with numerous migrant workers and a large internal floating population, plus an indeterminate number of drug addicts and the increased prevalence of sexuality transmitted diseases, a crisis may be in the making. High time we got the message across to those who need it most.

In 1995, Bangladesh started the process of seriously considering and documenting the relative roles and responsibilities of Government and the Non Government Organization, NGO sector towards prevention and control

of AIDS. Since then, AIDS policy, a strategic and detailed action plan has been formulated which now detail respective roles. The mechanisms for Government working with the NGO sector remain to be developed. Bangladesh could profit from its own example of a national Government/NGO collaboration for TB control, which is held to be unique world wide and successful in many respects (Rasheed et al., 1998).

Never the less the important factors that contribute to the spread, poverty, over population, malnutrition, threat of HIV epidemic, a lack of education and human rights abuses of women and children are here in plenty. Therefore it is suggested some immediate and medium-term steps that include building the database to enable effective HIV prevention and AIDS care programs, strengthening National AIDS Programs to fulfill their existing and new function, undertaking advocacy, expending to multicultural response and mobilizing society-wide resources and building supportive and enabling environment and free drugs for TB to people living with HIV should be distributed. Putting the HIV/AIDS issue in economic, cultural, religious and political perspective, we need to emphasis on strengthening communication for behavior change to eliminate social, cultural and religious stigmas and discrimination. In changing the individual behavior, the following five factors can be pointed out. These are: a) government policy and commitment, b) socio-economic status, c) culture, spirituality and gender, which affect in addressing the HIV/AIDS issues.

For adequate care and support to people living with HIV and active TB, two measures emerge to be urgently in need of action and that is voluntary HIV testing and counseling (VCT) needs to be more widely available, while TB services need to be fully integrated in the hospital programs and programs delivering Anti-retroviral drugs (ARVs). However, equally or even more urgent than the second measure is the integration of care, support and treatment for people living with HIV (PLHIV) into the community health system (SEA-AIDS, 2007b).

In 5 country- specific reports ("Civil Society Perspectives on TB Policy in Bangladesh, Brazil, Nigeria, Tanzania, and Thailand"), researchers all found low levels of awareness of the basic facts about TB and TB/HIV co-infection among political officials and the

general population, including within high-risk groups such as people living with HIV/AIDS. Widespread ignorance of how TB is spread and the fact that the disease can be cured contribute to high levels of stigma and discrimination against people living with TB. Media coverage of TB is limited, and national TB programs (NTPs) generally lack strong communications strategies and staff with the experience and skills to interact effectively with the press. Due to a lack of information, stigma, and the prohibitive cost of care, many patients do not seek or fail to complete TB treatment, the reports find (Emily, 2007)

DISCUSSION

In light of the linkages between TB and HIV infection, the AIDS program in Bangladesh and possibly others elsewhere, could consider adapting the experience, to support NGOs serving communities at highest-risk towards greater funding for and co-ordination of the national NGO response. Given the link between TB and AIDS, such TB program could also work more closely with AIDS program to absorb some of the HIV surveillance responsibilities of the AIDS program, integrate clinical training and build in cross-referral systems (Rasheed et al., 1998).

Similar idea also made by Apoorva Mandavilli, an editor of nature medicine's by saying "HIV and tuberculosis are a deadly combination, ravaging populations in Africa and Asia. But the two disease camps are too busy fighting each other to heed the crisis" (SEA AIDS, 2007c). It is time for all governments and the donor community to meet their full responsibility to Stop TB and HIV/AIDS, and for decision-makers to stand alongside people and communities affected by TB and HIV/AIDS. Of course in all levels of the health care system need to be involved, but we must press for more decentralization of care, support and treatment for PLHIV. TB is an aggressive, HIV-associated opportunistic infection that arises at higher median CD4 counts than do most other AIDS-defining disorders. The transmission and treatment of MDR-TB and XDR-TB must be urgently addressed if survival of people with HIV is to be improved. More willingness to look beyond current TB control strategies will help accelerate the essential re-examination of how TB drug resistance occurs, spreads and takes advantage of HIV-associated vulnerability (Partners Zambia, 2007a). TB/AIDS activists, health practitioners and policymakers need to better understand what journalists need in order to report TB, which may mean appointing dedicated communication officers, translating available information into local languages, providing a free-call or local telephone number for journalists, and being available to respond to enquiries quickly when approached by the media (AFAIDS, 2007c).

On the eve of World TB Day - March 24, 2010 - the

Indian network for people living with HIV (INP+) have brought out results of the first of its kind study on barriers to accessing TB treatment services among people living with HIV, injecting drug users (IDU) and the general population. The study highlights the lack of penetration of TB control services among vulnerable populations. The results also concluded saying that the gap of knowledge among people living with HIV/AIDS of this key co-infection contributes directly to their higher mortality. However early treatment can avert a majority of these deaths (SEA-AIDS, 2010a). Another report said that this points to the urgent need for improvements in laboratory facilities, access to rapid diagnosis, and treatment with more effective drugs and regimens shorter than the current two years (Partners Zambia 2010b; Dye C. 2006; Onyebujoh P, et. al. 2006). Never the less new technology is also crucially required to diagnose the problem of drug resistance among both the general population and among people living with HIV (SEA-AIDS, 2010a).

The WHO report concluded that while information available is growing, and more and more countries are taking measures to combat MDR-TB, urgent investments in infrastructure, diagnostics, and provision of care are essential if the target established for 2015 – the diagnosis and treatment of 80 percent of the estimated M/XDR-TB cases – is to be reached (Partners Zambia 2010b).

Regarding precaution of HIV/AIDS, HIV and AIDS policies and strategies need to be implemented, monitored and evaluated at different levels, involving both public and private actors. This will guide policymakers' researchers, and practitioners, who are involved in HIV and AIDS, to respond timely and efficiently to control the spread of this deadly disease. We must take part for HIV/AIDS awareness, protecting human rights, and ending stigma and discrimination, and arrange meetings, seminars, and workshops for the people living with HIV/AIDS (youth, women, and lesbians, gays, bisexuals and transgenders) to discuss these issues within the global, national and local context; in other words, to provide them universal access. More over importance of providing proper care and treatment for the people living with HIV/AIDS are also needed.

Internationally renowned physician-scientists should explore the potential for new HIV prevention strategies and detail tailored interventions needed to curb the epidemic among targeted populations, including injection drug users and women and infants; describe promising new tools in the TB drug and diagnostic pipeline, as well as the progress towards a TB vaccine; and present the latest evidence about treatment of TB in HIV-infected individuals, among other topics (Global Health, 2010)

FUTURE DIRECTIONS

While there is good understanding among policy

makers of these linkages, there is still limited integration of the two services, and weakened coordination between HIV and TB responses at operational level. The service providers, who have the responsibility to make the integration possible, either lack the knowledge about the linkages, or have insufficient training in dealing with TB and HIV co-infection. Policy makers need to be called upon to invest in extensive training of service providers, to operationalize the integration of services, and strengthen the coordination of TB and HIV and AIDS responses at all levels, which includes research into HIV and TB. For the future, a one-stop service for integrated TB and HIV testing can be envisaged, which would further cut on spending of already limited resources for the many who are co-infected with TB and HIV (AFAIDS, 2007d).

In contrast to TB treatments, there have been significant recent advances in HIV drug development, and as we learn more about TB-HIV co-infection it is becoming increasingly urgent for governments to partner with funding agencies - such as the US President's Emergency Plan for AIDS Relief and the Global Fund to fight AIDS, Tuberculosis and Malaria - and with scientists and research centres, so that these urgent research needs can be addressed rapidly (Partners Zambia, 2007c).

Community voices also need to be heard in decision-making, so that there is genuine and real-time feedback from the ground on how best the fight against TB and HIV can be driven. This will also help to ensure that government policy-makers and others in positions of power are kept accountable to their commitments on TB and HIV, and to the demands of those affected by their actions and inaction (Partners Zambia, 2007c).

A group of HIV and TB activists are issuing the following Demand for Action on TB and HIV and signed in the following resolution in Glen Cove, New York, on 7 March 2007: An immediate action must be taken to guarantee universal access to integrated TB and HIV prevention, treatment, care and support. This paper recommended that national governments, global health and development agencies, donors, and civil society may follow the following steps:

1. Make immediate and visible political commitments to halt the spread of XDR-TB;
2. Provide the US\$650 million urgently needed in 2007 for an immediate response to control MDR-TB (multi-drug resistant TB) and XDR-TB and an additional \$138 million in 2007 to accelerate the development of appropriate drugs and diagnostics;
3. Significantly increase investment in basic TB control programs as the key to preventing the further development and spread of drug-resistant TB and dedicate considerable additional resources to fill the long-term global financing gaps for TB and HIV;
4. Deliver TB and HIV services in the context of fully functioning primary health care systems to ensure cases

are detected, prevention is available and treatment accessible and sustained;

5. Invest substantial additional resources in accelerated research and development on new diagnostic, prevention and treatment technologies for TB and HIV; and

6. Reach the most vulnerable populations with TB and HIV services and redress the social injustices that fuel these dual epidemics and XDR-TB. People living with TB and HIV have a crucial role to play as advocates, providers, and partners in designing effective responses to these preventable and treatable diseases (SEA-AIDS, 2007e).

At the moment, there is more convincing epidemiologic evidence about the pair, and until now it is being largely ignored. None of the established guidelines/policies considers the relationship between the two diseases. It is high time that the double burden of HIV/AIDS and TB in developing country is recognized and given the utmost attention that it deserves.

Comments from TB and HIV/AIDS experts

"HIV people think TB people are dull, out of date and they don't read published literature. TB people think HIV people can't see beyond individuals to the community," says Richard Chaisson, Director of the Center for TB Research at Johns Hopkins University. "I work in both and I find it very frustrating" (SEA-AIDS, 2007c).

"We must strengthen basic TB control, in order to prevent MDR-TB, and also HIV management," continuing: "XDR-TB is a wake up call for both strengthening basic TB and HIV care, prevention and control, and scaling up the management of drug resistant TB. I think that success in this will also require us to put the concerns of individual patients right at the center of TB control." Dr Paul Nunn Paul Nunn, Coordinator of the WHO's TB/HIV and Drug Resistance program. (Partners Zambia, 2007b)

"If newspapers continue to under-report TB"... "This largely treatable infection will continue to make a deadly combination with HIV." Anushree Mishra, a TB Media Fellowship (AFAIDS, 2007c)

"...TB-HIV co-infection is of increasing concern.... We cannot control one without controlling the other. So, we must rapidly scale up TB-HIV collaborative activities through formally established mechanisms and plans" Dr Han Tieru, WHO Representative in Malaysia, Brunei Darussalam and Singapore (SEA-AIDS, 2007d).

"Last year we sounded the alarm regarding XDR-TB and that this is something the world cannot afford to ignore," Glenn Thomas, of the WHO Stop TB

Department. "If it is ignored, then what is happening in some of the low-income countries now is going to be replicated in many parts of the world, and we cannot afford that" (AFAIDS, 2007f).

"Invest in programmes and research for new drugs and diagnostics particularly for Multi Drug Resistant TB (MDR-TB) and Extremely Drug Resistant TB (XDR TB); Develop policies and implement programmes for the integration of TB and HIV programmes at country level" Ogechi Eronin, Journalists Against AIDS (JAAIDS), Nigeria (Afaids, 2008)

"We have to stop people living with HIV from dying of tuberculosis and Universal access to HIV prevention, treatment, care and support must include TB prevention, diagnosis and treatment. When HIV and TB services are combined, they save lives." "If a virus and bacteria can work so well together, why can't we?" Executive Director of UNAIDS, Mr. Michel Sidibe (SEA AIDS, 2009; Partners Zambia, 2010a).

"...to be successful, we need commitment at every level from government ministers and international donors to health care professionals, researchers, patients and families affected by TB." (Dr. Nils E Billo, Executive Director of International Union against Tuberculosis and Lung Disease (The Union)" (Partners Zambia, 2009).

Comment from TB and HIV/AIDS patient

"I have been living with HIV for almost 10 years. I am not proud to say that only after 10 years of living with HIV; I accepted the challenge of speaking publicly about Tuberculosis (TB) . What took me so long?" (Partners Zambia, 2010).

"For us the irony is that with the availability of drugs for HIV and particularly of safe and affordable Indian generics, we are living with HIV but dying of TB..." "TB research has yet to see any great progress as we struggle to pull ourselves out of a system that places profits before people's lives"(SEA-AIDS, 2010d).

Note: TB or not TB (when I die) by Werner Durand was played for World TB Day in Italy, 2010, sponsored by Stop TB. This piece is based on two Rembetiko songs by Kostas Roukounas: When I die and my suffering will be relieved (Stop TB, 2010b).

REFERENCES

Accessed (2000). MSF calls for government action for TB treatment research. Two million die every year. Drug resistance is growing.

- [On-line]. Available: <http://www.accessmed-msf.org/prod/publications.asp?scntid=228200133453&contenttype=P> ARA&. Accessed: August 11, 2005.
- AF-AIDS (2002). TB, HIV/AIDS, and Malaria together account for nearly 6 million deaths per year [On-line]. Available: af-aids@eforums.healthdev.org. March 10, 2002. Accessed: August 12, 2005.
- AFAIDS (2006). [On-line]. "TB ANYWHERE IS TB EVERYWHERE". World TB Day 2007: Available: af-aids@eforums.healthdev.org. December 20, 2006. Accessed: January 7, 2007.
- AFAIDS (2007a). World TB Day 2007 "One-in-Ten": A 50-day on-line campaign on drug resistant TB". [On-line]. Available: af-aids@eforums.healthdev.org. February 5, 2007. Accessed: February 5, 2007.
- AFAIDS (2007b). Press Release: Eldred to assume Project Director Post [On-line]. Available: af-aids@eforums.healthdev.org. February 8, 2007. Accessed: February 8, 2007.
- AFAIDS (2007c). Press Release: TB and HIV What the Papers Arent Saying! [On-line]. Available: af-aids@eforums.healthdev.org. February 8, 2007. Accessed: March 25, 2007.
- AFAIDS (2007d). Press Release: Statement: Everyone has a role to play in addressing TB and HIV [On-line]. Available: af-aids@eforums.healthdev.org. March 26, 2007. Accessed: March 27, 2007.
- AFAIDS (2007e). Perspective: TB Africas Silent Challenge [On-line]. Available: af-aids@eforums.healthdev.org. March 27, 2007. Accessed: March 27, 2007.
- AFAIDS (2007f). Perspective: TB Africas Silent Challenge [On-line]. Available: "CAPE TOWN 2007 News: Improved data on XDR-TB "early next year": WHO. November 12, 2007. Accessed: November 12, 2007.
- AFAIDS (2008). African Civil Society - Position paper on HIV and AIDS in Africa [On-line]. Available: af-aids@eforums.healthdev.org. June 6, 2008. Accessed: June 8, 2008.
- AFAIDS (2010). Global Fund seeks \$20 billion to fight AIDS, TB [On-line]. Available: af-aids@eforums.healthdev.org. June 6, 2008. Accessed: March 25, 2010.
- AFP (2007) Deadly HIV-TB co-epidemic sweeps sub-Saharan Africa: report. [On-line]. Available: <http://afp.google.com/article/ALeqM5hm0OfScglB8CKBbSOBjkOxg3ojhA>. Accessed: November 5, 2007.
- Agence France Presse (2002). Asian TB Catastrophe (02.18.02).
- Alam MS, Sarker MS, Asif Mujtaba M, Mushfiqur Rahman Faruq AKM, Jahanara B, Pierpaolo de C, David Y, David AS, Tasnim A (2005). Low infection rates among tuberculosis patients in Dhaka, Bangladesh. *Int. J. STD AIDS* January 2005. 17: 86-87.
- Answers Encyclopedia (2010). [On-line]. Available: Q and A. Available: <http://answers.encyclopedia.com/question/aids-discovered-111880.html>. Accessed: April 5, 2010.
- Bangladesh observer (2002). Tuberculosis one of major syndromes of HIV infection in Bangladesh.
- Daily Star (2005a). [On-line]. Free drugs for TB to people living with HIV Available: <http://www.thedailystar.net/2005/05/20/d50520012622.htm>. May 20, 2005. Accessed: February 11, 2006.
- Daily Star (2005b). [On-line]. Effective advocacy vital to lowering TB prevalence. Available: (<http://www.thedailystar.net/2005/12/14/d5121401097.htm>). Dec 14, 2005. Accessed: February 11, 2006.
- Daily Star (2005c). [On-line]. Situation of TB in Bangladesh. Available: <http://64.233.179.104/search?q=cache:zesk4TQQsk0J:www.thedailystar.net/2005/12/18/d512186105105.htm+tb+and+HIV&hl=en&ct=clnk&cd=9&ie=UTF-8>. Dec18, 2005. Accessed: February 11, 2006.
- Daily Star (2005d) [On-line]. TB claims 70,000 a year. Available: <http://www.thedailystar.net/2005/08/01/d50801060660.htm>. Aug 1, 2005. Accessed: February 11, 2006.
- Daily Star (2007) [On-line]. 88 patients of MDR-TB detected. Available: <http://www.thedailystar.net/2007/03/25/d70325012418.htm>. Accessed: March 25, 2007.
- Department of Virology (2002). Bangabandhu Sheikh Mujib Medical University (2002).
- Dye C. Global epidemiology of tuberculosis. *Lancet* 2006; 367: 938-940.

- Emily Bell (2006). Open Society Institute. Civil Society Perspectives on TB Policy in Bangladesh, Brazil, Nigeria, Tanzania, and Thailand. http://www.soros.org/initiatives/health/focus/phw/articles_publications/publications/civilsociety_20061101. Accessed on: March 7, 2007.
- Financial Express (2009). Half of country's adults carry TB bacteria. [On-line]. Available: http://www.thefinancialexpress-bd.com/more.php?news_id=88054. Accessed: Feb 7, 2010.
- Global Fund (2010). Elimination of HIV transmission from mother to child by 2015 within reach [On-line]. Available: http://www.thefinancialexpress-bd.com/more.php?news_id=88054. Accessed: March 22, 2010.
- Global Link (2002). Finding solution for AIDS. [On-line]. Available: <http://www.globalhealth.org/assets/publications/HL115.pdf>. May – June Accessed: August 11, 2005.
- Global Health (2010). Changing Course: Stemming the Deadly Twin Epidemics of HIV and Tuberculosis. [On-line]. Available: <http://www.globalhealth.org/news/article/12318/newsletter>. Accessed: May 11, 2010.
- Goletti D (1996). Effect of Mycobacterium tuberculosis on HIV Replication: Role of Immune Activation. *Journal of Immunology* 1996; 157: 127.
- Health net (2008). Stop-TB eCorrespondent. [On-line]. Available <http://www.healthdev.net/site/post.php?s=3210>. Accessed: August 5, 2008.
- Lancet (1996). 348(9024): 393. 16/8/96.
- Masimba B (2007). TB wake-up call after years of neglect in Africa. [On-line]. Available: <http://www.healthdev.org/kc/.Feb 7 2007>. Accessed: February 22, 2007.
- Mwaba P (1993). The relentless spread of tuberculosis in Zambia-- trends over the past 37 years (1964-2000). *South African Medical Journal* 2003; Feb 93(2):149-52. Accessed: September 14, 2005.
- New Nation (2009) Awareness of HIV/AIDS. [On-line]. Available: <http://nation.ittefaq.com/issues/2009/11/11/news0205.htm>. Accessed: March 18, 2010.
- NIAD (2006). Tuberculosis. [On-line]. Fact Sheet. Available: <http://www.niaid.nih.gov/factsheets/tb.htm>. March 2006. Accessed: September 14, 2005.
- Onyebujoh P, Rodriguez W, Mwaba P. Priorities in tuberculosis research. *Lancet* 2006; 367: 940-942.
- Partners Zambia (2007a). HIV challenging accepted truths about TB control and drug resistance [On-line]. Available: partnerszambia@eforums.healthdev.org. Accessed: March 22, 2007.
- Partners Zambia (2007b). Addressing TB drug resistance: Whats in the new tools pipeline? [On-line]. Available: partnerszambia@eforums.healthdev.org. Accessed : March 25, 2007.
- Partners Zambia (2007c) Cape Town march calls for more effective responses to TB and HIV [On-line]. Available: partnerszambia@eforums.healthdev.org. Accessed : November 11, 2007.
- Partners Zambia (2009) Global: TB and HIV co-infection crisis a bigger threat PlusNews. [On-line]. Available: partnerszambia@eforums.healthdev.org. Accessed : February 7, 2010.
- Partners Zambia (2010a) Perspective: Living with HIV? How to become part of the TB revolution [On-line]. Available: partnerszambia@eforums.healthdev.org. Accessed: March 24, 2010.
- Partners Zambia (2010b). Global: Too few MDR-TB cases diagnosed [On-line]. Available: partnerszambia@eforums.healthdev.org. Accessed : March 26, 2010.
- Partners Zambia (2010c) Spotlight: World Health Day (7th April): 2010 is Year of the Lungs [On-line]. Available: partnerszambia@eforums.healthdev.org. Accessed : April 8, 2010.
- Paul R (2003). Associated Press, June 3, 2003.
- Pio A, Luelmo F, Kumaresan J, Spinaci S, National tuberculosis programme review: experience over the period 1990–1995. *Bull World Health Organ* (1997); 75: 569–581.
- Procaare (2001). [On-line]. Tuberculosis Pleurisy More Severe in HIV-Positive Patients. Available: <http://www.procaare.org/archive/procaare/200110/msg00037.php>. Accessed: September 14, 2005.
- Prothom Alo in (2007b). March 24, 2007.
- Prothom A (2007a). In collaboration with Brac January 5, 2007.
- Rasheed F, Choudhury MR, de Colombani P, Narain JP (1998). Adapting the Principles of Government/NGO Memorandum of Understanding (MOU) on TB for AIDS. (Unpublished).
- Research for Development (2010) [On-line]. Tackling TB-HIV stigma. Available: <http://www.research4development.info/news.asp?articleID=50607>. Accessed: March 27, 2010.
- RTI International News (2003). Where in the world is RTI. [On-line]. Available: <InternationalNews@rti.org> Fri, 7 Feb. Accessed: August 11, 2005.
- Salimullah M, Tahera Y, Siddiqui MA. Prevalence of human immunodeficiency virus infection among tuberculosis cases in some clinics in Dhaka, Bangladesh. *Trans R Soc. Trop. Med. Hyg.* (2000) 94: 276.
- SEA-AIDS (2007a). Benchmark: Integration of TB and HIV services urgently needed in Indonesia. Bobby Ramakant [On-line]. Available: SEA-AIDS [sea-aids@eforums.healthdev.org]. Accessed: February 26, 2007.
- SEA -AIDS (2007b). Integration of TB and HIV services urgently needed in Indonesia (1). Chris W Green. [On-line]. Available: SEA-AIDS [sea-aids@eforums.healthdev.org]. Accessed: February 27, 2007.
- SEA-AIDS (2007c). A clash of cultures. *Nature Medicine* [On-line]. Available: SEA-AIDS [sea-aids@eforums.healthdev.org]. Accessed : March 10, 2007.
- SEA-AIDS (2007d). TB control efforts inadequate in Western-Pacific region. [On-line]. Available: SEA-AIDS [sea-aids@eforums.healthdev.org]. Accessed: March 13, 2007.
- SEA-AIDS (2007e). Demand for Action on TB and HIV. [On-line]. Available: SEA-AIDS [sea-aids@eforums.healthdev.org]. Accessed: March 13, 2007.
- SEA-AIDS (2007f). Regional media focuses on drug resistant TB. [On-line]. Available: SEA-AIDS [sea-aids@eforums.healthdev.org]. Accessed: March 22, 2007.
- SEA-AIDS (2008). Special Edition eCorrespondent - June 2008 [On-line]. Available: SEA-AIDS [sea-aids@eforums.healthdev.org]. Accessed: June 15, 2008.
- SEA-AIDS (2009). Human Rights and people living with HIV-TB co-infection (1) Dr Avnish Jolly, India [On-line]. Available: SEA-AIDS [sea-aids@eforums.healthdev.org]. Accessed: Nov 17, 2009.
- SEA-AIDS (2010a). World TB Day: AIDS and Drug Resistance pose challenges to TB control in India. [On-line]. Available: SEA-AIDS [sea-aids@eforums.healthdev.org]. Accessed: March 25, 2010.
- SEA-AIDS (2010b). Action: Double burden - Diabetes and Tuberculosis (TB). [On-line]. Available: SEA-AIDS [sea-aids@eforums.healthdev.org]. Accessed: April 5, 2010.
- SEA-AIDS (2010c). World Health Day (7th April): 2010 is Year of the Lungs. [On-line]. Available: SEA-AIDS [sea-aids@eforums.healthdev.org]. Accessed: April 7, 2010.
- SEA-AIDS (2010d). Making Open Source Drug Discovery a Reality: TB Treatment Research. [On-line]. Available: SEA-AIDS [sea-aids@eforums.healthdev.org]. Accessed: April 15, 2010.
- SEA-AIDS (2010e). Global Drug Facility reaches 16.5 million mark for tuberculosis treatments. [On-line]. Available: SEA -AIDS [sea-aids@eforums.healthdev.org]. Accessed: May 10, 2010.
- SHOHOJOGI (2002). UN Says India May Overtake S.Africa in AIDS Cases [On-line]. Available: bangladesh@hivnet.ch. Accessed: September 14, 2005.
- Stop TB (2001). [On-line]. Available: <http://www.stoptb.org/material/news/press/Ungass.010625.htm>. Accessed: September 14, 2005.
- Stop TB (2010a). [On-line]. Drug-resistant tuberculosis now at record levels. Available: <http://stoptb.org/news/stories/2010/mdrreport032.asp>. Accessed: March 22, 2010.
- Stop TB (2010b). [On-line]. 24-hour World TB Day music marathon begins at midnight, 24 March. Available: <http://stoptb.org/news/stories/2010/tobecontinued.asp>. Accessed: March 24, 2010.
- Stop TB (2010c). [On-line]. Global Plan to Stop TB 2006–2015, 24 March. Available: <http://www.stoptb.org/global/plan/>. Accessed: March 27, 2010.
- The Global Alliance for TB Drug Development (2005). [Online]. Available: http://66.216.124.114/7_1_1GenericNewsArticles.asp

- ?itemId=289. Accessed: September 14, 2005.
- University of Maine (2004), Communicable Disease, a Power point presentation.
- WHO (2005). [On-line]. Available: http://www.who.int/vaccine_research/documents/new_vaccines/en/index3.html. Accessed: September 14, 2005.
- USAID Bangladesh (2009). [On-line]. Bangladesh. Available: http://www.usaid.gov/our_work/global_health/id/tuberculosis/countries/asia/bangladesh.pdf. Accessed: Feb 7, 2010.
- WHO (2005a). [On-line]. New Vaccines. Available: http://www.who.int/vaccine_research/documents/new_vaccines/en/index3.html. Accessed: August 11, 2005.
- WHO (2005b). [On-line]. Fact Sheet. Available: <http://www.who.int/mediacentre/factsheets/fs104/en/>. Accessed: September 14, 2005.
- WHO Global TB Report 2009.
- Wrong Diagnosis (2005). [On-line]. Tuberculosis: Introduction. Available: <http://www.wrongdiagnosis.com/t/tuberculosis/intro.htm>. Accessed: September 14, 2005.
- Zaman, K, Hossain S, Yunus M, Arifeen SE, Mahmud A, Begum V, Islam A, Baqui AH, Luby S (2007). Tuberculosis in Bangladesh: A 40-Year Review .11 ASCON. ICDDR,B. Scientific session, abstract book 86: 4-6 March 2007.
- Zaman K (2010). Tuberculosis: A Global Health Problem. Editorial. J. Health Popul, 2010 April, 2010; 28(2): 111-113.