INTEGRATION OF TB AND HIV SERVICES IN RESOURCE-CONSTRAINED COUNTRIES

Experience from low and middle income countries and a way forward for TB/HIV service integration in Vietnam

Phuong Thuy Nguyen
Vietnam

49th International Course in Health Development
September 19, 2012 - September 6, 2013

KIT (ROYAL TROPICAL INSTITUTE)
Development Policy & Practice/
Vrije Universiteit Amsterdam

Integration of TB and HIV services in resource-constrained countries - Experience from low and middle income countries and a way forward for TB/HIV service integration in Vietnam

A thesis submitted in partial fulfilment of the requirement for the degree of Master of Public Health

by

Phuong Thuy Nguyen
Vietnam

Declaration:

Where other people's work has been use (either from a printed source, internet or any other sources) this has been carefully acknowledged and referenced in accordance with departmental requirements.

The thesis "*Integration of TB and HIV services in resource-constrained countries - Experience from low and middle income countries and a way forward for TB/HIV service integration in Vietnam*" is my own work.

Signature: 

49th International Course in Health Development (ICHD)
September 19, 2012 - September 6, 2013
KIT (Royal Tropical Institute)/ Vrije Universiteit Amsterdam,
Amsterdam, The Netherlands

September 2013

Organised by:

KIT (Royal Tropical Institute), Development Policy & Practice
Amsterdam, The Netherlands

In cooperation with:

Vrije Universiteit Amsterdam/ Free University of Amsterdam (VU)
Amsterdam, The Netherlands

Table of Contents

Acknowledgement iii
List of Abbreviations iv
Abstract v
Introduction vi
I. Background information 1
1. General information 1
2. HIV epidemic in Vietnam 1
3. TB/HIV co-infection in Vietnam 2
II. Problem statement, Justification, Objectives and Methodology 3
1. Problem statement and justification 3
2. Objectives 4
2.1. General objective: 4
2.2. Specific objectives: 4
3. Methodology 5
3.1. Study design 5
3.2. Data sources 5
3.3. Search strategy 5
3.4. Data synthesis and analysis 5
3.5. Limitations of the study 6
3.6. Conceptual framework 6
III. Findings 10
1. "TB-refer" model 10
1.1. Organization of the model 10
1.2. Measures of effectiveness of integration 11
2. HIV refer 12
2.1. Organisation of the model 12
2.2. Measures of effectiveness of integration 13
3. TB: tests and refers 14
3.1. Organisation of the model 14
3.2. Measures of effectiveness of integration 15
4. HIV test and refer 16
4.1. Organisation of the model 16
4.2. Measures of effectiveness of integration 18

5. Single facility 19
5.1. Organisation of the model 19
5.2. Measures of effectiveness of integration 20
IV. Discussion 22
Strengths and weaknesses of the models 22
Advantages and disadvantages of implementing each model in the context of Vietnam 23
V. Conclusion and recommendation 27
Conclusion 27
Recommendation 28
VI. References 30
VII. Annex 37
Annex 1 – Organization of Vietnam health system 37

Acknowledgement

Foremost, I would like to express my deepest appreciation to my thesis advisor and backstopper for all of your guidance and constructive feedbacks for my thesis. Without your support, this thesis would not have been accomplished.

Secondly, I would like to thank ICHD course coordinators and KIT staff for organizing this master course and for all your practical and moral support during this intensive year.

Special thanks also to my ICHD classmates and my colleagues at Hanoi School of Public Health in Vietnam for your contributions, advises and feedbacks, not only for my thesis but also for my study throughout the year.

I am also deeply grateful to Ford Foundation through Center for Education Exchange with Vietnam (CEEVN) for their financial support, which allowed me to be able to attend this course.

Last but not least, I would like to thank my family: my parents, my aunt and my little sister for all your love and support in my life; and to my fiancé for always taking care of me, especially for the time I am in Europe.

List of Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
ART	Anti-retrovirus Therapy
CPT	Co-trimoxazole Preventive Therapy
DHC	District Health Centre
DOTS	Direct Observed Therapy Short-course
FSW	Female Sex Worker
GDP	Gross Domestic Product
HIV	Human Immunodeficiency Virus
IPT	Isoniazid Preventive Therapy
LMIC	Low and Middle Income Countries
LTBI	Latent Tuberculosis Infection
M&E	Monitoring and Evaluation
MOH	Ministry of Health
MSM	Men who have Sex with Men
NGO	Non-governmental Organizations
OOP	Out-of-pocket Payment
OPC	Out-patient Clinic
PAC	Provincial HIV/AIDS Control Centre
PEPFAR	The U.S. President's Emergency Plan for AIDS Relief Program
PITC	Provider Initiated Testing and Counselling
PLHIV	People living with HIV
PMTCT	Prevention of Mother to Child Transmission
PWID	People Who Inject Drug
STI	Sexually Transmitted Infection
TB	Tuberculosis
TST	Tuberculin Skin Test
TWG	Technical Working Group
UNAIDS	The Joint United Nations Programme on HIV/AIDS
VCT	Voluntary Counselling and Testing
VAAC	Vietnam Authority of HIV/AIDS Control
WHO	World Health Organization

Abstract

Objective: To review literatures on the outcomes of integrating tuberculosis (TB) and HIV service in Vietnam and resource-constrained countries in order to provide recommendations for Vietnam to effectively implement TB/HIV service integration.

Method: Literature review. Both published and grey literatures were obtained from search of electronic databases and snowball searching (manually search articles in reference list of publications obtained). Literatures were reviewed and categorized by 05 models of TB/HIV integration developed by H. Legido-Quigley et al.

Results: 40 publications were included in the review. The integrated models based on referrals only ("TB refers" and "HIV refers") were seen more often in countries with low HIV prevalence while the more integrated models were more common in countries with generalized HIV epidemic. More integrated models required more resources to set up but tended to provide better outcomes and reduce referral failure. Stigma remained the main barrier for TB/HIV integrated service utilization. Few publications presented cost/cost-effectiveness of integration models. In Vietnam the integration of TB and HIV services have been implemented here and there but few of them were documented. No example of fully integrated model was found.

Conclusion: From the experience of TB/HIV service integration in low and middle income countries and Vietnam, in short-term, Vietnam should implement referral-only model at national TB and implement "TB: tests and refers" and "HIV: screens and refers" models at provincial and district TB and HIV facilities. For longer-term, fully integrating TB and HIV services is a way forward for Vietnam.

Keywords: HIV, Tuberculosis, service integration, low and middle income countries, Vietnam

Introduction

Having worked at Hanoi School of Public Health, Vietnam for more than 3 years, my main task is to provide training on management of HIV control programs in Vietnam. My interest as well as concern regarding HIV program in Vietnam are the effectiveness and sustainability of the program.

Beside HIV epidemic, Vietnam also has very high burden of TB, which has been ranked 12th among countries with highest burden of TB in the world. TB-HIV co-infection is becoming a serious public health issue in Vietnam as roughly 6400 new TB-HIV co-infection cases are detected yearly (1). Nonetheless, according to report of Vietnam Authority of HIV/AIDS Control (VAAC) in 2012, only 3396 (i.e. 50%) of TB/HIV co-infected patients received anti-retrovirus therapy (ART) and approximately 60% of TB patients were screened for HIV (2). This indicates the ineffectiveness in coping with TB/HIV co-infection issue in Vietnam even though Vietnam Ministry of Health (MOH) has issued a strategy on TB/HIV control since 2008 following the interim policy on TB/HIV collaborative activities in 2004. Integration of TB and HIV services for patients is a way to deal with TB/HIV co-infection issue (3). Evidences on potential benefits and risks of integrated model of service delivery for TB and HIV have been described elsewhere but how to apply those evidences to establish effective TB/HIV collaboration for Vietnam remains untouched. Therefore, this thesis will focus on reviewing evidences of the outcomes of integrating TB and HIV services for patients in order to provide recommendation on best practices for Vietnam in the time to come.

I. Background information

1. General information

Vietnam is a country located in South East Asia, covering an area of approximately 331,210 km^2. With a population of roughly 88.8 million people by end of 2012 (4), Vietnam is ranked 13^{th} among most populated countries in the world (5).

Since late 2010, Vietnam has become a lower low-middle income country with a gross domestic product (GDP) per capita of just more than US$ 1100. The country has a fast economic growth approximately 6% yearly and is expected to become an industrialized country by 2020 (5). Regarding health care, total expenditure for health has been increasing gradually over years and has reached 6.8% of GDP according to World Health Organization (WHO) report in 2011 (6). A majority of total health spending comes from domestic sources and only 3% comes from international donors. However, donor funding has been covering quite a large amount of spending for preventing several important diseases in Vietnam such as HIV/AIDS and tuberculosis (TB). Most (93.3%) health expenditure in Vietnam is out-of-pocket payment (OOP) but the government are working on decreasing OOP by introducing national health insurance scheme in 2012 (6). The objective is to have 80% of Vietnamese citizens covered with health insurance by 2020 (7).

When it comes to service delivery, Vietnam has a 4-tier health system from central, provincial, district to communal level (more details on Vietnam health system see Annex 1). Most preventive and primary care are provided at communal level while clinical services are more likely to be provided at district level or higher. HIV control and TB control are two separate vertical programs. Screening of TB and HIV testing and treatment are mostly delivered at district level but only TB treatment with Direct Observed Therapy Short-course (DOTS) is provided at communal level.

2. HIV epidemic in Vietnam

Vietnam has a concentrated epidemic with a prevalence of 0.3% in general population (8). As of November 2012, there were 208,866 people living with HIV (PLHIV) reported through case-reporting system, including 59,839 patients with AIDS and 62,184 deaths due to complications from HIV related diseases. Since the first case of HIV was detected in early 1990s, the epidemic has spread rapidly in high risk populations such as people who inject drug (PWID), female sex workers (FSW) and men who have sex with men (MSM). According to VAAC report in 2012, the prevalence among PWID was 17.2% and among FSW was 4.6% (2). Additionally, the Integrated Biological and Behavioural Study (IBBS) in 2009 revealed that the prevalence among MSM was 16.7% (9). For year, the epidemic in Vietnam has been largely driven by PWID with more than 70% of reported cases infected with HIV through sharing needles.

However, the mode of transmission has gradually shifted from injecting to sexual transmission. In 2012, for the first time the proportion of reported sexually transmitted cases has been higher than transmission through injecting drug (45.5% and 42.1% respectively) (2).

Regarding responses to HIV epidemic, the HIV control program in Vietnam started in the 1990s as a sub-committee under the MOH and has since expanded to a vertical system from central to district level. At national level, VAAC is in-charge of coordinating all HIV/AIDS prevention activities national-wide. At provincial level, there are Provincial HIV/AIDS Control Centres (PACs) and at district level, there are HIV/AIDS control departments as part of District Health Centre (DHC). PACs have close collaboration with the Provincial People's Committees, which allowed good coordination for multi-sectorial response.

3. TB/HIV co-infection in Vietnam

According to WHO, having HIV is the greatest risk factor to develop TB disease in those who infected with Mycobacteria and PLHIV have 20 – 37 times higher risk of developing TB than people who do not have HIV (10). Worldwide, TB is the major cause of morbidity and mortality with 8.7 million people got sick with TB, among those 1.1 million were PLHIV in 2011. TB took away lives of 1.4 million people globally and 30% of them were TB/HIV co-infected (11). Vietnam has been ranked 12th among 22 countries with highest TB burden in the world. In 2011, 90,000 new TB were reported and the mortality rate due to TB was 34/100,000 (1). However, it was estimated that only 54% of all TB cases had been detected national-wide (12). The prevalence of HIV among TB patients in Vietnam has been changing over time, lowest in 1994 with 0.54%, highest in 2004 with 5% and the latest number was 3.6% in 2009 (13). However, this rate differed between research and regions and tends to be higher. A research in Hai Phong, the North o Vietnam showed that 14.2% of TB patients had HIV (14) while other research conducted at National Hospital of Tuberculosis and Respiratory Diseases showed that HIV prevalence among TB patients was 8.2% (15). On the other hand, on the national scale, it is estimated that 65% of PLHIV have TB and 40% of all death among PLHIV are due to TB (16). However, only more than 6,000 new TB/HIV co-infected cases were detected annually. In 2010, only 43% of TB patients were ever screened for HIV while only 38.6% of PLHIV were screened for TB (12). The misdetection of TB/HIV co-infection hinders the care and treatment for TB and HIV, leading to high morbidity and mortality. Hence, TB/HIV co-infection is a serious public health issue in Vietnam.

II. Problem statement, Justification, Objectives and Methodology

1. Problem statement and justification

TB/HIV co-infection is a serious public health issue in Vietnam and a solution for that problem is to provide integrated TB and HIV services to address the co-infection. However, there are not many evidences on TB/HIV integration models and the advantages and disadvantages, effectiveness as well as risks of integrated models.

TB and HIV currently remain great health burdens worldwide. TB accounted for 1.3 million deaths in 2010 and hinders HIV control globally (11). In order to cope with TB/HIV issues, in 2004, WHO published a guideline on TB/HIV collaborative activities (3) and later in 2009, WHO defined indicators for monitoring and evaluation (M&E) of TB/HIV collaborative activities (17). Following WHO guidelines, Vietnam Government and MOH have also promulgated strategies on collaboration in TB and HIV prevention and control such as Decision on the collaboration procedure on diagnosis and treatment for TB/HIV co-infected patients; Decision on M&E of HIV/AIDS program including TB/HIV collaborative activities. Most recently, MOH has approved the collaborative framework for National HIV/AIDS control and prevention program and TB control and prevention project under National health program, period 2012 – 2015. The strategies indicated that TB control program and HIV control program should collaborate in planning and implementing TB/HIV control activities, by establishing TB/HIV steering committee in each province, providing HIV counselling and testing for TB patients, providing TB screening and isoniazid preventive therapy (IPT) for PLHIV and ART for TB/HIV co-infected patients. The goals are to reduce the incidence of TB among PLHIV, reduce the incidence of HIV among TB patients and to minimize mortality and morbidity due to TB/HIV co-infection (12).

Nonetheless, when it comes to implementation of those strategies, not many goals have been achieved. At the moment, TB and HIV control programs are vertically implemented and little collaboration between two programs has been established. In 2008, a sub-committee on TB/HIV was established to coordinate TB/HIV activities at national level and by end of 2012, 49/63 provinces have established a committee on TB/HIV activities under Provincial Health Services to steer TB/HIV collaborative activities in the provinces (12). The number of PLHIV screened for TB as well as the number of TB patients got HIV testing remained low. According to VAAC report, in 2010 there were 22.500 PLHIV got TB screening (accounted for only 38.6% of all PLHIV registered for care and treatment across the country) (18). As for TB patients, in 2011, 59% of them ever got HIV testing and among those who HIV positive, only 48% of them were on ARV treatment due to the poor referral between HIV counselling and testing facilities and ARV treatment facilities (11).

In the new TB/HIV collaborative strategy, Vietnam is aiming to reach the targets by 2015: 90% of TB patients get HIV testing and counselling; 90% of PLHIV with TB get treatment for both TB and ARV; 75% of PLHIV registered in care and treatment program get IPT and 70% of all HIV/AIDS care and treatment facilities perform TB control measures (12). A huge effort need to be made in order to reach those objectives. On the other hand, both TB and HIV control programs are heavily dependent on international funding. According to WHO Global Tuberculosis Report 2012, 68% of all resources for TB control in Vietnam relied on Global Fund (11). As for HIV/AIDS control program, UNAIDS reported that during 2008 – 2010 period, international funding accounted for 72.6% of total expenditure (19) while in 2013, it is estimated that donor fund accounts for 68.2% of all resources (12). As Vietnam has become a middle income country (5), donor fund is expected to decrease drastically in the near future. In the context of decreasing external resources, it is now high time for Vietnam to looking for innovative approaches to efficiently implement TB/HIV collaborative activities.

HIV and TB control program have similar activities (e.g. epidemiological surveillance, behaviour change campaign, M&E, diagnosis/case finding, treatment and infection control), which utilize the same resources of the health system such as drug supply mechanism, laboratory facilities, M&E system and human resources). Therefore integration of TB and HIV services has the potential to share the constrained resources between two programs (20), (21). However, there are not many evidences on TB/HIV integration models and the advantages and disadvantages, effectiveness as well as risks of integrated models. Therefore, this thesis will focus on reviewing evidences of TB/HIV service integration models and the effect of service integration on output of service delivery, patients' outcomes, and cost-effectiveness of those models to provide evidences and recommendation on best practices for Vietnam in providing TB/HIV collaborative activities in the time to come.

2. Objectives

2.1. General objective:

To review literatures on the outcomes of integrating TB and HIV service in Vietnam and resource-constrained countries in order to provide recommendations for Vietnam to effectively implement TB/HIV service integration.

2.2. Specific objectives:

1. Review existing TB/HIV service integration models in Vietnam and other low and middle income countries
2. Review effects of each model on outputs of service delivery, patients' outcomes, and cost-effectiveness
3. Provide recommendations to improve service integration in Vietnam

3. Methodology

3.1. Study design

I conducted a literature review of literatures describing the implementation of integrated TB and HIV services in health facilities and the outcomes of integrated models in Vietnam and other low and middle income countries (LMIC)

3.2. Data sources

Data for literature review were obtained from printed and electronic journal articles, reports, webpages of related organizations (WHO, UNAIDS, VAAC, MOH, Non-governmental organizations (NGO) working in TB/HIV issues, etc.) and grey literature related to the topic. Electronic materials were obtained via different bibliographic databases including PubMed, Scopus, ScienceDirect, Google Scholar, PLoS Medicine, Ingentaconnect, PLoS Ones, Cochrane and local databases in Vietnamese.

There is no date limit for publications used in this review. All full text materials presented the delivery of TB/HIV integrated services in practice and results on (both) positive and negative outcomes (service delivery, patients' outcomes, and cost-effectiveness) of the models in LMIC were included. LMICs are defined according to World Bank's definition (22).

With the magnitude of this thesis, 5-10 publications were selected for review for each integration model. Priority was given to those described the integration model in detailed, provided more comprehensive information on integration outcomes and for those in countries with similar HIV epidemic with Vietnam (probably geographically close to Vietnam).

3.3. Search strategy

Combinations of key words (primary in in English and translated correspondingly into Vietnamese) were used to search for literatures: "tuberculosis (TB)", "HIV", "delivery of services", "health care delivery", "integration" (integrated/integrating), "linkages" (link/linking), "referral", "collaborations/collaborative", "co-infection", "Isoniazid", "Co-Trimoxazole", "preventive therapy", "treatment", "testing", "screening" and "Vietnam"/other names of countries in LMIC list as defined by the World Bank (5). I also manually searched from reference lists of articles found (snowball searching) to obtain further appropriate articles.

3.4. Data synthesis and analysis

Review findings are organized around two frameworks: firstly, it is the TB/HIV service integration framework by H. Legido-Quigley et al (23) to examine models of service integration and the second framework derived from WHO guideline on TB/HIV collaborative activities and indicators to analyse the outcomes of integration models (3),(17). Detail on the frameworks is presented in below session.

3.5. Limitations of the study

Limitations of this review include the incomprehensiveness of publications, especially of those describing the situation in Vietnam. Even though brief reports and news suggested that integrated TB/HIV services have been implemented here and there but no concrete reports were obtained. Only literatures in English and Vietnamese were used for this review. Not all articles relevant to the topic could be obtained due to limitation in access to several bibliographic databases. Among publications retrieved, few of them compared two or more models so there has not been strong evidence on the relative effectiveness of different integrated models. Additionally, most studies were implemented on small scale (at provincial or district level) rather than a representative research at national scale.

3.6. Conceptual framework

3.6.1. TB/HIV service integration framework

H. Legido-Quigley et al has developed a framework of TB/HIV service integration as illustrated in Figure 1 below. The framework describes three levels of integration with five integrated models based how patients first access to healthcare services. The level of integration ranges from least integrated (only referral between TB and HIV services) to the most integrated form where all TB and HIV services are provided in the same health facility (23).

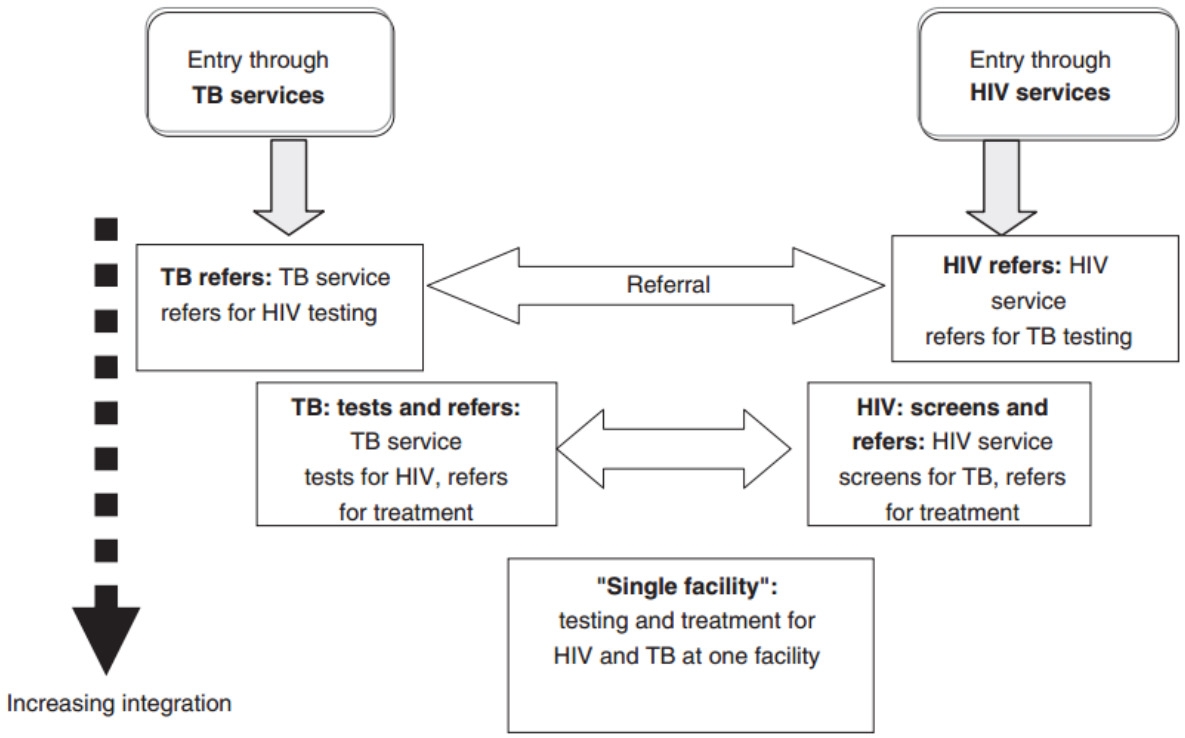

Figure 1 – TB/HIV service integration framework

Least integrated: Referral model

- If patients enter the healthcare system through TB facilities which provide only TB services, they will be referred to HIV facilities for testing and treatment if needed (co-trimoxazole preventive treatment, ARV treatment). This is called the "TB refers" model in this framework.
- If patients enter the healthcare system through a facility that provides HIV services only, they will be referred to TB services for screening and subsequence treatment. This is "HIV refers" integration model

Moderate integrated: closer integration

- "TB: tests and refers" model: TB facilities also provide HIV testing for their clients but refer them to HIV services for subsequence treatment
- "HIV: screens and refers" model: HIV facilities provide TB screening to identify TB infection and refer patients with TB to TB facility for treatment

Most integrated: single facility

- All services for both TB and HIV are provided at the same facility. If TB and HIV services are integrated in to primary health care centres together with other services (such as PMTCT, STI, family planning, etc.), this model also included in "single facility" model in this review.

3.6.2. Outcomes of TB/HIV integrated models

The framework to review effect of integration models was developed based on WHO guideline on TB/HIV collaborative activities in 2004 (3) and the guideline for monitoring and evaluation of TB/HIV collaborative activities in 2009 (17). The 2004 guideline included 8 main strategies for TB/HIV collaborative activities that could be implemented at health facility level and for each activity, a set of indicators has been selected in the 2009 guideline to monitor and evaluate its progress and effects. The indicators mainly measure the service delivery aspect of TB/HIV collaborative activities. Hence, each model in Legido-Quigley's framework will be assessed based on but not limit to those indicators when applicable. Beside, patient outcomes and cost-effectiveness of each model if emerge from literature will also be reported in the review findings.

Table 1 - WHO framework on TB/HIV collaborative activities and indicators for M&E

Domain	Recommended collaborative activities	Indicators
Decrease the burden of TB in PLHIV	Establish intensified case finding: TB screening and diagnosis	Percentage of HIV-positive patients who were screened for TB in HIV care or treatment settings
		Percentage of HIV-positive patients who received TB treatment
		Percentage of estimated HIV-positive incident TB cases that received treatment for TB and HIV
	Introduce isoniazid preventive therapy	Percentage of new HIV-positive patients starting IPT during the reporting period
	Ensure tuberculosis infection control in health-care and congregate settings	Proportion of health-care facilities providing services for people living with HIV that have infection control practices that include TB control
		Proportion of health-care workers, employed in facilities providing care for people living with HIV, who developed TB during the reporting period
Decrease the burden of HIV in TB patients	Provide HIV testing and counselling	Proportion of TB patients with known HIV status
		Proportion of all registered TB patients who had documented HIV status recorded who are HIV-positive

		Case-detection rate of TB patients with documented HIV-positive status
	Provide HIV prevention methods	Availability of free condoms at TB services
	Introduce Co-Trimoxazole preventive therapy (CPT)	Proportion of HIV-positive TB patients who receive CPT
	Ensure HIV care and support	Proportion of HIV-positive TB patients enrolled in HIV care services during TB treatment
	Introduce Antiretroviral therapy	Proportion of HIV-positive registered TB patients given ART during TB treatment

(Source: WHO. A guide to monitoring and evaluation for collaborative TB/HIV activities. Geneva: World Health Organization, 2009.)

III. Findings

After applying search strategy as mentioned earlier, 40 publications have been qualified and selected for the review. Most of the publications were published during the last decades (2000 until current) and more publications were found in recent years. Geographically, a majority of the publications was in Sub-Sahara countries, some from Asia countries such as India or Cambodia. "Single facility" model were mainly found in Sub-Saharan countries while referral mechanism between TB and HIV services were more dominant in Asian countries. In all publications obtained from Vietnam, there is no example of "one-stop shop" but only referral models. Most studies in Vietnam were carried out in provinces in the North and the South of the country. Little publications were found in the Central part of Vietnam. Literatures were reviewed and categorized by 05 models of integration. For each model, the organization/setting up of service integration and its outcomes were summarized and reported as following.

1. "TB-refer" model

1.1. Organization of the model

This model is described in 08 papers found after searching. In this model, patients entered the healthcare system through TB clinics, mostly at district level, and were counselled to have HIV test in another facility. If patients agreed to get tested, they would be referred to HIV counselling and testing centres, to receive the test. These centres could be a stand-alone facility near TB clinics or located in the same facility with TB clinics but operated by different health staff. After having test, they might or might not receive subsequent HIV care.

For example, in Congo when patients at TB clinics were counselled on taking HIV testing and then, if agreed, were referred to a stand-alone voluntary counselling and testing (VCT) centre which was 1 km away from TB clinics (24). The same model, where patients were referred to VCT centres located distantly from the TB clinics, was also seen in India and Mozambique (25),(26),(27),(28). In case the TB clinic is a part of a DHC where VCT centre also located, patients were transferred to the VCT centre under the same roof. This could be seen in Congo (24), India (29), and Malawi (30),(31). Patients preferred when the VCT centre is shared location with TB service as patients did not have to travel long distance to seek for HIV testing. As for TB staff, referring patients for HIV testing could avoid increase in their workload and they can focus more on TB treatment (24),(28).

There is no published article on this model found in Vietnam. However, as in the guideline on the procedure of collaborative diagnosis and treatment for TB/HIV co-infected patients of Vietnam MOH, it was stated that all TB patients must be screened for HIV related illnesses during TB examination/treatment. Plus, for TB patients with unknown HIV status, they should be counselled to have HIV test voluntarily at VCT centres (32). Although the guideline was promulgated in 2007, by 2010, only

43% of TB patients had ever tested for HIV according to report from VAAC (12). Additionally, this statistic included all TB patients in different clinic models (including those in more integrated TB/HIV clinics) so the real percentage of TB patients referred for HIV testing in Vietnam was much lower.

Regarding the preparation for implementing referral system between TB clinics, only articles from India described the process. In a study in South India, both TB and VCT staff involving in referral service were trained on referral procedures, standardized referral form, and record keeping and reporting process (25). In another study in West India, besides training on referral procedure and referral data recording, health staff were also trained on general knowledge on TB, HIV and TB/HIV co-infection (27).

None of the studies reported use of screening checklist or written questionnaire to determine whether or not a TB patient had HIV-related risk behaviours before referring them for HIV testing. When TB patients referred to VCT centres, their referral records and test result were only kept in VCT registration system (27) or communicated by VCT counsellor back to TB doctor under patients' consent (25),(26).

1.2. Measures of effectiveness of integration

Studies on this "TB-refers" model found that HIV testing and counselling was accepted among TB patients (24),(25),(29). 99% of TB patients in a study in Congo believed that HIV testing should be provided to them (24) while in South India, 69% of TB patients were willing to take HIV test when they were counselled about it (25). However, the percentage of referred patients eventually had HIV test varied widely between studies. The study in TB hospitals across Malawi in 2002-2003 revealed that only 8% of TB patients tested for HIV after registered at TB clinics of TB patients tested for HIV after being registered at TB clinics and this percentage in 2003 was 15% (30). Study in South India showed that up to 92.4% of TB patients accepted HIV testing (25). Another study in two districts in Southern region of Malawi also indicated a 91% uptake of VCT among TB patients (31). Main difficulties they faced when reaching VCT centres was the long distance between two facilities, cost of transportation and fear of stigma for HIV (24),(25). The huge difference in uptake of HIV testing could due to barriers mentioned before but it can also be explained by the different in data collection and reporting. For example, in the case of Malawi, they did not report the percentage of TB patients who had already known their HIV status before coming to TB clinics. Therefore, the real denominator (TB patients who HIV status had not been known) might be smaller and the percentage of TB patients tested after registered at TB clinics could be higher. Only one study in India reported the proportion of TB patients with known HIV status (70%) (25).

Regarding subsequence treatment for TB/HIV co-infected patients who were detected after referring to VCT, 44% – 87% of patients received CPT (26),(30). In the region of 81% – 93% of co-infected patients were

referred to ART clinics but only 56 – 61% of them were actually registered at the ART clinic (25),(26),(29). Only the study in Malawi compared the treatment outcomes of TB patients who were and were not offered referral VCT and CPT. Treatment success rate was significantly higher in the clinic offered referral VCT and co-trimoxazole than the one without such service. Death rate among TB patients was also lower in clinic with extra services (31).

No information on cost or cost-effectiveness was reported in literature found.

2. HIV refer

2.1. Organisation of the model

This model was described in 06 papers and 01 report. Similar to "TB refers" model, clients enter through a HIV service facility and got referred to a separated TB facility for screening and treatment. However, unlike "TB refers" model in which entry point was solely TB clinics, the entry points for "HIV refers" model could be a VCT or more commonly – HIV care and treatment facilities.

For example, in India, VCT clients were quickly screened by VCT counsellors for suggestive symptoms of TB (long coughing) and referred to TB clinics with a request form for sputum examination (27),(28). The same procedure was reported in Mozambique (33). However, none of the publications described methods used to diagnose TB for referred VCT clients. The referral of VCT clients was made irrespectively of their HIV status and in all cases, the result of TB screening were reported back to VCT counsellors and clients' records were kept at VCT centres (27),(28),(33).

As for the case that the entry points are HIV care and treatment facility, where clients are PLHIV, TB screening tended to be done on a regular basis. For example, newly diagnosed PLHIV in Uzbekistan, Tajikistan, and Kyrgyzstan were referred for TB screening by chest X-ray immediately and the screening was repeated once every year. Screening results were kept at TB clinics and informed back to HIV facilities. Patients who had TB were registered and treated at TB clinics (34).

In Vietnam, all found publications described the referral of PLHIV in HIV care and treatment facilities for TB screening. This reflected the fact that there is no guideline on referral of VCT clients for TB screening as all HIV-positive VCT clients would be referred to HIV out-patient clinic (OPC) - a hub for all HIV care and treatment activities. As guided by MOH, all registered PLHIV at OPCs should be screened for TB at least once a year by a standard package including clinical health check, chest X-ray and sputum smear. PLHIV should also be screened for any TB suspect symptoms at every clinic visit. Those with suggestive signs or TB symptoms must be referred to TB clinic for diagnosis using standard package (32). Studies in Ho Chi Minh City and An Giang (two southern

provinces in Vietnam) and Hanoi (the capital city in the north of Vietnam) showed that most PLHIV were screened using chest X-ray. Sputum smear was rarely used as the test is less reliable in PLHIV (35),(36),(37). Another report from Health Care Improvement project in 2 provinces in the north - Nam Dinh and Hai Duong – reported that this project had supported TB screening for PLHIV on ART by referring them to TB clinics in District Health Centres. Furthermore, with the help of local peer educators, the project had outreach for unregistered PLHIV in the area to have TB screening at DHCs (38).

Regarding the preparation for implementing referral system, similar to "TB refers" model, HIV and TB staff involved in the process were trained on the referral and record keeping procedure (27),(33). Additionally, HIV staff were trained on TB suggestive symptoms. To monitor and cross check the referral results, meeting between TB and HIV staff were also held on a regular basis (27),(38). Overall, few logistical and additional resources were required to implement such referral.

2.2. Measures of effectiveness of integration

When the entry point of referral was a VCT, studies showed that 3 – 6% of all VCT clients had TB symptoms and were referred to TB clinics for further diagnosis. Among those who were referred, 83 – 85% had reached TB clinics to receive services (27),(33). By referring VCT clients for TB screening, the TB case notification rate for VCT clients was 655 per 100,000 compared to 138/100,000 for the district, which meant referral had contributed to improve TB detection (27). However, VCT clients also had to face difficulties in reaching TB clinics due to distance between 2 facilities, inconvenient opening hours at TB clinics as well as they did not understand the importance of TB screening (27),(28),(33).

In Vietnam, studies showed that the proportion of PLHIV screened for TB remained low. In a study in Ho Chi Minh City and Hanoi, only 18% of PLHIV registered at OPC were screened for TB using chest X-ray and sputum smear (36). In An Giang province, only 21% of PLHIV were screened when referral system was first established and the proportion had increased over time to 61% after 4 years of implementation (35). The project in Nam Dinh and Hai Duong reported 69 – 99% of patients on ART had TB screening. However, this was a small project implemented in 3 districts in a limited period of time and no follow-up data were presented (38). Barriers for PLHIV to access TB screening were similar with VCT clients. As for staff at HIV clinics, their difficulty in implementing referral activities was that suggestive TB symptoms were unclear and poor communication between two services (34),(36).

Only article in Central Asia countries reported providing subsequence co-trimoxazole preventive treatment for TB/HIV co-infected patients but no concrete data were presented.

Only the study in An Giang, Vietnam reported the cost for TB screening. According to study result, each chest X-ray screening cost US$2.5 – 3.8 (including cost of round-trip transportation to the TB clinics), hence, for each TB suspect detected, the cost was US$40 (35).

3. TB: tests and refers

3.1. Organisation of the model

This model was described in 7 papers and 1 report. In this model, patients arrived at TB clinics were offered HIV counselling and testing onsite and if they got HIV, they would be referred for ARV treatment in another facility. There is a thin line between "TB refers" model and this model since in "TB refers", sometimes TB patients were referred for testing at a VCT under the same roof with the TB clinic as mentioned earlier (24),(29),(30). The distinctions between the two models are that in "TB: refers and tests", TB nurse/doctor is the one who provide pre/post counselling for TB patients (HIV rapid test could be done by them of by other technician). In Kenya, a study described the initiative to integrate provider initiated testing and counselling (PITC) into TB clinics. When it was first implemented, PITC was only provided for patients with confirmed TB infection but later it was introduced to all clients regardless of their TB status. The TB nurse is the one who provide pre-test counselling for patients. If they agreed, they would be referred to the laboratory next door to have two rapid HIV test. Result would be provided after 20 – 30 minutes and the TB nurse would continue with the post-test counselling for patients (39). In Congo and South Africa, TB nurses were in charge of providing completed PITC for TB patients (24),(40). In Cambodia, the model was quite similar but only one staff appointed as TB/HIV coordinator in each district hospital was responsible to provide counselling and HIV test for TB patients (41). Regarding record keeping, as TB staff were the ones who provide PITC, they knew patients' test results and the results were recorded into patients' record (41),(42).

In most cases, if TB patients were HIV positive, they were provided with co-trimoxazole and referred to ARV treatment facilities. However, the mechanism for referring HIV-positive patients to ARV treatment facilities (how to establish the referral system between TB clinics and ARV treatment facility, referral forms, communication between two facilities, etc.) was not described in details (39),(40),(41),(43). Only the study in Cambodia described meetings between TB-HIV stakeholders on regular basis to improve communication and establish the referral flow between two services (41).

In order to set up the integrated TB/HIV model, the most important part was to train for TB staff on HIV counselling and testing so that they could be able to directly provide services for patients. For instant, in Kenya, the TB nurses had both in-classes as well as hand-on session on HIV counselling and testing, and emotion support for HIV positive patients

(39). In South Africa, TB nurse had a 2 day training course on PITC (40). Besides human resources, it was also necessary to set up counselling rooms, equip HIV test kits and other equipment (39),(41).

In Vietnam, only one published project report on integrating HIV testing in TB clinics was obtained. The project was carried out from 2007 to 2008 in Thai Binh, a province in the north of Vietnam with the aim to improve HIV detection among TB patients. At the beginning of the project, health workers at district TB clinics were trained on HIV counselling and testing. As for monitoring and evaluation, a new form for patient's record was developed. The project also assured uninterrupted supply of HIV test kits for all project sites. Only patients with active TB were offered PTIC and CPT was provided on site for co-infected patients (44). Nonetheless, VAAC reported that PEPFAR and Global Fund in Vietnam had been supporting establishment of VCT rooms at TB clinics across the country but how that VCT function within TB clinics and the results of this activity could not be obtained (45).

3.2. Measures of effectiveness of integration

Among TB patients newly registered at TB clinics with unknown HIV status, the percentage of patients underwent HIV testing and counselling was high. In Cambodia, 89% of all TB patients did not know their HIV status before coming to TB clinics and 86% of them were eventually got tested at TB clinics. The percentage of TB patients accepting PITC in the study in Kenya also reached 87% (39). The study in Rwanda showed that TB/HIV activities had resulted in improving HIV testing rate in TB patients from 69% to 97% (42). In Malawi, the evaluation of TB/HIV integration programme showed a drastic increase in HIV testing amongst TB patients and the figure reached 84% at the time of the end-line evaluation (43). In Vietnam, after the project being implemented in Thai Binh, the uptake of HIV testing had significantly increased from just fewer than 20% at the baseline to more than 80% after 20 months (44).

HIV prevalence among TB patients varied largely between countries depends on the epidemic situation of each country. In sub-Saharan countries which had generalized HIV epidemic, the prevalence was very high, from 42% to 70% (39),(42),(43),(46). On the contrary, HIV prevalence amongst TB patients in the study in Cambodia was 4%. In Thai Binh, Vietnam the notified HIV positive rate in TB patients was 5.4%, increased from 1.9% before implementing the integration (44). However, regardless of the HIV prevalence, more than 95% of newly diagnosed TB/HIV co-infected patients were offered CPT in Kenya (39), Rwanda (42), Malawi(43), Cambodia(41), and Vietnam(44). Subsequently, it was reported that timely HIV testing and CPT had contributed to reduce mortality rate in TB/HIV patients in Thai Binh, Vietnam from 21.4% to 13.8% and TB cured rate increased from 8.9% to 13.8% after 18 months of the project (44). In Rwanda, risk of death in TB/HIV patients in was reported to reduced overtime after implementing integration services (42).

Regarding the referral of TB/HIV patients to HIV care and treatment, only the study in Cambodia and Kenya reported the results. In Cambodia, 85% of newly diagnosed co-infected patients were referred for home-based care and 42% received ART during TB treatment (41). In Kenya, 58% of newly diagnosed TB/HIV patients were assessed for ART and 71% of eligible patients received treatment (39).

Implementing this model of integration requires more resources compared to "TB refers" due to the investment in infrastructure and HIV testing and counselling materials (23). Barriers for integration including not enough trained staff to provide PITC, lack of sufficient space for testing and counselling, not enough supply, patients' fear of stigma related to HIV testing (40),(42). A huge barrier emerged from studies was the unwillingness of TB staff to provided PITC for patients, especially TB nurses who directly provided such services (24),(40),(42). The study in Rwanda revealed that staff felt uncomfortable to offer the test (42). In South Africa, TB nurses reported to be burned-out due to high patient load and extra PITC services as well as administrative work. Furthermore, TB nurses found it was contradicting to play the role of both care giver (providing TB treatment) and educator (providing counselling) (40). Patients also feel more pressure to accept the test offered by their care givers since they were afraid they would not be treated well if they refused the test (24).

None of the studies or report mentioned cost or cost-effectiveness of this integration model.

4. HIV test and refer

4.1. Organisation of the model

This model of integration was described in 7 papers and 2 reports. In this model, clients entered health care system via HIV service (VCT centres or HIV care and treatment facilities) and they were offered onsite TB screening. HIV facilities used different screening method to diagnose TB in patients and they may or may not provide IPT.

Four publications described the integration of TB screening in VCT centres. The study in Haiti described a very early initiative in 1997 to provide onsite TB screening for all VCT clients regardless of their HIV status. During the pre-test HIV counselling, counsellor explored the history of coughing in clients and anyone reported a coughing history was transferred to have onsite TB evaluation. The evaluation included physical check, sputum smear, sputum culture (samples provided 3 days in a row) and chest X-ray. Clients diagnosed with active TB were referred for treatment (47). Studies in Uganda and Cambodia pictured the integration of screening for both active and latent TB infection (LTBI) and provision of IPT for PLHIV with LTBI (patients who had Mycobacteria but did not have active TB disease, however they can develop active TB in later stage of life (48)). In Uganda, VCT clients were provided with information on TB at

pre-test counselling session but only those with HIV positive test results were screened for TB. PLHIV were screened for active TB first, if they did not have active TB, they would be provided the Tuberculosis Skin Test (TST) to determine whether or not they had LTBI. For those with LTBI, they were offered IPT and follow-up monitoring (49),(50). In Cambodia, there was no TST available. Therefore, all HIV-positive clients with no active TB were screened again for contraindications (jaundices or chronic liver diseases, having acute hepatitis within last 6 months, pregnancy or alcoholic) and potential signs of poor adherence to IPT (<15 years old, no specific address, poor appointment keepings, etc.). Those who were ineligible for ITP were observed for developing of active TB and those eligible were provided with IPT (51).

Another method for integration is to provide TB screening with or without subsequent IPT via HIV care and treatment facilities. In Rwanda, a study in 3 district hospitals reported that ART staff screened patients using "five-question TB symptom checklist" and TB suspects were accompanied to the onsite TB clinics for sputum microscopy and/or chest radiography. IPH was not available (52). The model in Brazil was quite similar with the one of Uganda in which ART patients were screened for active TB first and later for LTBI using TST (53). In Cambodia, a project to scale-up IPT for PLHIV reported that TST was originally used to screen for TB in all PLHIV at pre-ART/ART treatment sites (54).

Regarding setting up the integration of services, only the studies in Uganda, Brazil and Cambodia described the process. It involved developing a standard operating guideline for TST and IPT, training health staff on providing TST and IPT (50),(53),(54). In Brazil, training nurse on pre and post counselling for TST and adherence to IPT were emphasized to assure effectiveness of the intervention (53). Study in Uganda also mentioned a need for tuberculin procurement mechanism and storing system for skin test and medical doctor to classify TB active and LTBI patients (50). Ventilation and infection control measures were considered when setting up this integration model (47),(50). Hence, providing TB screening together with IPT required more investment in infrastructures as well as human resources than "HIV refers" model.

No published article or report was found in Vietnam describing such model of integration but one grey literature on the subject was obtained (55). A small quality improvement project was implemented in an OPC in Ho Chi Minh City with the aim to increase the percentage of TB screening among ARV patients. In this project, patients on ARV were screened for suggestive TB symptoms and TB suspects were offered sputum test. Sputum samples were taken by HIV nurse and transferred to TB clinics for testing. Therefore patients did not have to travel far and reduce referral failure (55). However, if patients needed a chest X-ray, s/he had to go to TB clinics. This was not completely qualified as "HIV tests and refers" model but it was an attempt to further integrate TB services in HIV treatment setting.

Regarding IPT program in Vietnam, IPT treatment was piloted in 2010 and by end of 2010, 1,300 newly-enrolled ARV patients had given IPT across the country (16). In July 2012, the national guideline on intensified TB case finding and IPT was promulgated which allows providing IPT for all PLHIV, including pregnant women without progressive TB. Hence, confirmation of LTBI is not a requirement to get IPT for PLHIV (56). However, no operational data on the implementation of this regulation were obtained to access the current situation in Vietnam.

4.2. Measures of effectiveness of integration

After implementing the integration services, the percentage of HIV patients screened for TB had increased. In Cambodia, 91% of new pre-ART patients had TB screened (54). The study in Uganda showed that 67% of HIV positive clients were screened for TB when the integration was first implemented in 2001. This figure increased rapidly to 88% in 2003 and stabilized at 85-88%. However, only approximately 40% of TB active patients received treatment after diagnosis (50). In Haiti, the TB suggestive symptom screening was offered to 100% of VCT clients and for TB suspects, they were offered TB diagnosis test. Through this screening program, 10.8% of HIV positive clients were diagnosed with TB and 2.8% of HIV-negative clients were found to have active TB. The benefit of such program is that TB suspects were separated from other clients, reducing the risk of TB transmission between clients and those HIV positive clients without active TB may have chance to access IPT (47).

As for IPT treatment, effectiveness of the program varied depending on the IPT strategy of each country or each project. In the study in Cambodia, to identify eligible PLHIV for IPT, TST was not used but they accessed patients based on contraindications for IPT and potential poor adherence signs. Hence, from 2420 HIV positive patients, 1684 of them had no active TB but only 202 PLHIV were eligible for IPT and in the end only 153 patients were enrolled for IPT. Cost-effectiveness analysis showed that for every 100 patients treated with a full course of ITP (9 months), 25 active TB cases were averted and the cost for a full course IPT treatment was US$135 per person and for each TB case prevented through IPT, the cost was US$955 (51). The analysis in Uganda compared cost-effectiveness of two IPT strategies which were providing IPT with TST or without TST. The study revealed that the strategy to screen PLHIV with TST before giving ITP cost less per patient then the program without TST. The cost per patient in TST program was US$19.80 while this figure for non-TST program was US$51.30. Cost was increased due to the fact that without TST, patients without LTBI also received IPT (49). Hence, using TST to identify patients for IPT made the program more effective. However, there were drawbacks in applying TST. Firstly, it required more resources for training staff on TST, supply of tuberculin test and storing system (50). Secondly, TST takes 72 hours to give result so many PLHIV never returned for the test result and to get IPT (54). Thirdly, quality of TB screening and IPT treatment (patients adherence, complement of IPT

course) varied depending on how much technical support health workers received and how patients perceived IPT (53),(54). For example, in the study of Brazil, by providing support for health staff and emphasis on counselling for PLHIV on IPT, the percentage of patients completed the IPT course had increased significantly from 79% to 87% (53).

5. Single facility

5.1. Organisation of the model

This model was described in 10 publications. South Africa is the source for a majority of articles on "one-stop" model for TB/HIV services. As its name "single facility" or "one-stop", TB and HIV services are comprehensively provided under the same roof. The implementation of this model rooted from the idea that treatment for a patient with both diseases (TB and HIV) in a single facility seemed more practical, especially in the context of increasing number of TB/HIV co-infected patients in countries with high TB and HIV burdens (57),(58).

There are different ways to set up a "single facility": fully integrating HIV services into an existing TB clinic, fully integrating TB services into an existing HIV facility or merging two independent TB clinic and HIV clinic under the same roof (most commonly in a primary health care centre) into one unified facility. Furthermore, in a one-stop facility, TB and HIV services could be provided by separate staff or by the same staff. For example, in Kenya, HIV services including HIV testing and counselling, treatment for HIV including ARV was added to the TB clinics. The integrated TB/HIV clinic not only provided services for their TB clients diagnosed with HIV but also provide care and treatment services for TB/HIV co-infected patients referred from other HIV-only clinics (57). The same method of integrating was also observed in different settings in South Africa (58),(59),(60) and Ghana (61). All TB staff (doctors, nurses, DOTS supporters) were trained on HIV management and provision of ART as well as treatment of TB/HIV co-infection (59),(60). In some case, extra staff were temporarily hired to develop skills of existing staff and help them to gradually get use to the increased workload (58). Beside TB/HIV screening and treatment, integrated facility might provide supplementary services such as family planning or prevention of mother to child transmission (58),(60). Establishment of a supply mechanism of ARV drug for TB clinics was also an important element in setting up such model of integration (59).

The integration of TB services into HIV clinics was described in a study in Uganda. The integrated clinics serves not only its patients but also act as a referral point for TB/HIV co-infected patients referred from other non-integrated HIV clinics in the area (62). To set up the service, a group of selected health care workers at the HIV clinics formed a TB working group. This group were trained on TB screening, IPH treatment and DOTS. Hence, PLHIV diagnosed with TB were provided care for both

diseases by the same staff. As introducing TB services in a HIV clinic might increase the number of TB patients in the facility leading to the risk of nosocomial transmission among non-TB ARV patients, the TB/HIV clinic was separated in and outdoor space for better ventilation and to take advantage of natural ultraviolet light (62).

Merging two facilities to create an integrated TB/HIV clinic were reported in studies in Malawi and Zambia. In both studies, TB and HIV clinics had been coexisting under one facility but the link between two departments was weak. The integration was made by strengthening the linkages between two services to create better patients flow between two services, ensure screening and treatment for both diseases to be provided for patients once they came to the facility (63),(64). In Malawi, they established a "front desk" to manage patients' records and direct them to appropriate services (HIV or TB services). Each patient had a unique code to monitor their treatment history (63). In Zambia, patients access to TB and HIV department separately but once they diagnose with co-infection, they would be put under the TB/HIV co-management procedure to ensure access to both TB/HIV care and monitor treatment progress (64).

In Vietnam, there have not been any "one-stop" TB/HIV clinics established across the country. Nevertheless, the latest strategy on TB/HIV collaboration of MOH has mentioned provision of TB and ARV treatment at the same facility as a solution to improve treatment outcome for TB/HIV co-infected patients but no detailed plan for implementation was given (12). This solution was also put in the agenda to discuss with Global Fund in round 10 in Vietnam (16).

5.2. Measures of effectiveness of integration

Several studies reported the improvement in TB treatment outcomes of patients in fully integrated facility. In Malawi, the percentage of TB patients having HIV status recorded was high as 96% (63). In Kenya, the results showed that after 5 years of implementing integrated services, TB treatment success rate (cured or complete treatment course) rose from 40.0% to 74.6% while lost to follow-up and deaths fell significantly from 36.0% to 12.5% for the former and from 20.0% to 5.4% for the latter. This studied also revealed that patients who started ARV in less than 2 months after TB treatment were twice as likely to TB treatment success than patients with later ARV initiation (57). In Ghana, TB treatment success rate for all patients was significantly improved from 50% to 69%. Treatment failure and transferred-out also decreased after integration, from 14.4% to 1.4% and 15.3% to 9.0% respectively. For those with TB/HIV co-infected specifically, TB treatment success was higher among those received ARV (75%) than those did not (61%) (61). In Uganda, the same pattern was observed. TB treatment cure or completion was significantly improved from 62% to 68% and death or treatment default fell to 25% from 33% (62).

Shortening the time for ARV initiation and improving ARV treatment outcomes were among other effectiveness of this model of integration.

Early initiation of ART for TB/HIV patients contributed to reduce mortality (65). Therefore, WHO revised guideline for ARV treatment in 2010 suggested that TB/HIV co-infected patients should be put on ART as soon as TB treatment is tolerated, ideally 2 weeks after finishing the therapy or maximum 8 weeks after (66). Study in Cape Town, South Africa reported that after fully establishing the integration, the average time from TB treatment to initiation of ARV dropped from 147 days to 75 days. Multivariate analysis to control confounders such as sex, age, CD4 count and TB treatment showed that after integration, patients were 1.6 times more likely to stat ARV treatment than before integration (60). In Uganda, the integration of services contributed to increase the patients initiated ART during TB treatment significantly from 78% to 94% and most of them started ART during intensive phase (62). Integrated services in South Africa was believed to improve ARV treatment outcomes with 88% of ARV patients had undetected viral load after 12 months, 84% of co-infected patients finished TB treatment and 99% of ARV patients adherence to treatment (59).

A "single facility" approach was also said to improve staff's capacities in managing co-infected patients and better address patients' complex clinical conditions (59),(62). Furthermore, this model of service delivery was more efficient as it helped to avoid duplication in logistic and administrative work (57),(60),(63). Nonetheless, establishing such integration also faced quite some obstacles. From health provider's perspective, they were afraid of the interaction between TB drugs and ARV drugs, which brought harmful side effects for patients (67), leading to delay in ART initiation (60). Secondly, nosocomial transmission of TB among immune-compromised patients was a great concern (57),(59),(60),(63). Gandhi et al in his research in South Africa, nearly 80% of all death among patients on ARV in an integrated facility was due to multidrug-resistant tuberculosis and extensively drug-resistant tuberculosis, which raised a concern of whether or not TB and HIV patients should be treated in the same facility. However, it remained unknown whether or not the transmission occurred among patients of this site (59). Thirdly, from patient' perspectives, integration of TB and HIV services might increase the stigma for them because in many countries HIV and TB are still heavily stigmatized (68). In Zambia, patients who came for only TB services in an integrated facility often had to wait long due to a large volume of ARV patients also served at the site, causing their dissatisfaction with integrated services (64).

IV. Discussion

Strengths and weaknesses of the models

Each model has its strengths and weaknesses. Even though there were few publications directly comparing different models in the same articles, it could be seen from the findings that more integrated model required more efforts and resources to establish but it provided better outcomes. In a systematic review of cost-effectiveness of HIV services with other health services, Sweeney et al found that integrating TB and HIV services was a highly cost-effective measure (69). However, among all publications obtained, few of them described cost of intensified TB case finding or cost-effectiveness of providing IPT rather than describe cost-effectiveness of the integration comprehensively.

The first level of integration ("TB refers" and "HIV refers" models) seems to be the easiest method of integration. To establish a good referral system, it is important to have coordination between TB and HIV facilities on referral mechanism, training staff on referral and basic HIV/TB counselling, and monitoring and tracking referred patients. No extra services are added to each facility. Hence, it requires minimum extra resources. However, the most common disadvantage of referral-only model is the referral failure.

The second level of integration, in which testing for HIV is introduced at TB clinics and TB screening was introduced at HIV facilities, required more investment to establish. When providing PITC at TB clinics, it is important that TB patients receive appropriate counselling and agree to be tested. It requires separate room for counselling, comprehensive training for TB staff (most often TB nurse) on HIV counselling & testing, and supply of rapid HIV test kits. This form of integration assures a high percentage of TB patients received HIV testing but it creates more work for TB staff who have already been overloaded in crowded TB clinics. As for the "HIV: screens and refers" model, it is only possible to provide TB screening and diagnosis if the HIV clinic is part of a health centre with TB clinic in it because setting up infrastructure and human resources to provide sputum smear test and chest X-ray from the scratch requires a lot of investment. If the facility provide IPT, more investment on TST and IPT supply and storage is required. To set up such model, one important part is to training HIV staff on TB screening, TST and provision of IPT. However, if HIV facilities apply WHO latest guideline for intensified tuberculosis case-finding and ITP for PLHIV in resource-constrained setting, the integration could be established more simply. PLHIV can be screened for TB using clinical algorithm and those without suggestive TB symptoms will be offered IPT without TST and those with suggestive symptoms will be offer further TB diagnosis and treatment (10). It is also easier to provide TB screening at HIV treatment facility than at a VCT as HIV patients find TB screening is part of their treatment process while for VCT clients, they may find TB screening not important for them. Referring patients with

active TB or HIV positive for treatment also faces referral failure like in "TB refers" or "HIV refers" models.

"Single facility" model requires the most effort to set up, especially if TB and HIV services are provided by the same health staff. This model was seen mostly in Sub-Saharan countries with generalized HIV epidemic, where TB and HIV facilities are part of primary health care centres. Hence, setting up "one-stop" shop in such condition requires creating a patients management mechanism (patients flow in the facility, record keeping, etc.) and training for staff on TB/HIV treatment and co-infection management. If HIV facility is a stand-alone facility, introducing comprehensive TB service or via versa requires a lot of investment for infrastructure and human resources as well. This model provides best access to both services for patients and their treatment outcomes for both diseases are improved. The risk of nosocomial transmission of TB among PLHIV is a great concern but it can be reduce by taking into account ventilation system when set up the model.

Stigma is a barrier that all models have to face. TB used to be a highly stigmatized disease in the past but with the availability of chemotherapy in the 1960s, it has been seen as a normal disease (70). However, with the emerging of HIV and the frequent presence of TB among PLHIV, two diseases have been inextricably linked and TB became stigmatized again (71). Stigma toward HIV has been long a barrier for people to access HIV services (72) and the link between HIV and TB also hinders the accessibility for TB services (73). Hence, it could be the case that the more integration of TB and HIV services the less accessible it is.

Using indicators from WHO framework for M&E of TB/HIV collaborative activities to assess the effectiveness of integration models is a challenge. Several indicators such as percentage of health facilities provide TB services; percentage of health care workers at HIV facilities developed TB or the availability of condom at TB clinics were not reported in any articles found and it is more likely to find such figures in national report on TB/HIV collaborative activities. The indicators reported for each model also varied greatly. The more integrated model, the more indicators available for report. This could be explained that due to the better monitoring of patient flow, more data were available in more integrated models.

Advantages and disadvantages of implementing each model in the context of Vietnam

In Vietnam, TB control and HIV control programs are currently run vertically. Both TB and HIV services are provided at different levels at presented in Figure 2 (74),(75),(76).

With the current organization of service provision, TB/HIV integration could be implemented at national, provincial and district level. Even though few case studies on TB/HIV integration in Vietnam have been documented, based on experience from other countries and the current

TB and HIV service provision in Vietnam, the pros and cons of establish integrated model at TB and HIV facilities in Vietnam could be discussed as following.

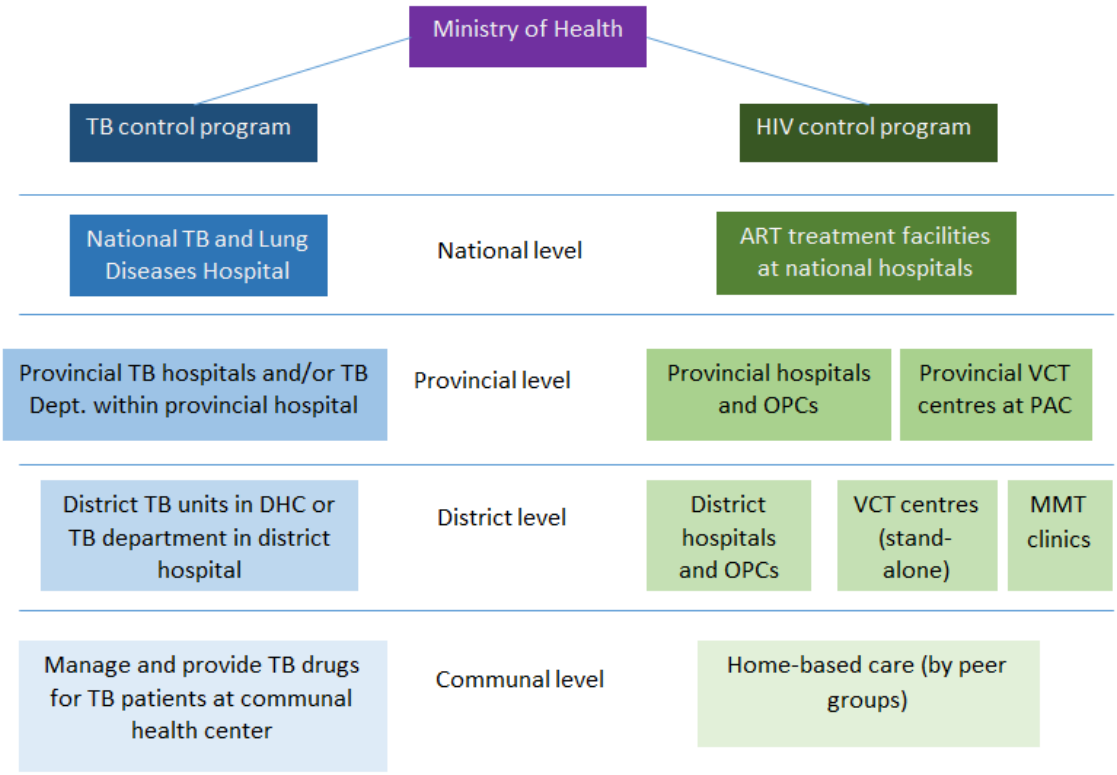

Figure 2 – Provision of TB and HIV services in Vietnam

National TB and lung diseases hospital has Haematology and Blood transfusion Departments, allowing implementation of different kind of blood tests including HIV test. Similarly, 14 national level hospitals which have ART treatment facilities (providing both out-patient and in-patient services for PLHIV) are also well-equipped and able to provide TB diagnosis test (at Infectious Diseases Department) (77). This is an advantage for those facilities to provide integrated services for TB and HIV patients. However, patients receiving treatment at national level facilities are mainly severe cases and patients load is very high while doctors are highly specialized in their area (TB or HIV). Hence, setting up a fully TB/HIV integrated service or adding TB screening or HIV counselling and testing to doctors' work will require drastic change in human resources and increase workload for them who have already been overloaded. In this case, setting up "TB refers" or "HIV refers" model could be a solution to ensure TB patients access to HIV testing and PLHIV are screened for TB. This form of referral is similar to other specialist referrals that have been implemented within hospitals such as referring patients with complications between clinical departments or referring pregnant women for PMTCT services. As all departments are close to each other, it could reduce referral failure.

At provincial level, in charge of TB control is the provincial TB hospital. In provinces where resources are more limited, provincial TB control unit is a

department of provincial hospital or provincial preventive medicine centre (74). Provincial TB facilities mainly provide confirmatory diagnosis of pulmonary and extra-pulmonary TB cases and treatment for severe cases. Provincial TB facilities are well-equipped and capable to provide HIV testing. Generally, patients load is lesser than at national level facilities, hence, to add PITC into services provided at provincial TB facilities seems to be possible ("TB tests and refers" model). It requires training for TB doctors on HIV counselling and the test can be done by laboratory technicians at the facilities. If we establish the "TB refers" model in provincial TB facility, it could face referral failure. On the other hand, establishing ARV treatment at TB facility requires much more investments. Furthermore, HIV prevalence among TB patients in Vietnam is less than 10% so the number of TB/HIV co-infected need treatment is expected to be small, leading to ineffectiveness.

As for HIV services at provincial and district level, it is possible to integrate TB screening and treatment for OPCs located within a hospital as the provincial and district hospital itself is capable to provide TB diagnosis and treatment (at Infectious Diseases Department) (76). By end of 2011, 54 OPCs (17.5% of all OPCs national-wide) had been established at provincial or district hospitals in Vietnam (of which 25 OPCs at provincial hospitals and 29 OPCs at district hospital) (77). To organize integrated TB/HIV services on such basis is an advantage, not so much extra investment needed for training staff, provision of IPT, etc., but to establish patient management mechanism between OPC and Infectious Diseases Department could be more difficult because even the OPC is located in the hospital but it run independently. Moreover, this "single facility" might mostly serve for HIV patients of the OPC because people who need TB services tend to go to TB specialized facilities. There are 100 other stand-alone OPCs at provincial level. For those OPCs, to provide TB diagnosis for PLHIV is a challenge because infrastructure is unavailable. However, screening for TB suggestive symptoms and provision of IPT could be feasible. It mainly requires training for staff on IPT and supply of isoniazid rather than capital investment for TB diagnosis equipment since MOH guideline on IPT does not require confirmation of mycobacteria infection using TST. However, example from Uganda showed that doing TST to determine whether PLHIV need IPT was higher cost-effective. This should be considered in Vietnam when scaling up IPT for PLHIV. Moreover, the main concern is to refer patients with active TB symptoms for TB diagnosis and treatment at TB facility.

At district level, TB control unit is established in each and every district national-wide and responsible for TB diagnosis and treatment in the district. For district that has a hospital, TB unit is a department of the hospital, and for district without a hospital, TB unit is part of DHC. According to report of Administration of Medical Examination & Treatment Precaution Medical Department of MOH, by end of 2008, 80% of districts had a hospital in Vietnam (78). District OPCs, apart from those located at district hospital, are also located at DHC. However, there are only 25% of

districts in the country have an OPC (2). Hence, the percentage of DHC having both TB unit and OPC is rather small but for such DHC, it is an advantage to implement "single facility" but fear of double stigma toward TB/HIV could be a barrier for patients to access the facility. For TB units as part of district hospital, pros and cons of setting up integration model is similar to TB provincial hospital. For OPC in DHC without TB unit, advantages and disadvantages for integrating TB services is similar to those of provincial stand-alone OPCs.

Regarding VCT centres, to ensure confidentiality for VCT clients, most VCT centres are stand-alone facilities located far from resident areas. VCT clients can get counselling and HIV test result in one visit only (79). If TB screening is introduced in VCT centres, patients might have to wait for longer time (as the counselling session is longer) and have to come back several times in case they have to take sputum smears for testing (to hand-in the 03 sputum specimens and to get result). This might turn into a barrier for potential VCT clients in accessing the service.

Integrating TB/HIV services in Vietnam has its pros and cons but the overall advantage is that the political will of MOH and VAAC toward TB/HIV service integration. MOH and VAAC have promulgated different legal documents and regulation supporting TB/HIV collaborative activities including:

- Decision No. 3116/QD-BYT of MOH on The collaboration procedure on diagnosis and treatment for TB/HIV co-infected patients, dated August 2007. This document provides guidance on TB screening for PLHIV, diagnosing HIV for TB patients and case-management of co-infected patients at health facility level.
- Decision No.28/2008/QD-BYT on monitoring and evaluation of HIV/AIDS program including TB/HIV collaborative activities
- Decision No.856/QD-BYT, dated March 2012, on the establishment of National Coordinator Board and Technical Working Group (TWG) for TB/HIV collaboration activities. The board and the TWG consist of personnel from both TB and HIV control programs. Decision No.2497/QD-BYT on approval of collaborative framework for National HIV/AIDS control and prevention program and TB control and prevention project under National health program, period 2012 – 2015, dated July 2012; and Decision No.2495/QD-BYT on TB case-intensified finding and provision of isoniazid Preventive Therapy for PLHIV. The legal documents have provided a legal framework for systematically planning and integrating TB/HIV services from central to grassroots levels.

However, the barrier for integration, apart from lack of resources and double stigma toward TB/HIV, is the acceptance of integration by TB and HIV staff (80).

V. Conclusion and recommendation

Conclusion

Integration of TB/HIV services is a solution to control the epidemic of TB/HIV co-infection. There are 3 levels with 5 models of integrating TB and HIV services as defined by H. Legido-Quigley et al (23). The first level of integration is about establishing the referral mechanism between TB and HIV facilities and patients receive TB services and HIV services in two different facilities. This model is seen most often in countries with low HIV prevalence. This is the most simple integration model to set up but it faces the highest risk of referral failure. The second level of integration is to introduce HIV testing into TB clinic and TB screening into HIV facility. This type of integration helps to increase uptake of HIV tests and TB screening among patients but also faces failure in referring patients for treatment. It also requires more investment in infrastructure and training for staff. The third level of integration is to fully integrate TB and HIV services, i.e. to provide TB and HIV services at the same facility. This model provides the most desirable outcomes for TB/HIV co-infected patients. The "single facility" model is seen commonly among countries with generalized HIV epidemic, where both TB and HIV treatment is part of primary health care system. Otherwise, fully integrating TB services into HIV facility or via versa requires the most investment among all three levels of integration. Stigma and discrimination toward TB and HIV is a key barrier for service integration. HIV has been long stigmatized, which prevents PLHIV from accessing HIV services. Linking TB services to HIV services might associate having TB with having HIV and hence, hinder the access to integrated services in general and TB services in particular.

In Vietnam, TB and HIV service integration has been implemented here and there but few case studies on integrated services have been documented. Generally, TB and HIV control programs are organized vertically and the results of TB and HIV collaborative activities are low. In order to improve diagnosis of TB/HIV co-infection, short-term solutions are to integrating HIV counselling and testing at provincial TB hospitals ("TB: tests and refers" model) and provide TB screening and IPT ("HIV: screens and refers" model) and at ART treatment facilities (OPCs) located at provincial/district hospitals. Those solutions do not require so much investment (approximately 3 month training for staff on related fields and supply of HIV rapid tests and IPT) so it is possible to implement in the upcoming time. However, for a longer-term effectiveness, fully integration of TB and HIV services at district level in areas with high HIV prevalence is a way forward for Vietnam.

Recommendation

To implement TB/HIV service integration in Vietnam, the following measures are recommended for different levels:

- **Central level (for National TB/HIV Coordination Board and TB/HIV TWG)**

- First, it is important to map all the TB and HIV facilities across the countries to have a comprehensive picture of the current situation of TB and HIV service provision in Vietnam. As the TB and HIV control programs are operated vertically, such information is currently unavailable. This will be used as the baseline information for planning activity. The mapping process can be implemented conveniently since the National TB/HIV Coordination Board and TB/HIV TWG, two bodies that in charge of both programs has been established.
- Conduct feasibility evaluation studies: based on mapping exercise, identify suitable integration models for each type of facilities (as presented in discussion section) and conduct the studies to evaluate how feasible it is (infrastructure, human resources, patients characteristics, attitudes of PLHIV, TB patients and health staff toward integration, etc.) to integrate TB/HIV services in such facilities. Facilities selected should be representative (by regions, rural/urban areas, level of facility). The evaluation results will provide firmer evidence for service integrating in Vietnam.
- Conduct a cost-effectiveness study to compare between using TST to determine the provision of IPT for PLHIV and provision of IPT based on screening of TB suggestive symptoms only to find the best cost-effective measure for Vietnam
- Short-term measures: establishing "TB: tests and refers" and "HIV: screens and refers" models across the country
    - Developing concrete guidelines on establishing PITC in TB clinics and developing training curriculum on PITC for TB staff and on TB screening and IPT provision for HIV staff.
    - Organize training of trainer (TOT) courses for provincial level on establishing those models to build up their capacity and enable provinces to establish the model on their owns. National Coordination Board and TWG will provide supervision and assistance for the process.
    - Planning for drug and HIV test kits supplies for integration
- Long-term measures: Pilot TB/HIV "single facilities" at district level and based on experience gained, develop a plan for scaling up this model in the future. PLHIV representatives should be involved in all processes. The establishment and scaling up of "single facility" model should be incorporated into the proposal to Global Fund and

other donors as soon as possible to make use of available fund to invest infrastructure and train human resources.

- **Provincial level**

- Establish the provincial TB/HIV Coordination Board to act as the focal point for TB/HIV integration activities in the province.
- Set-up integration of TB/HIV services at health facilities in the province: Pilot the integration of HIV testing at district hospital with TB clinics ("TB: tests and refers" model), TB screening and IPT provision at OPC located in district hospital (HIV: screens and refers" model) and "single facility" model at DHC having both TB clinics and OPC (if available). For models that rely on referral for treatment, attention must be paid to the referral mechanism to ensure patients reach to and receive services at treatment facilities. Facilities which have good infrastructure and human resources are prioritized for piloting. Based on the pilot results, develop scale-up plan: organize training for TB and HIV staff, preparing resources for medical supplies, improving infrastructure (from annual budget for health allocated by government and provincial people committee) in order to establish integrated models in the province. Private facilities providing TB services could be potential referral facilities and the cost for services could be covered by health insurance scheme.

- **District and communal level**

- Implement integrated activities as directed by provincial level and enhance monitoring and reporting system to provide better information for M&E of integrated services
- Enhance communication and education to raise awareness of TB and HIV patients particularly and the community as a whole on TB/HIV co-infection to reduce stigma and discrimination towards TB/HIV, increasing the access to TB/HIV services for those who need it. This activity could be implemented in collaboration with various local NGOs working on HIV communication.

VI. References

1. Vietnam Tuberculosis profile [database on the Internet]. 2012 [cited May 4th, 2013]. Available from: https://extranet.who.int/sree/Reports?op=Replet&name=/WHO_HQ_Reports/G2/PROD/EXT/TBCountryProfile&ISO2=VN&outtype=html.
2. VAAC. 2012 yearly report of HIV/AIDS prevention and control program and plan for 2013. Hanoi: Vietnam Authority of AIDS Control, 2012.
3. WHO. Interim policy on collaborative TB/HV activities. Geneva: Stop TB Department and Department of HIV/AIDS 2004.
4. GSO. Statistical Handbook of Vietnam 2012. Hanoi: Statistic Publish House; 2013. Available from: http://www.gso.gov.vn/default.aspx?tabid=512&idmid=5&ItemID=13699.
5. World Development Indicators database - Population [database on the Internet]. 2013. Available from: http://databank.worldbank.org/data/download/POP.pdf.
6. Vietnam Country Profile [database on the Internet]. 2010 [cited May 3rd]. Available from: http://www.who.int/countries/vnm/en/.
7. Approval of Universal health insurance proposal in 2012 - 2015 periods and up to 2020, 538-QD/TTg (2013).
8. The Social Republic of Vietnam. UNGASS Country Progress Report: Vietnam. Vietnam Administration of HIV/AIDS Control. UNGASS Country Progress Report: Vietnam - Reporting Period: January 2010 - December 20112013.
9. MOH. Result from the HIV/STI Integrated Biological and Behavioural Surveillance (IBBS) in Vietnam - Round II 2009. Hanoi: 2011.
10. WHO. Guidelines for intensified tuberculosis case-finding and isoniazid preventive therapy for people living with HIV in resource-constrained settings. Geneva: World Health Organization, 2011.
11. WHO. WHO Global Tuberculosis - Report 2012 Geneva: World Health Organization; 2012 [cited 2013 June 25]; Available from: http://www.who.int/tb/publications/factsheet_global.pdf.
12. Decision on approval of collaborative framework for National HIV/AIDS control and prevention program and TB control and prevention project under National health program, period 2012 - 2015, 2497/QĐ-BYT (2012).
13. VAAC. Vietnam HIV/AIDS Sentinel Surveillance data 1993 - 2010. Yearly. Hanoi2010.

14. Pham MK, Tran QP, Nguyen VH, Jarlier V, Robert J. Drug resistance and HIV co-infection among pulmonary tuberculosis patients in Haiphong City, Vietnam. International Journal on Tuberculosis and Lung Diseases. 2008;12(7):6.
15. Duong HT, Dang NS, Nguyen DL, Tran H, Hoang TD, Tran T, et al. HIV infection among tuberculosis patients in Vietnam: prevalence and impact on tuberculosis notification rates. International Journal on Tuberculosis and Lung Diseases. 2010;14(8):8.
16. Bui DD. Enhancing TB/HIV in Global Fund proposals: What more could be done? - AIDS programme manager perspective. 2012.
17. WHO. A guide to monitoring and evaluation for collaborative TB/HIV activities. Geneva: World Health Organization, 2009.
18. VAAC. HIV/AIDS program database of 2010. Yearly. Hanoi2010.
19. UNAIDS. Vietnam National AIDS Spending Assessment 2008 - 2010. Hanoi: 2012.
20. Uyei J, Coetzee D, Macinko J, Guttmacher S. Integrated delivery of HIV and tuberculosis services in sub-Saharan Africa: a systematic review. Lancet Infectious Diseases. 2011;11:13.
21. Maher D. Re-thinking global health sector efforts for HIV and tuberculosis epidemic control: promoting integration of programme activities within a strengthened health system. BMC Public Health. 2010;10:11.
22. Country and Lending Groups [database on the Internet]. 2013 [cited July 5, 2013]. Available from: http://data.worldbank.org/about/country-classifications/country-and-lending-groups#Low_income.
23. Legido-Quigley H, Montgomery CM, Khan P, Atun R, Fakoya A, Getahun H, et al. Integrating tuberculosis and HIV services in low- and middle-income countries: a systematic review. Tropical Medicine and International Health. 2013;18(2):13.
24. Corneli A, Jarrett NM, Sabue N, Duvall S, Bahati E, Behets F, et al. Patient and provider perspectives on implementation models of HIV counselling and testing for patients with TB. International Journal on Tuberculosis and Lung Diseases. 2008;12(3):6.
25. Vijay S, Swaminathan S, Vaidyanathan P, Thomas A, Chauhan LS, Kumar P, et al. Feasibility of Provider-Initiated HIV Testing and Counselling of Tuberculosis Patients Under the TB Control Programme in Two Districts of South India. PLoS ONE. 2009;4(11):e7899.
26. Raizada N, Chauhan LS, Babu BS, Thakur R, Khera A, Wares DF, et al. Linking HIV-Infected TB Patients to Co-trimoxazole Prophylaxis and Antiretroviral Treatment in India. PLoS ONE 2009;4(6):e5999.

27. Shetty PVD, Granich RM, Patil AB, Sawant SK, Sahu S, Wares DF, et al. Cross-referral between voluntary HIV counselling and testing centres and TB services, Maharashtra, India, 2003-2004. International Journal on Tuberculosis and Lung Diseases. 2008;12(3):6.

28. Health Alliance International. Integrating TB and HIV Care in Mozambique: Lessons from an HIV Clinic in Beira. Washington, DC: 2005.

29. Thomas BE, Dewan PK, Vijay S, Thomas A, Chauhan LS, Vedachalam C, et al. Perceptions of Tuberculosis Patients on Provider-Initiated HIV Testing and Counselling - A Study from South India. PLoS ONE. 2009;4(12):e8389.

30. Chimzizi R, Harries AD, Gausi F, Golombe C, Manda E, Khonyongwa A, et al. Scaling up HIV/AIDS and joint HIV-TB services in Malawi. International Journal on Tuberculosis and Lung Diseases. 2005;9(5):3.

31. Chimzizi R, Gausi F, Bwanali A, Mbalume D, Teck R, Gomani P, et al. Voluntary counselling, HIV testing and adjunctive cotrimoxazole are associated with improved TB treatment outcomes under routine conditions in Thyolo District, Malawi. International Journal on Tuberculosis and Lung Diseases. 2004;8(5):7.

32. MOH. Collaborative protocol for TB/HIV collaborative diagnosis, treatment and case control. Hanoi2007.

33. Ramachandran R, Chandrasekaran V, Muniyandi M, Jaggarajamma K, Bagchi A, Sahu S. Cross-referral between HIV counselling and testing centres and smear microscopy centres in Tamil Nadu International Journal on Tuberculosis and Lung Diseases. 2009;13(2):5.

34. Hausner DS, Kulsharova M, Seledtsov V, Khodakevich L, Deryabina A. Facilitating interaction between TB and AIDS medical services for better management of patients with co-infections. Global Public Health: An International Journal for Research, Policy and Practice. 2007;2(2):15.

35. Shah NS, Mai HA, Tran TT, Bui SDT, Tran L, Duong TN, et al. Population-based chest X-ray screening for pulmonary tuberculosis in people living with HIV/AIDS, An Giang, Vietnam. International Journal on Tuberculosis and Lung Diseases. 2008;12(4):7.

36. Trinh TTT. Evaluation of the implementation of tuberculosis (TB) intensified case finding (ICF) among HIV- infected patients in Ho Chi Minh City and Hanoi, Vietnam. Atlanta, USA: Emory University; 2012.

37. Duong TMN, Nguyen QH, Le TG, Nguyen HD, Nguyen TNL, Nguyen L, et al. Improving the diagnosis of pulmonary tuberculosis in HIV-

infected individuals in Ho Chi Minh City, Viet Nam. International Journal on Tuberculosis and Lung Diseases. 2011;15(11):7.

38. USAID. Improving TB detection and TB-HIV integration in Vietnam. Vietnam: 2010.
39. Odhiambo J, Kizito W, Njoroge A, Wambua N, Nganga L, Mburu M, et al. Provider-initiated HIV testing and counselling for TB patients and suspects in Nairobi, Kenya. International Journal on Tuberculosis and Lung Diseases. 2008;12(3):6.
40. Pope DS, Atkins S, DeLuca AN, Hausler H, Hoosain E, Celentano DD, et al. South African TB nurses' experiences of provider initiated HIV counselling and testing in the Eastern Cape Province: a qualitative study. AIDS Care: Psychological and Socio-medical Aspects of AIDS/HIV. 2010;22(2):8.
41. Tsurugi Y, Eam KK, Eang MT, Uehara R, Nakamura Y, Murakami K, et al. Evaluation of collaborative tuberculosis and human immunodeficiency virus activities in Phnom Penh, Cambodia. International Journal on Tuberculosis and Lung Diseases. 2011;15(11):5.
42. Pevzner ES, Vandebriel G, Lowrance DW, Gasana M, Finlay A. Evaluation of the Rapid Scale-up of Collaborative TB/HIV Activities in TB Facilities in Rwanda, 2005-2009. BMC Public Health. 2011;11:8.
43. Harries AD, Zachariah R, Chimzizi R, Salaniponi F, Gausi F, Kanyerere H, et al. Operational research in Malawi: making a difference with cotrimoxazole preventive therapy in patients with tuberculosis and HIV. BMC Public Health. 2011;11:9.
44. Dang VH, Ho TML, Nguyen TTL. Expanding TB and TB/HIV Integrated Services in Thai Binh Province, Vietnam Hanoi: 2009.
45. VAAC. International collaboration of VAAC. 2013 [cited 2014 July 16]; Available from: http://www.vaac.gov.vn/Desktop.aspx/Noi-dung/Hop-tac-quoc-te/.
46. Srikantiah P, Lin R, Walusimbi M, Okwera A, Luzze H, Whalen CC, et al. Elevated HIV seroprevalence and risk behavior among Ugandan TB suspects: implications for HIV testing and prevention International Journal on Tuberculosis and Lung Diseases. 2007;11(2):7.
47. Burgess AL, Fitzgerald DW, Severe P, Joseph P, Noel E, Rastogi N, et al. Integration of tuberculosis screening at an HIV voluntary counselling and testing centre in Haiti. AIDS. 2001;15:5.
48. CDC. TB Elimination The Difference Between Latent TB Infection and TB Disease. 2011 [cited 2013 July 20]; Available from: http://www.cdc.gov/tb/publications/factsheets/general/LTBIandActiveTB.pdf.

49. Shrestha RK, Mugisha B, Bunnell R, Mermin J, Hitimana-Lukanika C, Odeke R, et al. Cost-effectiveness of including tuberculin skin testing in an IPT program for HIV-infected persons in Uganda. International Journal on Tuberculosis and Lung Diseases. 2006;10(6):7.

50. Ssemafumu E, Mabirizi D, Kasasa S, Luzze H, Muswan I. Evaluation of the integration of Isoniazid Prophylactic Therapy (IPT) in HIV/AIDS prevention and control programs at the AIDS Information Center (AIC) Uganda. Washington: Management Systems International, 2007.

51. Sutton BS, Arias MS, Chheng P, Eang MT, Kimerling ME. The cost of intensified case finding and isoniazid preventive therapy for HIV-infected patients in Battambang, Cambodia. International Journal on Tuberculosis and Lung Diseases. 2009;13(6):6.

52. HDI Rwanda. Tuberculosis Detection, Care, and Treatment for People Living with HIV in Rwanda - A rapid situation analysis in three districts. 2011.

53. Durovni B, Cavalcante SC, Saraceni V, Vellozo V, Israel G, King BS, et al. The implementation of isoniazid preventive therapy in HIV clinics: the experience from the TB/HIV in Rio (THRio) Study. AIDS. 2010 24(5):7.

54. Hart L, Canoutas E, Butcher N, Ferradini L, Tonsing J, Aradhya K. National Scale-Up of Isoniazid Preventive Therapy in Cambodia. Durham: 2012.

55. Nguyen TS, Nguyen NP, Nguyen VQ, Nguyen THV, Vu TTT. TB Screening at Out-patient HIV Clinic, District 5, HCMC, Vietnam 2012.

56. Decision No. 2495/QĐ-BYT on Intensified TB Case Finding and provision of Isoniazid Preventive Therapy for people living with HIV, 2495/QĐ-BYT (2012).

57. Shaffer DN, Obiero ET, Bett JB, Kiptoo IN, Maswai JK, Sawe FK, et al. Successes and Challenges in an Integrated Tuberculosis/HIV Clinic in a Rural, Resource-Limited Setting: Experiences from Kericho, Kenya. AIDS Research and Treatment. 2012;2012:8.

58. Coetzee D, Hilderbrand K, Goemaere E, Matthys F, Boelaert M. Integrating tuberculosis and HIV care in the primary care setting in South Africa. Tropical Medicine and International Health. 2004;9(6):6.

59. Gandhi NR, Moll AP, Lalloo U, Pawinski R, Zeller K, Moodley P, et al. Successful Integration of Tuberculosis and HIV Treatment in Rural South Africa: The Sizonq'oba Study Journal of Acquired Immune Deficiency Syndromes. 2009;50:7.

60. Kerschberger B, Hilderbrand K, Boulle AM, Coetzee D, Goemaere E, De Azevedo V, et al. The Effect of Complete Integration of HIV and TB Services on Time to Initiation of Antiretroviral Therapy: A Before-After Study. PLoS ONE. 2012;7(10):9.

61. Ansa GA, Walley JD, Siddiqi K, Wei X. Assessing the impact of TB/HIV service integration on TB treatment outcomes and their relevance in TB/HIV monitoring in Ghana. Infectious Diseases of Poverty. 2012;1(13):8.

62. Hermans S, Castelnuovo B, Katabira C, Mbidde P, Lange JMA, Hoepelman AIM, et al. Integration of HIV and TB Services Results in Improved TB Treatment Outcomes and Earlier Prioritized ART Initiation in a Large Urban HIV Clinic in Uganda. Journal of Acquired Immune Deficiency Syndromes. 2012;60(2):7.

63. Phiri S, Khan PY, Grant AD, Gareta D, Tweya H, Kalulu M, et al. Integrated tuberculosis and HIV care in a resource-limited setting: experience from the Martin Preuss centre, Malawi. Tropical Medicine and International Health. 2011;16(11):7.

64. Harris JB, Hatwiinda SM, Randels KM, Chi BH, Kancheya NG, Jham MA, et al. Early lessons from the integration of tuberculosis and HIV services in primary care centres in Lusaka, Zambia. International Journal on Tuberculosis and Lung Diseases. 2008;12(7):7.

65. Baleta A. Trial finds simultaneous HIV/tuberculosis treatment beneficial. The Lancet infectious diseases. 2008;8(11).

66. WHO. Antiretroviral therapy for HIV infection in adults and adolescents - Recommendations for a public health approach 2010 revision. Austria: World Health Organization, 2010.

67. Munsiff S, Nilsen D, Ahuja SD, Burzynski JN. Antiretroviral Drugs and the Treatment of Tuberculosis. New York: NYC Department of Health & Mental Hygiene, Bureau of Tuberculosis Control, 2007.

68. Levin L, Irving K, Dikgang M, Punwasi J, Isaacs M, Myer L. TB patients' perspectives on integrated TB/HIV services in South Africa. Tropical Doctor. 2006;36:3.

69. Sweeney S, Obure CD, Maier CB, Greener R, Dehne K, Vassall A. Costs and efficiency of integrating HIV/AIDS services with other health services: a systematic review of evidence and experience. Sexual Transmitted Infections 2012;88:85e99 doi:101136/sextrans-2011-050199. 2012;88(2):15.

70. Sontag S. Illness as Metaphor and AIDS and Its Metaphors London: Penguin Books; 1991.

71. Pebody R. People with TB and HIV in South Africa face a double stigma. Continuing Medical Education Journal. 2012;30(6):2.

72. Wolitski RJ, Pals SL, Kidder DP, Courtenay-Quirk C, Holtgrave DR. The Effects of HIV Stigma on Health, Disclosure of HIV Status, and Risk Behavior of Homeless and Unstably Housed Persons Living with HIV. AIDS and Behavior. 2009;13(6):11.

73. Daftary A. HIV and tuberculosis: The construction and management of double stigma. Social Science & Medicine. 2012;74:8.

74. Fujiwara PI, Hennig C, Hu DM, Nishikiori N, Bui TTQ, Dao HB, et al. End-term evaluation of National Tuberculosis Control Program of Vietnam 2007 -2011. Hanoi: 2011.

75. VAAC, HSPH. Vietnam HIV/AIDS prevention and control program. Duong QT, Le VA, editors. Hanoi: Medical Publish House; 2008.

76. Decision on approval of planning and development of Tuberculosis and pulmonary diseases control network during the period 2011 - 2020, 2357/QĐ-BYT (2011).

77. VAAC. Mapping of OPC sites. 2011.

78. Vietnam hospital operational results [database on the Internet]. 2008. Available from: http://www.kcb.vn/ShowNews.aspx?lang=vn&cat=027&nid=70.

79. National guideline on HIV testing, 1098/QĐ-BYT (2013).

80. Conseil A, Mounier-Jack S, Coker R. Integration of health systems and priority health interventions: a case study of the integration of HIV and TB control programmes into the general health system in Vietnam. Health Policy and Planning. 2010;25:5.

VII. Annex

Annex 1 – Organization of Vietnam health system