博士論文

Assessing HIV service delivery using 'continuum of prevention and care' framework to maximize HIV case detection and retention in care in six Asian and Pacific Countries

（アジア太平洋地域６カ国における、**HIV** 感染者の発見とケアの保持を最適化する **HIV** サービス供給体制に関する研究：

“継続予防・ケアフレームワーク”による検討）

藤田雅美

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Abstract

Introduction: This study aimed to assess HIV service delivery in Vietnam and across six Asia and Pacific countries to inform national HIV programs for maximizing HIV case detection and retention.

Methods: As implementation research, the author collaborated with national HIV programs to analyze information from published and unpublished sources. An analytical framework of the continuum of prevention and care was developed and applied to assess service delivery in Vietnam and then across Cambodia, Myanmar, Nepal, Papua New Guinea, Thailand and Vietnam.

Results: In Vietnam, identified strengths included decentralized HIV service delivery with good linkages in high HIV burden provinces especially donor-supported areas. Constraints included centralized service delivery with limited linkages in middle/low burden provinces as well as lack of mechanism to monitor the linkages.

Among six countries, considerable variations were found in service availability and linking approaches. Limited HIV testing availability was a barrier for referring key populations in Myanmar and Vietnam. Referral from HIV testing to pre-ART care was not constrained by physical distance only in Thailand and Vietnam. The proportion of districts/townships having antiretroviral treatment (ART) was less than 70% except in Thailand, posing a barrier for accessing treatment. Tuberculosis and antenatal care services offered HIV testing nation-wide only in Cambodia and Thailand.

Conclusions: The analytical framework was instrumental in identifying system-related strengths and constraints in Vietnam. Service linkages appeared to be more coherent in some countries than in others, partly dependent upon service availability patterns. The countries should adjust service availability and systematically strengthen linkages.

Key words: HIV, implementation research, service delivery, care continuum, case detection, retention in care, Asia-Pacific, Vietnam

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List of Abbreviations

ANC	Antenatal care
ART	Antiretroviral treatment
ARV	Antiretroviral
CHBC	Community- and home-based care
COPC	Continuum of prevention and care
FSW	Female sex workers
HTC	HIV testing and counseling
MSM	Men who have sex with men
MNCH	Maternal, newborn and child health
NGO	Non-governmental organizations
OST	Opioid substitution therapy
PITC	Provider-initiated testing and counseling
PLHIV	People living with HIV
PMTCT	Prevention of mother-to-child transmission
PNG	Papua New Guinea
PWID	People who inject drugs
STI	Sexually transmitted infection
TB	Tuberculosis
TG	Transgender people
UNAIDS	Joint United Nations Programme on HIV/AIDS
VAAC	Vietnam Authority of HIV/AIDS Control
VCT	Voluntary counseling and testing
WHO	World Health Organization

1. INTRODUCTION

1.1. HIV situation in the world

Worldwide, 34.0 million people were estimated to be living with HIV at the end of 2011 [1,2]. An estimated 0.8% of adults aged 15-49 years were living with HIV while the burden of the epidemic remains diverse significantly between countries and regions. Sub-Saharan Africa continues to be most heavily affected, where 4.9% are living with HIV and accounting for 69% of the people living with HIV globally. Although the regional prevalence of HIV infection is nearly 25 times higher in sub-Saharan Africa than in Asia, almost 5 million people are living with HIV in Asia. After sub-Saharan Africa, most seriously affected regions are the Caribbean and Eastern Europe and Central Asia, where 1.0% of adults were living with HIV in 2011.

The estimated number of adults and children newly infected with HIV (2.5 million) was 20% lower than in 2001 [1]. Since 2001, the numbers of people acquiring HIV infection have been rapidly declined in the Caribbean (42%), sub-Saharan Africa (25%) and Asia and the Pacific (17%). In 2011, 372,000 people were newly infected with HIV in Asia and the Pacific. However, since 2001, the number of people newly infected with HIV has increased by more than 35% (from 27 000 to 37 000) in the Middle East and North Africa. In Eastern Europe and Central Asia, the incidence of HIV infection appeared to begin increasing in the late 2000s following relatively stable status for several years.

The number of people who die from AIDS-related causes began to fall in the mid-2000s. This is due to rapid expansion of antiretroviral treatment (ART) and the steady decline in HIV incidence since the peak in 1997 [1]. In 2011, 1.7 million people died from AIDS-related causes globally. This indicates a 24% decline in AIDS-related deaths compared with that in 2005 when 2.3 million died. In sub-Saharan Africa, the number of AIDS-related deaths dropped by 32% from 2005 to 2011, although 70% of all the people dying from AIDS in 2011 in the world occurred in this region. The Caribbean (48%) experienced significant declines in AIDS-related deaths between 2005 and 2011. During the same period declines are

more modest in Latin America (10%), Asia and the Pacific (6%) and Western and Central Europe and North America (1%). In 2011, 310,000 people died from AIDS-related causes in Asia and the Pacific. However, AIDS mortality was significantly increased in Eastern Europe and Central Asia (21%) and in the Middle East and North Africa (17%).

1.2. Responding to HIV in the world

1.2.1. Combination prevention

HIV prevention approaches have evolved over many years in responding to various HIV epidemics in different parts of the world. Combination of behavioral, biomedical and structural strategies has been implemented in specific populations in concentrated epidemics and across the whole populations in generalized epidemics [3,4]. With regard to sexual transmission, main programmatic elements include behavior change, condom provision, male circumcision, focused programs for female sex workers (FSW) and men who have sex with men (MSM) and access to ART.

HIV behavior change programs aim to promote safer individual sexual behavior and changes in social norms that influence individual sexual behavior. These programs have been evaluated by measuring the number of young people initiating sexual intercourse early, the number of sexual partners, and the percentage of the correct and consistent use of condoms among people who are sexually active. Among populations, behavior change has been demonstrated to reduce HIV prevalence in several countries with generalized epidemics [5-7]. However, it remains challenging to link behavior change programming to HIV outcomes [1].

Condom use is one of the most efficient ways to reduce sexual HIV transmissions. Among 20 countries with adult HIV prevalence higher than 1% for selected years 2000-2011, condom use at last high-risk sex increased in 11 countries among populations between 15 and 49 years old while it decreased in 4 countries, according to a review of nationally representative surveys [1].

Male circumcision reduces the likelihood that men will acquire HIV from a female partner. According to three randomized clinical trials conducted in sub-Saharan Africa, voluntary medical male circumcision reduced the risk of acquiring HIV by 60% among heterosexual HIV-negative men [8-10]. Since 2007, voluntary medical male circumcision has been recommended as an additional HIV prevention program in countries with high rates of HIV infection and low rates of male circumcision [11]. Thirteen countries in Eastern and Southern Africa were identified as priority countries for expanding the intervention based on their epidemiological profiles and prevalence of male circumcision. Most of these countries endorsed the intervention and started its implementation by 2011 [1].

Sexually transmitted infections (STIs) increase the risk of HIV transmission [12]. Interventions for controlling STIs include condom use, syndromic management of genital ulcer disease and urethral discharge, syphilis testing of pregnant women and individuals diagnosed with other STIs, and treating people with gonococcal, chlamydial and syphilis infections and their partners. These interventions have resulted in a decline in the prevalence of STIs such as chancroid, syphilis, gonorrhea and genital warts. They also reduced long-term consequences such as infertility, congenital syphilis and cervical cancer in many parts of the world [13]. STI control may have also contributed to the gradual decline in HIV prevalence in several low- and middle-income countries [14]. Limited data on STI services for general populations have been made available globally, except on syphilis among pregnant women [13]. Regarding key populations, 132 out of 140 countries (89%) reported STI treatment were offered to female sex workers while only 82 countries (59%) reported screening of asymptomatic STI were conducted for female sex workers. Further, 112 out of 140 countries reported STI services were available for men who have sex with men. However, limited information is available on the number of these populations receiving STI services.

HIV infections occur in health care settings. Transmission routes include blood transfusions, health care injections, as well as health care, waste and occupational exposure. According to the WHO Global Database on Blood Safety, 72 among 179 countries were dependent on family or replacement and paid blood donors for more than half of their blood supplies in 2012 [13]. However, blood donations from voluntary unpaid donors increased by 8.6 million between 2004 and 2012. Increasing numbers of countries have been introducing or enhancing blood safety procedures. In 2012, 70% of countries globally had a national blood policy, compared with 60% in 2004. Specific legislation covering the safety and quality of blood transfusion is more likely to exist in high-income countries (81%) than in middle-income (60%) and low-income (44%) countries [15]. In low-income countries, 24% of the blood donations were screened without basic quality procedures that include documented standard operating procedures and participation in an external quality assurance scheme. The prevalence of HIV infection in blood donations was estimated at 0.85% in low-income countries and 0.12% in middle-income countries, compared with 0.002% in high-income countries in 2012. Unsafe injections were estimated to account for 0.7–1.3% of new HIV infections globally in 2010 [16]. An estimated 5.5% of total injections in the world were given with unsterilized reused syringes and needles in 2010 while this proportion was much higher in some countries [17]. Major efforts have been made to reduce unsafe injections in the world. From 2000 to 2010, the numbers of HIV and HCV infections transmitted through unsafe health care injections were estimated to decline by 87% and 83%, respectively.

Antiretroviral (ARV) drugs contribute to combination HIV prevention, through ART, post-exposure prophylaxis and pre-exposure prophylaxis. Evidence from a trial indicated that ART could reduce the risk of HIV transmission by 96% [18]. In operational settings, the protective effect appears to be smaller. For instance, HIV incidence among a cohort of HIV discordant couples was reduced by 66% in China [19]. Findings of the trials have been confirmed by longitudinal studies. HIV incidence fell by 17% for every 10% increase in the number of people receiving ART in a rural part of South Africa [20]. To maximize the impact of ART on HIV transmission, countries are promoting early initiation of ART,

enhancing adherence to ART, and combining ART with other prevention approaches. Furthermore, HIV-positive partners in sero-discordant couples start ART irrespective of their clinical or immune status in line with the global guidance in 2012 [21].

Studies indicated pre-exposure prophylaxis could be effective in preventing HIV infections among certain populations. These populations include men who have sex with men [22], sero-discordant couples [23], sexually active young adults [24] and people who inject drugs (PWID) [25]. Pre-exposure prophylaxis may have a role as part of a combination prevention package while a high level of adherence is crucial [26-28]. Global guidance was released in 2012 on oral pre-exposure prophylaxis for sero-discordant couples as well as for men and transgender women who have sex with men [29]. The guidance recommended the intervention be considered as a possible additional prevention choice, while supporting demonstration projects in a limited number of countries to examine critical implementation issues.

Post-exposure prophylaxis has been recognized as a prevention intervention for many years [30]. Post-exposure prophylaxis can reduce the risk of developing HIV infection in an individual who has been exposed to HIV. It can be used effectively for occupational and non-occupational exposure, including sexual assault, drug-injecting equipment sharing, and potential exposure through consensual sex. A systematic evidence review for developing WHO guidelines found that only 60% of people considered eligible for post-exposure prophylaxis completed the entire 28-day course. The implementation of post-exposure prophylaxis appears to vary across countries, including types of exposure (i.e. occupational or non-occupational), regimens used, and frequency for repeated exposures.

1.2.2. Key Populations

A disproportionately high HIV prevalence has been reported among key populations, such as female sex workers, men who have sex with men, transgender people (TG) and people who inject drugs. Studies

estimated that men who have sex with men are 19 times more likely to have HIV than the general population [31], and female sex workers are 14 times more likely to have HIV than other women [32].

HIV prevalence among female sex workers varies across the world. A meta-analysis of HIV data for female sex workers found the pooled HIV prevalence was 37% in sub-Saharan Africa, 11% in Eastern Europe, 6.1% in Latin America and the Caribbean, 5.2% in Asia and 1.7% in the Middle East and North Africa [32]. According to the Global AIDS Response Progress Reporting, between two thirds and three quarters of female sex workers were being reached with HIV prevention programs in the 114 countries that reported during 2011–2013 [13]. Service availability also varies among regions. The global reporting in 2011 indicated that all reporting countries in East, South and South-East Asia made available targeted services for HIV testing and counselling, HIV treatment and care, and treatment of symptomatic sexually transmitted infections [33]. However, the availability of these services was considerably limited in North Africa and the Middle East. In these regions, more than one quarter of the reporting countries indicated no targeted interventions were provided for female sex workers.

Concerning men who have sex with men, similar levels of HIV prevalence have been observed across regions. A meta-analysis in 2012 showed that the pooled HIV prevalence among this population ranged between 14% and 18% in Latin America, sub-Saharan Africa and South and South-East Asia, and was 25% in the Caribbean [31]. HIV incidence among men who have sex with men appears to be rising in parts of Asia [34,35] and Europe [36] and in Australia [37] and the United States of America [38,39]. According to the Global AIDS Response Progress Reporting, a median of 69% of men who have sex with men were reached with HIV prevention programs in 109 countries that reported these data at least once during 2011–2013 [13]. However, the proportion of men who have sex with men who were tested HIV in the previous 12 months was a median of 42% in the 108 countries reporting those data. Service provision for this population varies across regions. In Africa, for instance, government sponsored HIV services for men who have sex with men were very limited. In this region, it is not only difficult, but

also dangerous for non-governmental organizations (NGO) to provide services for this population in a generally hostile context [40].

HIV prevalence in people who inject drugs ranges from an estimated 6–10% in Western and Central Europe, the Americas, and Central, South, East and South-East Asia to 23% in Eastern Europe and 29% in South-West Asia [41]. Needle and syringe programs have been demonstrated to be very effective [42,43]. It has been the case especially when complemented by structural interventions such as changes in policies, laws, regulations and law enforcement practices [44]. Eighty-six countries and territories were implementing needle and syringe programs in 2012 [45]. However, service coverage was not sufficient to stabilize or reverse HIV epidemics in this population in most low- and middle income countries [41]. Less than 20% of people who inject drugs were being reached with needle and syringe programs in 49% of the 83 countries reporting these data in 2013. Seventy-nine countries reported offering opioid substitution therapy (OST) in 2013, but two thirds were providing it to 40% or less of the opioid-dependent people who inject drugs. HIV prevention services for people who inject drugs were deemed limited in quality in most countries, especially in Africa [46].

1.2.3. HIV testing and counseling

HIV testing and counseling (HTC) services evolved over many years. Since the first antibody tests were introduced in mid-1980s, HTC has been offered in clinical settings especially when HIV infection was suspected due to symptoms or risk. Outside clinical settings, HTC was offered through client-initiated voluntary counseling and testing (VCT). VCT was expanded widely during the first two decades of the HIV response [47,48]. Throughout the process of scaling-up VCT, voluntarism and informed consent was emphasized and ethical standards of HTC were established.

However, it was recognized that the VCT model was not sufficient to achieve high uptake of HTC, early HIV diagnosis and high ART coverage [47]. Since 2002, provider-initiated testing and counseling

(PITC) has been promoted. It routinely offers HTC in clinical settings in the context of the rapid increase of ART availability [49]. Following the global guidance on the implementation of PITC in health facilities in 2007 [50], PITC has been expanded in antenatal care (ANC), tuberculosis (TB), STI and other clinical settings as part of prevention of mother-to-child transmission (PMTCT) services, especially in generalized epidemics [33,51,52]. In low-level and concentrated epidemics, the implementation of the PITC in health facilities is to be guided by the assessment of the local epidemiological and social context. HTC has also been expanded through outreach or mobile services in a variety of settings in the community. Such settings include churches or other faith settings, brothels, entertainment venues including bars, karaoke and massage parlors, schools and workplaces.

Remaining challenges include attrition between HIV testing and counselling and HIV treatment services. Studies showed people who test positive were often inadequately linked to ART [53,54]. In Uganda, for instance, only 10.5% of individuals identified as living with HIV through home-based HIV testing and counselling were linked to ART [55].

1.2.4. Treatment, TB/HIV and PMTCT

The number of people on ART increased by 20 times from 2003 to 2011. It reached 8 million out of 14.8 million people who were eligible for the treatment (54%) [33]. Since 1995, ART has added 14 million life-years in low- and middle-income countries, including 9 million in sub-Saharan Africa. In Asia and the Pacific, 1.1 million people were on ART among 2.4 million eligible for the treatment (46%) in 2011.

TB remains a major challenge for the lives of people living with HIV. However, TB‐related deaths among this population have fallen by 25% from 2004 to 2011 worldwide [33]. According to a systematic review and meta‐analysis [56], ART was strongly associated with a reduction in the incidence of TB across all CD4 count strata. Global guidelines recommend all people with both HIV infection and TB disease should start ART as soon as possible regardless of their CD4 count. However,

among the TB cases having an HIV-positive test result, only 48% obtained ART in 2011 globally. The proportion was 36% in East Asia and 58% in South and South-East Asia. Globally, the proportion of TB cases receiving HIV testing was 40% in 2011. In Asia and the Pacific, less than 30% of people having TB disease received HIV testing in the same year. Among people living with HIV globally, 3.2 million were reported to have been screened for TB in 2011. In Asia and the Pacific, 628,000 people living with HIV were screened for TB in the same year.

The estimated number of children who acquired HIV infection was 330,000 in 2011 globally. [33]. This represents a 43% decline since 2003 and a 24% drop since 2009. More than 90% of the children who acquired HIV infection lived in sub-Saharan Africa in 2011. ARV and infant-feeding based prevention service expansion appears to be primarily responsible for the sharp reductions in the number of newly infected children, rather than reductions in the number of adults acquiring HIV. From 2009 to 2011, ARV prophylaxis prevented 409,000 children from acquiring HIV infection in low- and middle-income countries. In these countries, coverage of effective ARV regimens for PMTCT reached 57% in 2011. At the regional level, the coverage was estimated to be 79%, 59%, 18% and 7% in the Caribbean, sub-Saharan Africa, South and South-East Asia, and the Middle East and North Africa, respectively,

1.3. Moving towards zero AIDS-related deaths in Asia and the Pacific

In Asia and the Pacific region, the HIV epidemic is concentrated among key populations. These populations include female sex workers, men who have sex with men, transgender, and people who inject drugs. In this region, remarkable progress has been made. New HIV infections declined by 26% from 2001 to 2012, and ART coverage increased by 46% from 2009 to 2012 [57]. However, the majority of the low and middle-income countries in the region need more time to achieve the global goals described in Zero New HIV Infections, Zero AIDS-related Deaths and Zero Discrimination [58-60].

To reach Zero AIDS-related Deaths, the Treatment 2.0 initiative gives us a hope. It aims to stimulate innovation and to improve the efficiency and impact of HIV prevention, care and treatment programs in resource-limited countries [61,62]. One of the five pillars of Treatment 2.0 is to "adapt delivery systems". This pillar calls for decentralization and for integrating HIV care and treatment with other HIV and non-HIV services such as drug dependency services, maternal, newborn and child health (MNCH), or TB services. The primary aims of this pillar are; (a) increasing community engagement for HTC, (b) promoting early enrollment in pre-ART care and ART, and (c) retaining them for life. This initiative calls for expanding evidence base on optimal service delivery models in a variety of settings and in resource-limited contexts.

1.4. Continuum of prevention and care (COPC)

The continuum of care concept has been used to coordinate and link key populations, the health facilities, the community, and other sectors under one coherent framework [63-67]. The continuum of care has been more recently understood as the continuum of prevention and care (COPC). The COPC can be regarded as a coordinated network of prevention, treatment, care, and support activities across different levels of the health system including the community, resulting in provision of comprehensive services over the long-term [67].

The COPC originates from the concept of the continuum of care developed in the 1970s to offer continuity of care for the elderly [68]. The continuum of care was then used for individual patient care and case management, and for linking services to ensure that no patient is lost to follow-up. A systematic review [69] showed that most of the 638 papers on the continuum-of-care approach between 1995 and 2002 focused on health systems for nursing, palliative care (58%), and mental health (19%). Others assessed the continuum within biomedical care (11%) and health-service administration (8%). Less than 1% of the identified papers related to public health or health promotion. These papers emphasized the connections between components along a continuum of care including people, places,

and times [70]. In the last several years, a number of systematic reviews were conducted on the continuum of care within the domains of maternal, newborn and child health (MNCH) [71] and HIV [72,73]. A systematic review and meta-analysis assessed the effectiveness of different continuum of care linkages for reducing neonatal, perinatal, and maternal mortality in low- and middle-income countries. A systematic review quantified losses from HIV infection to treatment in sub-Saharan Africa, and reviewed interventions to decrease attrition at different points in the pathway. Another systematic review determined the magnitude of loss to follow-up of HIV-exposed infants along the PMTCT continuum of care.

In resource limited settings, the continuum of care was promoted in the context of community home-based care. A WHO framework document in 2002 described: "A continuum of care involves a network of resources and services that provide holistic and comprehensive support for the ill person and family caregivers. The goal is an affordable range of services in various settings, from home to community agencies and clinics, to hospitals and vice versa. Comprehensive care involves the provision of care, treatment, support and preventive services. Holistic care involves referral, follow-up, monitoring and case management." [74] A definition of the continuum of care was proposed specifically for MNCH in resource limited settings in 2007: "The continuum of care for MNCH requires access to care provided by families and communities, by outpatient and outreach services, and by clinical services throughout the lifecycle, including adolescence, pregnancy, childbirth, the postnatal period, and childhood. Saving lives depends on high coverage and quality of integrated service-delivery packages throughout the continuum, with functional linkages between levels of care in the health system and between service-delivery packages, so that the care provided at each time and place contributes to the effectiveness of all the linked packages." [70]

This concept emerged in the field of HIV/AIDS in 1990s when there were limited measures to prevent and treat HIV [75,76]. The application of the continuum of care was deemed critical to HIV for a number of reasons. First, HIV infection was a chronic state which might extend over a long period of

time even in the absence of life prolonging ART at that time. This required a strong synergy between various levels of the care systems, as some opportunistic infections were diagnosed and treated at the local level, while others required effective referral to care institutions. Second, care needed to be available to people living with HIV at the level where they found it most convenient, where care provision was the most cost-effective, and where people benefiting from such care could pursue their professional and personal life with minimum disruption. As a general rule the further a person had to travel from home to receive care the greater the personal cost (i.e. economic cost of arranging travel time away from home and work). The continuum of care therefore required defining roles and functions within each of the elements of the care continuum: creating services and securing the resources adequate to perform these roles and functions; and building the bridges between each of the elements for the continuum that referral and return home coincide with the corresponding level of care needs and capacity at any point of the evolution of HIV infection [77].

The concept of continuum of care provided a framework for governments to ensure those individuals diagnosed HIV receive clinical and non-clinical care, and to create linkages between the various care domains. In its implementation, a number of issues were identified; (i) The model assumed that the person needing care would have obtained an HIV diagnosis despite the fact that the vast majority of people living with HIV did not have access to, or chose not to access HTC services; (ii) Although home care and community care were featured in the continuum of care, the focus remained on formal health sector interventions, failing to account for challenges to access posed by factors such as poverty and gender; (iii) All the steps on the continuum except peer support and home care indicated who would provide care, while the home care domain indicated what type of care would be provided, thus masking the differential impacts on individuals of providing care in the household; and (iv) The linkage mechanisms remained poorly defined. The ways in which any given individual move across the continuum were not apparent, and the peer support domain was completely unlinked to the rest of the continuum [78].

More recently, the continuum of care for HIV is said to have two defining characteristics. One is a network that links, coordinates and consolidates care, treatment, and support services for people living with HIV, which are provided in their homes, in the communities where they live, and in the health facilities. The other is a group of services themselves that together provide comprehensive support to people living with HIV and their families [67]. As the availability of HIV prevention, care and treatment has improved in resource limited settings, the concept has further evolved to include prevention [79,80]. WHO/UNAIDS document in 2000 indicated an important feature of the continuum of care concept was the explicit recognition that community based activities play a vital role, not only for HIV care and support, but also for HIV prevention, and a formal recognition of the links between care and prevention [81].

The COPC can be defined as a coordinated network of prevention, treatment, care, and support activities. This network includes government, community-based organizations, non-government organizations, people living with HIV and/or key populations, their family members and others. This network spans different levels of the health system including the community. The resulting activities provide comprehensive services for adults, children, youth and families vulnerable to, living with and affected by HIV over the long-term [67]. A critical element of the COPC is to establish a comprehensive care site as a central mechanism of a local service network. The comprehensive case site offers not only clinical care but a wide range of associated services. Such services include health education, psychosocial support, links to other services and community- and home-based care (CHBC), as well as opportunities for the involvement of affected communities such as key populations and people living with HIV. The names given to the comprehensive care site differ across Asia, such as the Day Care Centre, the Comprehensive Continuum of Care Centre, and the Friend-Help-Friend Centre [67]. Since HIV outpatient clinic is a common term used for HIV care and treatment facilities in Vietnam, the term HIV outpatient ‘plus’ is used to denote activities and services of the comprehensive care site in the first part of this paper for assessing HIV service delivery in Vietnam.

1.5. HIV service delivery assessment as implementation research

The global health community increasingly recognizes the need of implementation research. It provides a practical tool to identify ways to implement proven interventions across the full range of existing health systems and in the wide diversity of possible settings [82]. Implementation research is defined as the scientific inquiry into questions concerning implementation [83]. There are areas of overlap between areas of implementation research and health systems research, operations research, outcomes research, decision analysis, program evaluation, and quality improvement initiatives. Implementation research is, therefore, often seen as a sub-discipline to improve health services in the context of practical constraints [84].

Key questions for implementation research include: 'What is happening?', 'Is it what is expected or desired?', and 'Why is it happening this way?' [85]. Implementation research has been expected and conducted to address a range of issues related to HIV in resource-limited settings [86-89]. However, discussions on implementation and research on HIV service delivery tends to focus on either one component of HIV health services such as ART [90], or integration between two services such as HIV and TB [91], HIV and MNCH [92] or HIV and family planning [93]. To date, systematic assessment has been rarely conducted on overall HIV service delivery models and HIV service delivery analyses have been fragmented.

Implementation research can address or explore any aspect of implementation, including the factors affecting implementation, the processes of implementation themselves, and the outcomes, or end-products of the implementation under study. It may focus on issues such as: identifying common implementation problems; understanding the factors that hinder or facilitate access to health interventions; developing and testing solutions to tackle implementation barriers, either within a specific context or across a range of environments; and determining the best way to introduce innovations into a health system, or to promote their large scale use and sustainability. Implementation research often deals with implementation strategies such as: enhancing the capabilities of government (public policy,

oversight and financing agencies); improving the performance of implementing and provider organizations; strengthening the capabilities and performance of individual providers and front-line workers; empowering communities and households; and supporting multiple stakeholders engaged in improving health [94]. Implementation research is most likely to be useful where implementers have played a part in the identification, design and conduct of the research undertaken, and are not just passive recipients of results. Implementation research draws on a wide variety of qualitative, quantitative, and mixed-method research approaches, rather than refers to a narrow set of 'implementation research-methods'.

1.6. Study objectives and research approach

This study has two overall objectives. First, in collaboration with national HIV program officials and partner agencies, the author aimed to assess HIV service delivery in Vietnam by identifying system related strengths and constraints using the lens of the COPC. Second, based on the findings from the assessment in Vietnam, this study aimed to examine HIV health service deliveries in six Asia-Pacific countries with concentrated HIV epidemics involving national HIV program officials and their partner agencies.

This study is implementation research and deals with implementation of HIV service development. In particular, this study focuses on availability, coordination and linkages of services that facilitate or hinder HIV case detection and retention. Throughout the implementation research process, the author played as principal investigator and took a leading role in establishing study teams, developing and applying analytical framework, facilitating consensus building, organizing data collection, analyzing data, and drafting and revising manuscripts. As key implementers, national HIV program officials, partner agencies and individual experts participated as members of study teams in different steps of this study, not just passive recipients of the results. Research methods used are compilation, review and analysis of published and unpublished literature including national program data using an analytical framework, as described below.

1.7. Background information of the study countries

Cambodia, Myanmar, Nepal, Papua New Guinea (PNG), Thailand and Vietnam were chosen for three reasons. First, they had similar characteristics such as the population size (5 to 100 millions), area (100,000 to 1,000,000 square kilometer), income level (low-income to upper-middle), and type of HIV epidemics (concentrated). Second, the respective national HIV programs, World Health Organization (WHO) country offices, and FHI 360[*] country offices expressed their willingness to participate in the study. Finally, it was deemed manageable to work with three countries each in WHO Western Pacific Region and South-East Asia Region.

Among the six Asian and Pacific countries, Thailand was categorized as an upper middle-income country and Papua New Guinea and Vietnam were lower middle-income countries while the remaining three were categorized as low-income countries [95-100] (see **Table 1**, which summarized the context in each country, including population, HIV prevalence, and service coverage). By 2010, Cambodia and Thailand had reached high ART coverage; Papua New Guinea and Vietnam just surpassed 50%; while Nepal and Myanmar remained far below 50%. Myanmar and Thailand had achieved higher prevention of mother-to-child transmission coverage than ART coverage.

[*] FHI 360 (formerly Family Health International) is a nonprofit organization based in the United States, which has been providing the study countries with technical support in the area of HIV through its regional and/or country offices. '360' reflects this organization's belief: 'a 360-degree perspective is required to address complex human development needs'.

Figure 1. Map of study countries

Table 1. Brief characteristics of the study countries

	Cambodia	Myanmar	Nepal	PNG	Thailand	Vietnam
General information						
Total area (sq km)	181,035	678,500	147,181	459,854	514,000	329,560
Population (m.) (2009)	15	50	29	7	68	87
No. of provinces/Zones	24	14	14	20	76	63
No. of districts/Townships	77	330	75	89	878	697
Adult literacy rate (%) (2008)	78	92	58	60	94	93
Income level	Low	Low	Low	Lower middle	Upper middle	Lower middle
GNI per capita (US$) (2009)	650	-	440	1,180	3,760	1,010
HIV epidemic						
Estimated number of PLHIV as of 2010	56,200	226,000	70,000	54,000	517,000	254,000
HIV prevalence**						
Adults (aged 15-49)	0.6 (2011)	0.53 (2011)	0.3 (2011)	0.8 (2011)	1.3	0.4
People who inject drugs (PWID)	24.4 (2007)	21.9 (2011)	6.3 (2011)	Not available	38.7 (2009)	18.4 (2009)
Female sex workers (FSW)	13.9 (2010)	9.4 (2011)	1.7 (2011)	17.8 (2010)	2.8 (2009)	3.2 (2009)
Men who have sex with men (MSM)	2.1 (2010)	7.8 (2011)	3.8 (2009)	Not available	13.5 (2009)	16.7 (2009)
HIV program coverage**						
ART coverage (%)	89.5 (2011)	43.8 (2011)	23.7 (2011)	61.2 (2011)	64.6 (2011)	54.0 (2011)
HIV-positive women who received ARV to reduce the risk of mother-to-child HIV transmission (%)	63.5 (2011)	54.5 (2010)	12.2 (2011)	12.3 (2011)	94.0 (2011)	44.0 (2011)
TB cases who received ART and TB treatment (%)	32.7 (2011)	Not available	Not available	25.1 (2011)	29.8 (2011)	30.1 (2011)
Key populations reached by HIV prevention program**						
FSW (%)	81.5 (2010)	76.2 (2008)	60.0 (2011)	36.4 (2010)	56.9 (2010)	47.3 (2009)
MSM (%)	69.5 (2010)	69.1 (2009)	77.3 (2009)	66.6 (2010)	49.2 (2010)	24.0 (2009)
PWID (Number syringe distributed per injecting drug user per year)	120.2 (2011)	123 (2011)	71.4 (2011)	Not available	9.8 (2010)	140 (2011)
HIV testing coverage among key populations**						
FSW	81.5 (2010)	71.1 (2008)	54.6 (2011)	46.4 (2010)	50.4 (2010)	43.8 (2011)
MSM	34.0 (2010)	47.6 (2009)	42.0 (2009)	55.8 (2010)	29.2 (2010)	30.2 (2011)
PWID	35.3 (2007)	27.3 (2008)	21.4 (2011)	Not available	40.8 (2010)	29.1 (2011)

Remark: GNI: Gross national income

**AIDS Progress Report, 2012 of Cambodia [95], Myanmar [96], Nepal [97], PNG [98], Thailand [99], and Vietnam [100]

2. PART I: Assessing HIV service delivery in Vietnam

2.1. Introduction

The HIV epidemic in Vietnam is largely concentrated among key populations including people who inject drugs, female sex workers and men who have sex with men. Adult HIV prevalence (aged 15–49) was estimated to be 0.44% with an estimated 254,000 people living with HIV in 2010 [97]. HIV cases have been reported nationwide in all 63 provinces/cities, 98% of districts, and 74% of wards/communes (Vietnam Authority of HIV/AIDS Control (VAAC): Unpublished report; 2010).

This study aimed to assess HIV service delivery in Vietnam by identifying system related strengths and constraints that are common to multiple elements of HIV health services using the lens of the COPC. Specifically, this study aimed to assess service availability including geographical distribution and decentralization and service connectedness that contribute to HIV case detection and retention in care. Vietnam has several relevant characteristics in common with many other Asian countries, such as low HIV prevalence in the general population but high prevalence among various key populations [101], enormous variation of HIV prevalence across geographical areas, and structural barriers related to working with key populations [102].

2.2. Methods

To conduct this implementation research, the author established a study team involving national HIV program officials, partner agencies and individual experts. The author drafted a new analytical framework of COPC and collaborated with other study team members to refine it for the review of HIV service delivery in Vietnam (Figure 2). The COPC concept can be applied to analyze HIV service delivery across several dimensions: (i) geographical distribution of key populations and people living

with HIV; (ii) availability of HIV health services including their geographical distribution and decentralization; (iii) connectedness between different elements of HIV health services; (iv) outcomes and impact of service availability and connectedness at a population level; and (v) interaction between HIV service delivery and other parts of the health system. To meet the study objectives and the availability of existing data, the author focused primarily on (ii) and (iii) above.

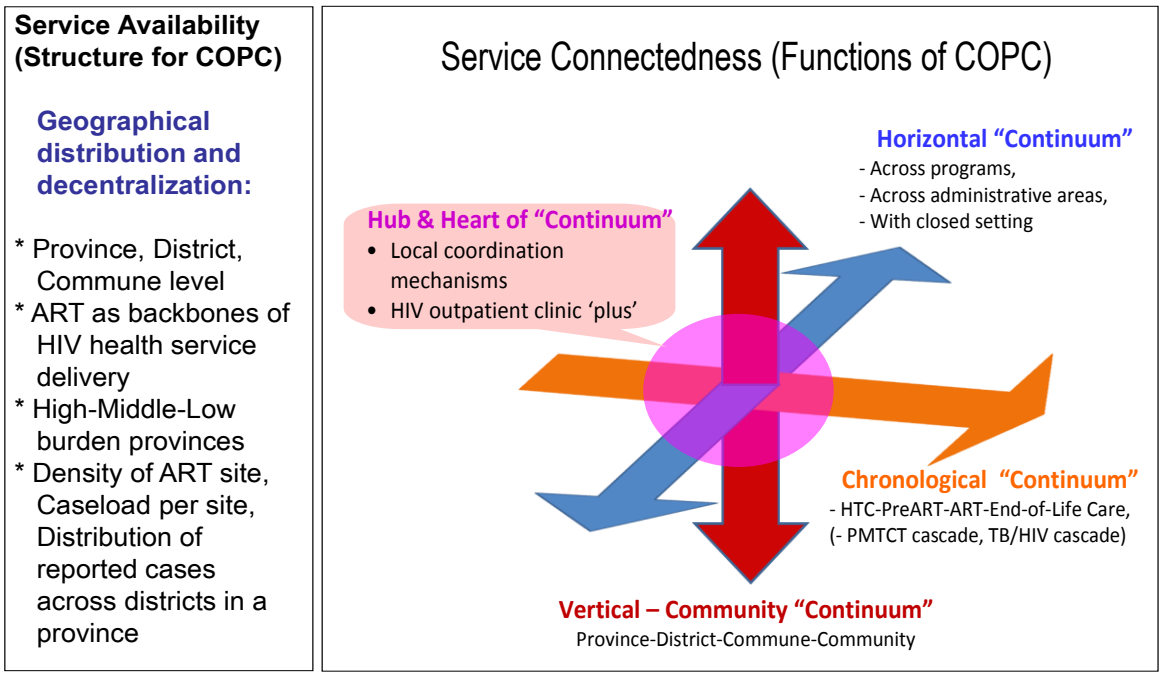


Figure 2. Analytical framework for assessing HIV health services in Vietnam from the viewpoint of COPC

The *service availability* assessment focused on examining geographical distribution of services and service delivery decentralization. In assessing *service connectedness*, the author led the study team to define four functions: 1) local coordination mechanisms and HIV outpatient clinic 'plus' (Hub and Heart of Continuum); 2) chronic care provision including self-care, peer support and patient follow-up and tracking as well as recording systems throughout the stages of HIV diagnosis, pre-ART care, ART and end-of-life care (Chronological Continuum); 3) linkages and/or integration across HIV and other health services, across different geographical administrative areas, and across community health facilities and closed settings such as detention centers for drug users and sex workers and prisons (Horizontal

Continuum); and 4) service linkages across commune, district and provincial levels including prevention outreach and CHBC (Vertical-Community Continuum).

The author coordinated participatory assessment of HIV program and project reports, policy documents, legislation, and published articles involving national HIV program officials, partner agencies and individual experts as study team members. A primary source was the office of the Vietnam Authority (formerly 'Vietnam Administration') of HIV/AIDS Control (VAAC), Ministry of Health. Electronic databases such as Popline, Web of Science, Medline, Embase, and Google scholar were also searched. Using these sources, the author identified articles published in English between January 1990 and August 2011. Keywords used for the search include HIV, AIDS, prevention, treatment, care, support and Vietnam in appropriate combinations and syntax according to the database. To fully explore the situation in Vietnam to the end of 2010, the reference lists of the key identified papers were explored and program staff members of various organizations were consulted. The author then analyzed the data obtained using the COPC analytical framework and identified strengths and constraints of HIV health service delivery in improving HIV case detection and retention in care.

2.3. Results

2.3.1. Service availability including geographical distribution and decentralization

Organization of local health facilities follows the administrative divisions of 63 provinces, 697 districts and 11,112 communes [103]. TB diagnosis (smear) and delivery services were noted to be available in all districts. All communes were charged with providing TB treatment and ANC services.

HIV prevention for key populations and HIV care and treatment has been rapidly expanded since 2004. Evolution of HIV health services are summarized in Table 2 [104-107]. By 2010 HIV prevention targeting key populations included needle and syringe programs for people who inject drugs. These programs were implemented in 3,333 communes in 352 districts or 51% of all districts in 43 provinces mainly by 1,792 peer educators. Condom use program targeting female sex workers involved 3,123 peer

educators. In addition, VCT and ART services co-existed in the same districts in most cases. That is, 175 districts had VCT and 167 of these districts had ART sites. At the provincial level, both VCT and ART were present in all provinces. PMTCT services involving ARV prophylaxis were available in 133 districts in 63 provinces. OST was available in 11 districts in 4 provinces.

Table 2. Evolution of HIV health services in Vietnam

Year	Evolution
Early 1990s	Small-scale responses initiated at the local level such as local government led needle and syringe programs and peer support activities.
Mid 1990s	The Ministry of Health initiated a HIV prevention campaign followed by commune health station based basic care and support for PLHIV in three provinces.
Early 2000s	The 100% condom use program piloted by the Ministry of Health and a number of needle and syringe programs implemented by NGO. Establishment of HIV clinical services at national hospitals followed by district level HIV outpatient clinics offering comprehensive care in Ho Chi Minh City.
2004 (and onward)	Health sector-led large scale expansion of HIV prevention, care and treatment initiated (supported by the United States, the United Kingdom, the World Bank and the Global Fund) For HIV care and treatment, HIV outpatient clinics expanded based on the experiences of a number of model sites. CHBC expanded in different forms, such as (i) HIV outpatient clinic based; (ii) Stand-alone model run by PLHIV groups, faith-based organizations or local NGO; (iii) Led by Women's Union; and (iv) Commune health station based. ART expanded in administrative detention centers for PWID and FSW, followed by in prisons.
2007	National Plan of Action on Harm Reduction approved. It stipulated that HIV officers at provincial and district health services play a central role in mobilizing peer educators from current or former PWID/FSW and entertainment establishment owners/managers.
2008	Under the legal framework of the Law on HIV and its decree, the national pilot OST program began in two provinces,

Source: [104-107],

The density of ART sites in the provinces (number of ART sites / number of districts x 100) was 66% in the high, 29% in the middle, and 15% in the low burden provinces (Table 3). It was noted that a number of high and middle burden provinces had mountainous remote areas where a substantive portion of key populations and people living with HIV had limited physical access to health facilities. These points were classified into strengths and constraints of HIV service availability as shown in Table 4.

Table 3. Availability of ART sites according to different levels of HIV burden in 2009

	High burden province		Middle burden province		Low burden province	
	n	**(%)**	**n**	**(%)**	**n**	**(%)**
Number of provinces	8		29		26	
Number of districts	122		300		268	
Number of ART sites	80		88		39	
District with ART	65		72		30	
Density of ART site (%)		65.6		29.3		14.6
(Number of ART sites / Number of districts x 100)						
Estimated number of patients needing ART	36,682	(58.0)	21,197	(33.5)	5,409	(8.5)
Number of patients on ART	25,449	(70.7)	8,464	(23.5)	2,095	(5.8)
Estimated number of patients needing ART per district	301		71		20	
Number of ART patients per district	209		28		8	
ART coverage (%)						
(Number of patients on ART / Estimated number of patients needing ART x 100)		69.4		39.9		38.7

Remark: High burden province: over 300 reported cases per district and over 150 patients needing ART per district;
Middle burden province: over 100 reported cases per district or over 50 patients needing ART per district;
Low burden: less than 100 reported cases per district and less than 50 patients needing ART per district.

Source: COPC review group: An HIV health service delivery review from the viewpoint of the "Continuum of Prevention and Care": Discussion paper for greater access, success and sustainability of Viet Nam's national HIV prevention, care and treatment program. Unpublished report; 2010., Do TN. HIV/AIDS care and treatment in Vietnam: Challenges towards providing comprehensive services. Presented at the 4th National Scientific Conference on HIV/AIDS, Hanoi, Vietnam, December 2010, Unpublished presentation; 2010.

Table 4. Strengths and constraints of HIV service availability in improving HIV case detection and retention in care

Strengths	Constraints
- Outreach peer educators in more than half of districts [D,R]	- Less than one-third of districts offering VCT/ART at district level in middle/low HIV burden provinces [D,R]
- Two-thirds of districts offering VCT/ART at district level in high HIV burden provinces [D,R]	- Lack of physically accessible VCT/ART in remote areas in high/middle burden provinces [D,R]

Remark:[D] stands for a strength or constraint that is related to HIV case detection
[R] stands for a strength or constraint that is related to retention in care
Source: VAAC: Compilation of data on service availability based on program monitoring; Unpublished information, 2010.

2.3.2. Service connectedness

1) Hub and heart of continuum

a) Local coordination mechanisms

Mechanisms for local coordination of HIV and other related health services were stipulated in several official documents from the Ministry of Health and its donor-funded projects. These documents included national guidance on HIV care and treatment, TB/HIV, PMTCT as well as project guidance on HIV prevention for key populations [108-114]. Consequently, a variety of coordination committees for HIV-related services were formed in some areas, while none were formed in other areas. Most provinces lacked coordination mechanisms for HIV-related services between districts. That is, districts providing ART/VCT services rarely coordinated with districts without such services (Table 5) (Bui DD: 2010 to 2015 Challenges and the way forward: Ensuring sustainable and patient- centered HIV service delivery through the continuum. Presented at the 4th National Scientific Conference on HIV/AIDS, Hanoi, Vietnam, December 2010, Unpublished presentation; 2010)

Table 5. Strengths and constraints of HIV service connectedness (Hub & Heart of continuum) in improving HIV case detection and retention in care

Strengths	Constraints
- Coordination mechanism between administrative detention centers and HIV outpatient clinics emerging [R]	- No coordination mechanism between districts with VCT/ART and those without [D,R]
- HIV outpatient clinic 'plus' at district level expanded in high and middle burden provinces [D,R]	- Clinical services only in government funded HIV outpatient clinic at provincial level [D,R]
	- No system to monitor expansion of outpatient clinic 'plus' [D,R]

Remark: [D] stands for a strength or constraint that is related to HIV case detection
[R] stands for a strength or constraint that is related to retention in care

Source: Bui DD: 2010 to 2015 Challenges and the way forward: Ensuring sustainable and patient- centered HIV service delivery through the continuum. Presented at the 4th National Scientific Conference on HIV/AIDS, Hanoi, Vietnam, December 2010, Unpublished presentation; 2010., [113-115]

b) HIV outpatient clinic 'plus' (Comprehensive Care Site)

The national guidance on HIV care and treatment stipulated the responsibilities undertaken in the HIV outpatient clinics [108,109]. These stipulations included the provision of clinical services, health education, prevention services, and psychosocial support. Other stipulations included the provision of linkages with other relevant health services and the involvement of people living with HIV as members of care teams and local HIV treatment committees.

Large donor funded initiatives supported expansion of HIV outpatient clinics mainly in high and middle burden provinces (Table 4). In addition to the clinical services, several functions were added consistent to support the concept of the HIV outpatient clinic 'plus'. These functions included: (i) facilitating HIV positive key populations to access HIV outpatient clinics; (ii) involving HIV positive key populations in HIV prevention initiatives targeting key populations; (iii) supporting treatment adherence in collaboration with commune health stations, peer educators and CHBC teams; (iv) linking with TB and MNCH services as well

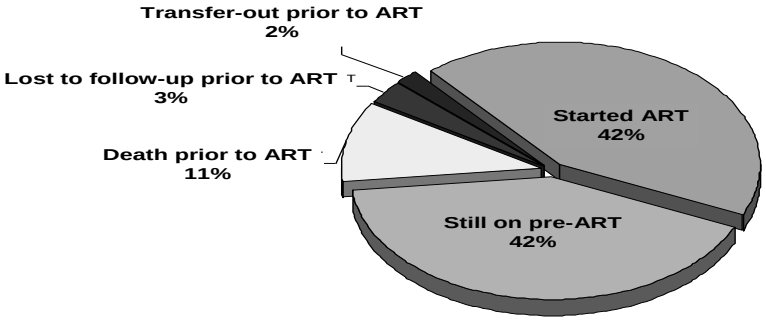
as closed settings; (v) establishing patient referral procedures to specialized hospitals [113-115]. Despite these initiatives, however, some HIV outpatient clinics were known to be only providing clinical services, especially in low burden provinces where limited donor funded projects were operating. These points were classified into strengths and constraints related to hub & heart of continuum as shown in Table 5.

2) Chronological continuum

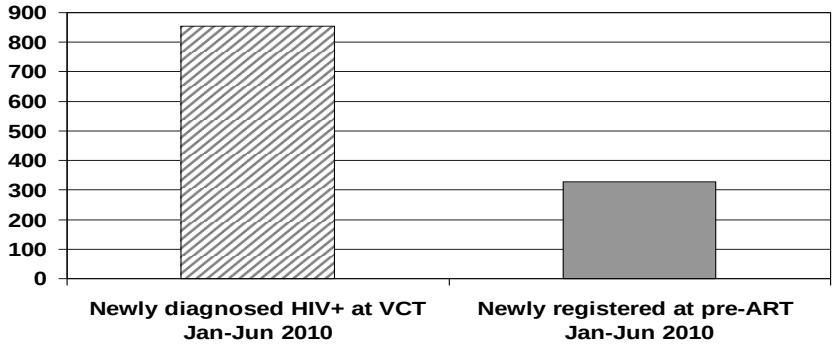
National guidance documents stipulated case management procedures and provided standardized longitudinal registers for pre-ART care and ART [116]. These documents were in line with the chronic care principles including self-care, peer support, and patient follow-up information systems [117]. HIV outpatient clinics tended to actively prepare and track patients for ART by mobilizing people living with HIV peer support and CHBC. Program data indicated the percentage of adults and children with HIV still alive and known to be on treatment 12 months after initiation of ART was 84.2% [118]. HIV drug resistance early warning indicators indicated good adherence to appointment schedule and low level of lost-to-follow-up despite a large proportion of the patients being people who inject drugs (Figure 3-a) [119,120]. Furthermore, a study conducted a 2-year prospective cohort analysis of patients taking ART in two HIV outpatient clinic 'plus' sites in Ho Chi Minh City. It revealed the change of median CD4 count over the 24-month follow-up period among patients who ever injected illicit opiates was similar to that for those who reported never having injected [121]. In another study in Hanoi, viral suppression was not statistically different among the patients who used drug in the previous six months versus those who did not use it after at least six months of ART initiation [122].

Indicators	Target	Adult sites meeting suggested targets	Pediatric sites meeting suggested targets
% appropriate initial ART regimen prescriptions (Jan-Dec 2008)	**100%**	**25/27 (92.6%)**	**3/4 (75%)**
% lost to follow up during the first 12 months of ART (Jan-Dec 2007)	**≤ 20%**	**26/27 (96.3%)**	**4/4 (100%)**
% ART patients keeping all clinical appointments on time (Jul-Sep 2008)	**≥ 80%**	**20/25 (80%)**	**3/4 (75%)**
% retained on first-line ART at 12 months (Jan-Dec 2007)	**≥ 70%**	**22/27 (81.5%)**	**4/4 (100%)**

3-a. Results of HIV drug resistance early warning indicators based on data collected from standard registers and records at sentinel adult and pediatric ART sites (Source: [119,120])



3-b. Status of PLHIV enrolled in pre-ART care from January 2008 to June 2009 at 3 outpatient clinics in Hanoi as of June 2009 (Source: Hanoi Health Services HIV/AIDS Center: Unpublished record review; 2010.)



3-c. Comparison of the number of people newly diagnosed HIV-positive and the number of newly registered at pre-ART in outpatient clinics in Thanh Hoa Province (Source: Kato M: "Pre-ART" Situation in the World and in Viet Nam and way forward. Presented at the 4th National Scientific Conference on HIV/AIDS, Hanoi, Vietnam, December 2010, Unpublished presentation; 2010.)

Figure 3. Outcomes of people diagnosed HIV-positive and initiated ART

To meet palliative care needs [123], the Ministry of Health [124] developed the guidelines on palliative care for cancer and AIDS patients in 2006. The ministry also improved opioid prescribing regulations in 2008 and trained over 400 physicians by early 2010 [125]. As a result, palliative care services have started in both hospitals and communities [126]. Patient follow-up and tracking for pre-ART care appeared to be considerably less operational than for ART. Results from an ad hoc assessment indicated that a substantial number of people living with HIV might be dying or lost-to-follow-up during the pre-ART period (Figure 3-b). In 2009, monitoring of attrition from pre-ART care started as part of HIV drug resistance early warning indicators monitoring [127]. Existing referral forms were not used extensively to facilitate the referral process from VCT to pre-ART care. An ad hoc assessment in one province indicated a large gap between the number of people diagnosed as HIV positive at VCT and the number of people enrolled in pre-ART care (Figure 3-c). No specific national guidance or patient tracking system was established for this process. These points were classified into strengths and constraints related to chronological continuum as shown in Table 6.

Table 6. Strengths and constraints of HIV service connectedness (Chronological Continuum) in improving HIV case detection and retention in care

Strengths	Constraints
- Chronic care based ART case management established for PWID and non-PWID [R]	- Limited capacity to address the needs of PLHIV on ART for many years [R]
- Palliative care initiated integrated with cancer care [R]	- Pre-ART care under-developed [R]
	- Linkage from VCT to pre-ART care under-developed [R]

Remark: [D] stands for a strength or constraint that is related to HIV case detection
[R] stands for a strength or constraint that is related to retention in care

Source: [116-127], Hanoi Health Services HIV/AIDS Center: Unpublished record review; 2010., Kato M: "Pre-ART" Situation in the World and in Viet Nam and way forward. Presented at the 4th National Scientific Conference on HIV/AIDS, Hanoi, Vietnam, December 2010, Unpublished presentation; 2010.

3) Horizontal continuum

Collaborative activities between HIV and TB services and HIV and MNCH services (PMTCT) were expanded mainly through donor funded projects. These collaborative efforts were consistent with the national guidance developed by concerned national programs [110,111].

However, these projects tended to support specific districts rather than a provincial network. In districts without donor-funded VCT/ART, scarcely any health workers were charged with providing HIV health services (COPC review group: An HIV health service delivery review from the viewpoint of the "Continuum of Prevention and Care": Discussion paper for greater access, success and sustainability of Viet Nam's national HIV prevention, care and treatment program. Unpublished report, 2010). In these districts, TB and ANC care services were rarely equipped to implement PITC for TB cases and for pregnant women. As a result, in 2009 the percentage of estimated HIV-positive incident TB cases that received treatment for TB and HIV was as low as 27.5% [118]. Similarly, the percentage of HIV-positive pregnant women who received ARV medicines to reduce the risk of mother-to-child transmission was 32.3%.

Standard TB registers included a section for recording HIV status. However, ANC care registers did not include a space to record HIV status among pregnant women. Pre-ART and ART registers did not have a section for recording TB diagnosis and treatment or for pregnancy status. Patient-held records provided this additional information but were used in only a limited number of sites.

All the OST sites were located in districts where VCT/ART was present [128] (National Committee for AIDS, Drugs and Prostitution Prevention and Control. Evaluation report: The national strategy on HIV/AIDS prevention and control in Vietnam till 2020 with a vision to

2020. Unpublished report; 2010:74–80., VAAC: Unpublished report; 2010.). Some of the current OST sites were stand-alone and physically separate from HIV outpatient clinics while others were co-located with HIV outpatient clinics. Efforts were made to strengthen linkages between OST and other HIV health services as part of the OST scale-up. These points were classified into strengths and constraints related to Horizontal Continuum as shown in Table 7.

Table 7. Strengths and constraints of HIV service connectedness (Horizontal Continuum) in improving HIV case detection and retention in care

Strengths	Constraints
- HTC integrated into TB and ANC in donor funded districts with ART/VCT in high (and middle) burden provinces [D]	- Lack of linkage for HIV-TB and HIV-MNCH in non-donor funded districts without VCT/ART in middle/low burden provinces [D]
- Referral system between administrative detention centers and HIV outpatient clinics being developed [R]	- HIV service register not designed to facilitate TB/HIV and PMTCT [R]

Remark: [D] stands for a strength or constraint that is related to HIV case detection
[R] stands for a strength or constraint that is related to retention in care

Source: [110,111,118,128], COPC review group: An HIV health service delivery review from the viewpoint of the "Continuum of Prevention and Care": Discussion paper for greater access, success and sustainability of Viet Nam's national HIV prevention, care and treatment program. Unpublished report, 2010., National Committee for AIDS, Drugs and Prostitution Prevention and Control. Evaluation report: The national strategy on HIV/AIDS prevention and control in Vietnam till 2020 with a vision to 2020. Unpublished report; 2010:74–80., VAAC: Unpublished report; 2010.

4) Vertical-community continuum

a) Linkages across different levels of health services

people living with HIV suspected of active TB were often required to travel long distances across the community, district, and provincial levels (VAAC: Compilation of information from HIV projects under VAAC. Unpublished information, 2010.). Diagnosis of smear-negative and extra-pulmonary TB was mostly performed at the provincial level. Similarly, a number of PMTCT services were provided mainly at the provincial level. These services included planned delivery of HIV positive women, early infant diagnosis and pediatric

treatment. In addition, the provincial level was responsible for confirmation of HIV treatment failure and prescription of second line ART regimens in most provinces [116].

All of these patient flows required robust referral systems including patient information sharing across the different levels. Commonly, a doctor simply instructed a patient to go to another facility often without a referral form (VAAC: Compilation of information from HIV projects under VAAC. Unpublished information, 2010.). . There were no routine mechanisms to monitor the functioning of the referral process. Respect for administrative boundaries and the hierarchy of authority were reported to often make health workers reluctant to contact their peers in other health facilities.

b) Community response and its linkage with health services

Peer educators for condom use and needle and syringe program were encouraged to systematically refer their clients to VCT (VAAC: Compilation of information from HIV projects under VAAC, Unpublished information, 2010.). An increasing number of peer educators for men who have sex with men were also recruited particularly in large cities. However, the coverage of HIV prevention programs for people who inject drugs, female sex workers and men who have sex with men was only 15.4%, 47.3% and 24%, respectively in 2009 [118]. Similarly, the coverage of HTC among people who inject drugs, female sex workers and men who have sex with men was low at 17.9%, 34.8% and 19.1%, respectively. Consequently, majority of people living with HIV accessed HIV care and treatment services at an advanced stage of HIV infection. Program monitoring data from 2009 indicated 64% of PLHIV started ART at CD4 100/cm^3 or lower [127].

Alternatives to the peer education approach were reported to be emerging to serve hard-to-reach populations. These alternatives included mobilization of pharmacies, street vendors,

self-service boxes and commune health stations for needle and syringe and condom use programs [129]. Civil society partners also began to extend their reach to men who have sex with men through internet connections and cruising hot spots.

In most districts, peer educators for prevention and those for care were reported to be managed and supported separately by different donor funded projects (VAAC: Compilation information from HIV projects under VAAC, Unpublished information, 2010.). However, there were growing examples of synergy between the activities of the two different peer educator groups [129]. These examples included drop-in-centers for people who inject drugs managed by people living with HIV with support from district HIV outpatient clinics, and needle and syringe program activities performed by people living with HIV.

These points were classified into strengths and constraints related to Vertical-Community Continuum as shown in Table 8.

Table 8. Strengths and constraints of HIV service connectedness (Vertical-Community Continuum) in improving HIV case detection and retention in care

Strengths	Constraints
- Extensive mobilization of peer educators to facilitate key populations to access VCT [D]	- Access to HIV testing and care and treatment in advanced stage of HIV infection [D,R]
- Alternative approaches to reach hidden key populations emerging [D]	- Health workers commonly providing verbal advice only to patients for referral across different levels of health facilities [R]
- CHBC models mobilizing a wide range of stakeholders [R]	- No system to monitor referral services [R]

Remark: [D] stands for a strength or constraint that is related to HIV case detection
[R] stands for a strength or constraint that is related to retention in care

Source: VAAC: Compilation of information from HIV projects under VAAC, Unpublished information, 2010., [116,127,129]

2.4. Discussion

2.4.1. Service availability including geographical distribution and decentralization

Only a quarter of districts had VCT or ART sites, while key populations had been identified and reached in more than half of the districts. TB diagnosis (smear) and ANC services were provided in all the districts throughout the country. In high burden provinces, estimated ART coverage appeared to be reaching saturation. However, in middle and low burden provinces, the coverage appeared to be relatively low and the ART caseload per facility was too small to warrant further expansion of district ART sites. In some remote areas rated high and middle burden, a substantive number of people living with HIV have limited physical access to district health facilities. To maximize HIV case detection and retention in care, it is therefore crucial to strengthen service connectedness in middle and low burden provinces. Remote areas in high and middle burden provinces require consideration of specific approaches. Such initiatives include further decentralized and/or mobile services [130,131].

2.4.2. Service connectedness

1) Local coordination mechanisms

Local coordination mechanisms for HIV-related health services vary significantly across different provinces and in some cases they are non-existent. It would be beneficial to review the experiences from different forms of coordination mechanisms across the country to inform future guidance development [115]. In particular, consideration should be given to coordination mechanisms between districts with VCT/ART and those without. One option is to form clusters of districts in each province and to establish clear referral procedures as implemented in a country in Asia [132]. In this way, within the same cluster, districts offering

VCT/ART could collaborate with districts not offering VCT/ART services to improve HIV case detection and retention in care.

2) Functions of HIV outpatient clinic

HIV outpatient clinics established multiple functions to the chronological, horizontal and vertical continuum of prevention and care. This was accomplished through mobilizing people living with HIV and key populations peer educators and by developing links to CHBC and other related services as seen in other Asian countries [66,115]. This was particularly evident in high burden provinces. Early in the epidemic, people living with HIV and key populations were seen as passive recipients of services. Over the past decade, there has been a paradigm shift. When new HIV outpatients were established, health workers encouraged people living with HIV and key populations to work as peer educators, care providers and support-group members. This provided opportunities for health workers to receive feedback on their services. As a result, acceptance and trust of health services among people living with HIV and key populations have improved. This improved relationship facilitated a rapid expansion of peer educators. However, limited information was available to know the status of more than 160 HIV outpatient clinics across the country. Establishment of a simple system to monitor the functions of these HIV outpatient clinics would help national and local HIV programs to improve HIV case detection and retention in care especially among key populations.

3) Chronic care

Chronic care systems for people living with HIV on ART were well established through peer mobilization, patient follow-up and tracking, and longitudinal monitoring [117,133]. Their effectiveness is reflected in high levels of ART retention and appointment keeping within a

twenty-four month period. Such success is evident despite the fact that a large proportion of the patients are people who inject drugs without OST services [121,122]. However, retention from HTC to pre-ART care and during pre-ART care was sub-optimal as in the case in Sub-Saharan Africa [134]. These processes should be strengthened to accelerate early ART initiation and to introduce ART as prevention among discordant couples [18,135,136]. It will also improve case management of TB-HIV co-infections and HIV positive pregnant women. Integrating pre-ART care with post-test counseling services should be considered [137,138] as VCT and ART sites were co-located in most cases in Vietnam. It is also vital to establish the mechanisms to assess and address the needs of people living with HIV on ART over the long term. These people living with HIV include those who are mobile across provinces and those who have mental health problems, cardio-vascular diseases, cancers and viral hepatitis B and C [139,140].

4) Linkages across different services, administrative boundaries and settings

Integration of HTC into TB and ANC services is progressing in districts offering VCT/ART through donor-funded projects. In districts without VCT/ART, no mechanisms appeared to be in place to facilitate access to HTC and to support retention in care. One option for consideration is to form district clusters [132]. In addition, districts without VCT/ART should explore new approaches to introduce HTC for key populations, TB cases and pregnant women. Such approaches might include point-of-care HIV diagnosis with rapid-test based algorithms and community outreach testing and counseling [130,131]. The introduction of ART in administrative detention centers has led to the referral system development between these centers and hospitals in the community. It has also triggered the potential of strengthening the basic health care in closed settings including prisons into the coming time.

5) Linkages across different levels of health services

The existing patient flows for TB/HIV, PMTCT and HIV treatment failure management require robust referral systems across the different levels of health services. However, limited information was available to assess the functioning of the referral processes. A simple monitoring system should be developed to assess retention including drop-out and delay during the referral processes. Administrative boundaries and the hierarchy of authority appear to hinder effective referral services. People-centered health care has been promoted in Asian countries including Vietnam [141]. This approach could help overcome some of the challenges to patient referral.

6) Community response and its linkage with health services

Extensive peer educator schemes established by local health services can be regarded as a major breakthrough in reaching and serving hard-to-reach populations and to ensure adherence to HIV treatment. These schemes are particularly critical in Vietnam where the existence of non-government organizations is limited. However, a substantial portion of key populations seems to be still hidden resulting in limited and delayed access to HIV services. Considerations should be given to expanding alternative approaches such as the mobilization of pharmacies and street vendors [129]. Also the capacity of existing peer educators should be maximized. For example, approaches to be considered include promoting synergy between the two schemes of peer educators for prevention and care [142]. Strategies to further decentralize HTC and care and treatment services should be explored. These strategies should include mobile services in the areas where a substantive number of people living with HIV have limited physical access to services. These efforts would improve HIV case detection and

retention in care and contribute to better outcomes of multiple HIV health services including targeted prevention, TB/HIV, PMTCT and OST.

2.4.3. Utility of the COPC framework

Existing literature tends to focus on one or two components of HIV services, such as testing, treatment, or HIV-TB. Systematic assessment has been rarely conducted on overall HIV service delivery models, and analyses have been fragmented. In this systematic assessment of HIV health services, the COPC framework was used to identify underlying system-related strengths and constraints which affect the performance of multiple HIV health services, particularly HIV case detection and retention in care. National HIV program officials and partner agencies were involved throughout the process of the assessment. Lessons learned from this review could contribute to service delivery optimization and Treatment 2.0 adaptation to Vietnam's specific situation [61,62]. In fact, based on this assessment, the national HIV program has initiated pilot projects to address the constraints identified. Furthermore, it plans to strengthen provincial programming by re-defining various service linkages and accelerate the transition from project-based approach to integrated service delivery in line with the Treatment 2.0 initiative.

While this review focused on HIV health service delivery, the COPC framework could also serve to systematically assess the interfaces between HIV and other health service delivery systems. This is particularly important in the context of the global health agenda to shift from disease control programs to health system strengthening. Such interface could include mechanisms for coordinating and linking different health services, cross-fertilization of management of various chronic illnesses [133], management of patient referral systems, and community mobilization and outreach.

2.4.4. Limitations of this study

This assessment was a first attempt to capture the wide range of HIV service delivery processes by using the COPC framework. However, not every element of HIV health services has been addressed. For instance, services for children born to HIV positive mothers have not been included in this analysis.

Another limitation of this study was that it included the analysis of unpublished documents. However, through active participation of study team members from the national HIV program in different stages of this study, the study team was able to access unpublished program information, gain insights in interpreting data from program perspective, and critically discuss each issue presented in the paper. Their participation also enhanced their understanding on HIV service delivery as implementers in program development, not just passive recipients of the study results.

Furthermore, a few assessments on HIV service connectedness relied on data from ad hoc data reviews and small scale studies when relevant data were not available from national program monitoring. For example, the study team deemed chronic care based ART case management as established, partly referencing the data from studies conducted in clinics in two big cities. Similarly, linkage from VCT to pre-ART care was regarded as under-developed based on an ad hoc data review in a province. In these cases, the study team made extra efforts to gather related information and critically discussed the generalizability of the data from these ad hoc data reviews and small scale studies.

2.5. Conclusions

This assessment of service delivery in Vietnam involving national HIV program officials and partner agencies identified the system-related strengths and constraints of HIV health service

delivery in maximizing HIV case detection and retention in care in Vietnam. District-based service delivery models have been developed especially in high burden provinces. Multiple service elements appeared to be connected well in districts offering VCT/ART where donor funded projects were operating. Extensive involvement of people living with HIV and key populations in prevention and care lowered barriers for the marginalized populations to access services. However, service elements tended to be disconnected in districts that were not supported by donor funded projects particularly in middle and low burden provinces. In addition, no adequate service delivery model has been established for key populations and people living with HIV in mountainous remote areas.

Based on this review, the national HIV program has initiated pilot initiatives to address the constraints identified. Furthermore, it plans to strengthen provincial programming by re-defining various service linkages and accelerate the transition from project-based approach to integrated service delivery in line with the Treatment 2.0 initiative. Similar reviews should be considered by the national HIV programs of other countries to optimize respective HIV service delivery models.

3. PART II: Investigating HIV service delivery in 6 Asian and Pacific countries

3.1. Introduction

Applying the COPC analytical framework used for assessing HIV service delivery in Vietnam, the author aimed to investigate HIV health service delivery in six Asia-Pacific countries with concentrated HIV epidemics involving national HIV program officials and their partner agencies. More specifically, the author aimed to assess the four types of continuum from the perspective of service availability, linking approaches to improve the continuum; and performance monitoring of the continuum across the study countries.

The author assumed that systematically assessing HIV service delivery models using the COPC concept involving national HIV programs and partners could characterize the implementation of HIV service development in study countries. Especially, it could inform the national HIV programs and their partners to cross-fertilize among the countries and to optimize respective service delivery models for maximizing HIV case detection and retention in care.

3.2. Methods

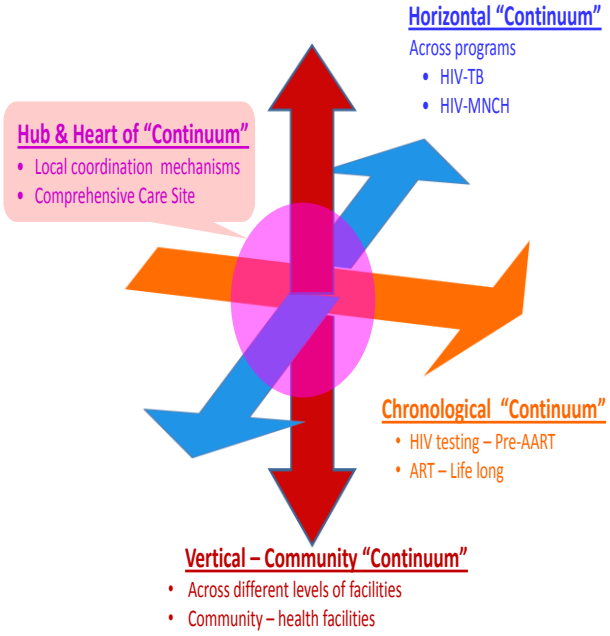
The author led the establishment of a regional study team to examine national HIV health service delivery systems. The team consisted of officials from WHO Western Pacific Region, WHO South-East Asia Region, and FHI 360 Asia Pacific Region as well as individual experts. Cambodia, Myanmar, Nepal, Papua New Guinea, Thailand and Vietnam

were chosen to be study countries considering: (i) characteristics such as the population size (5 to 100 millions), area (100,000 to 1,000,000 square kilometer), income level (low-income to upper-middle), and type of HIV epidemics (concentrated); (ii) willingness of the national HIV programs, WHO country offices, and FHI 360 country offices to participate in the study; and (iii) three countries each in WHO Western Pacific Region and South-East Asia Region. A main idea for setting these criteria was to choose countries that had similar characteristics and could work in collaboration easily.

Each country formed a country study team which included national HIV program officials together with staff of WHO and/or FHI 360 country offices. The author and other regional study team members provided guidance and support to each country study team in identifying and collecting the information on the availability of HIV related services, approaches to link the services, and activities to monitor the performance. Secondary program data that reflected the situation at the end of 2010 were collected from respective national HIV programs. Types of services covered included ART, HTC including VCT and PITC in TB and ANC services, CHBC, and HIV prevention for key populations. Global reports 2011 and country reports 2012 [33,95-100,143] were used to gather data on program performance including coverage of HIV testing, prevention and treatment as well as ART retention.

The author led the regional and country study teams in adapting and adopting the COPC analytical framework that had been applied to a previous study in Vietnam [144] (Figure 4). Points for modifying the framework included: (i) deleting "service availability (structure of COPC)" ; (ii) deleting items specific to the assessment in Vietnam (e.g. high-middle-low burden provinces, density of ART sites, and caseload per site); and (iii) inserting a matrix for articulating analytical scope. Regarding the point (iii), the matrix distinguished the contribution of service availability to the continuum; linking approaches taken to improve the continuum; and performance monitoring of the continuum.

Compiled data from each country study team was reviewed by the author and other regional study team members. The regional study team then sent a series of queries and additional data requests to respective country teams to assure the data quality and complete the comparative analysis across the countries.



	Service availability	Linking approach	Performance monitoring
Vertical-Community	Distribution and decentralization of VCT and HIV prevention for KPs	Accelerating access to testing and referral to care among KPs	Testing coverage among KPs and other related indicators
Chronological	Distribution and decentralization of VCT and ART sites	Improving retention from VCT to ART initiation and during ART	Status of monitoring systems on VCT to ART initiation and during ART
Horizontal	Distribution and decentralization of ANC, TB and HIV testing	Linking between HIV, antenatal care and TB services for HIV testing	HIV testing coverage and ARV coverage for PMTCT and TB
Hub & Heart	Features and expansion status of comprehensive care sites including PLHIV involvement in ART sites and linkages with CHBC.		

Figure 4. Modified analytical framework for reviewing HIV health services in 6 Asian and Pacific countries

For analyzing each continuum, data were examined to explore: contribution of service availability to the continuum; linking approaches taken to improve the continuum; and performance monitoring of the continuum. Regarding the vertical-community continuum, the author looked into: distribution and decentralization of VCT and HIV prevention for key populations (service availability); approaches to accelerate access to HTC and referral to care among key populations (linking approach); and HTC coverage among key populations and other related indicators (performance monitoring). Concerning the chronological continuum, the author examined: distribution and decentralization of VCT and ART sites (service

availability); approaches to improve retention from VCT to pre-ART enrolment, during pre-ART and during ART (linking approach); and status of monitoring systems on VCT to pre-ART, during pre-ART and during ART including national program data on ART retention and HIV drug resistance early warning indicators (performance monitoring). On the horizontal continuum, data analysis by the author focused on continuum between HIV, ANC and TB services for HTC. For this, the study author examined: distribution and decentralization of ANC services, TB services and HIV testing and counselling including VCT and PITC for pregnant women and TB cases (service availability); approaches to link between HIV, ANC and TB services for HTC (linking approach); and HIV testing coverage among pregnant women and TB cases, ARV coverage for PMTCT, and TB treatment and ART coverage among HIV positive TB patients (performance monitoring). On hub & heart of continuum, the author analyzed the information on features and expansion status of comprehensive care sites including people living with HIV involvement in ART sites and linkages with CHBC.

3.3. Results

3.3.1. Approaches to accelerate HIV diagnosis among key populations (Vertical-Community Continuum)

Service availability:

Availability of VCT at district/township level was limited in Vietnam and Myanmar while all districts had VCT in other countries (Table 9). In Vietnam, the number of districts with VCT was much fewer than the number of districts with outreach services for key populations. Quantifiable information on districts with outreach services for key populations was not available in Myanmar. In these countries, key populations living in districts without VCT had to travel to districts with VCT to access HIV testing and counselling services.

Linking approach:

In all countries, key populations were supposed to be referred to VCT from outreach services, OST sites and drop-in centers. Innovative on-site HTC services were emerging to target key populations in the study countries. For example, in Cambodia, VCT staff started to visit drop-in centers in the hot spots to provide female sex workers, men who have sex with men and transgender with HTC as part of the 'Community/Peer Initiated Testing and Counseling' strategy. Other forms of point of care testing were being explored in other countries.

Performance monitoring:

All countries had HIV testing and counselling coverage data for female sex workers, men who have sex with men and people who inject drugs, except Papua New Guinea which had not reported injecting drug use epidemic. The coverage among men who have sex with men and people who inject drugs appeared to be lower than that among female sex workers in five countries.

3.3.2. Chronic care management (Chronological Continuum)

Services availability:

In Thailand, all districts had VCT and ART, in most cases within the same hospital compound (Table 10). In Vietnam, one-fourth of districts had both VCT and ART while the remaining districts had neither VCT nor ART sites. In other countries, the number of districts/townships with VCT was far greater than that of districts/townships with ART sites. The proportion of districts/townships with VCT having ART sites was as low as 28% in Myanmar and 40% in Nepal. Except in Thailand, the proportion of districts/townships

having ART sites was less than 70%; the proportion was as low as 18% in Myanmar, 24% in Vietnam and 40% in Nepal. These indicate that significant portions of people living with HIV might need to travel across districts in order to enroll in pre-ART care and/or to retain in pre-ART/ART care in all countries but in Thailand. CHBC that supports adherence to ART and patient follow-up was available in all districts with ART in Cambodia while only 2 in 61 districts with ART in Papua New Guinea.

Linking approach:

In all countries, those diagnosed HIV positive were supposed to be referred from the sites offering post-test counselling to pre-ART care. In Cambodia, many of the newly diagnosed were enrolled in CHBC services that supported the patients to access pre-ART care. Supporting and promoting self-care of people living with HIV to cope with HIV as chronic illness had been integrated into the training of health workers working at ART sites in all countries. The study countries had either electronic or paper-based systems to generate a list of patients who were supposed to attend the ART consultation on the appointment day.

Performance monitoring:

No monitoring system was established to assess how the process of referral from VCT to pre-ART enrolment was working in study countries. With regard to pre-ART care, Cambodia, Papua New Guinea, Thailand, and Vietnam started monitoring of attrition from pre-ART care while this system was underdeveloped in other countries. According to the national program reporting data, attrition of pre-ART patients were substantive particularly in Cambodia and Thailand. In Cambodia, several pre-ART care monitoring indicators were introduced as part of the country's continuous quality improvement scheme. As for patients already enrolled in ART, monitoring of appointment keeping was operational in Cambodia, Thailand and Vietnam. These countries introduced health facility survey methods to assess the

appointment keeping among other HIV drug resistance early warning indicators. Most ART sites surveyed in these countries achieved over 80% of appointment keeping. Data on ART retention at 12 months were available in all countries except Nepal. Cambodia, Myanmar, Vietnam and Thailand achieved over 80%.

3.3.3. Linkages between HIV and TB or ANC services (Horizontal Continuum)

Services availability and linking approach:

Figure 5 illustrates geographical distribution and decentralization of ANC services, TB services, and HIV testing and counselling including VCT and PITC for pregnant women and TB cases, as well as their linkages across sub-district and district level. In Thailand, VCT, TB, and ANC services were available and linked within the same district hospitals. In addition, Thailand established the system to send blood samples from all sub-district health centers to district hospitals in support of PITC for pregnant women. Cambodia established the system for sub-district level health centers, including those that did not offer VCT, to send blood samples taken from both TB patients and pregnant women to other health facilities with VCT. In Nepal, Papua New Guinea, and Myanmar, VCT, TB and ANC services were located in the same district/township level facilities or there were linkages between these services across districts. However, most sub-district level TB and ANC services were not systematically linked to HIV testing and counselling services. In Vietnam, one-fourth of districts had linkages between TB and ANC services and HIV testing and counselling services. That is, these linkages existed only in the districts that offered VCT. PITC for pregnant women at sub-district (commune) level was introduced under the districts with VCT only. In these districts, district level staff visited sub-district level facilities to provide HIV testing and counselling when ANC services were operating.

Performance monitoring:

All countries had coverage data on HIV testing for pregnant women, HIV testing for TB cases, ARV for pregnant women to prevent mother-to-child transmission, and ART and TB treatment for HIV positive TB cases (Table 11). HTC coverage among pregnant women and TB cases were more than 70% in Thailand and Cambodia while around 50% or less in other countries. ARV coverage for PMTCT was highest (94%) in Thailand, followed by Cambodia, Myanmar and Vietnam (44-64%). It was as low as 12% in Nepal and Papua New Guinea. TB treatment and ART coverage among HIV positive TB patients were around 30% in Cambodia, Vietnam, Thailand and Papua New Guinea, and no data were available in Myanmar and Nepal.

3.3.4. ART sites offering comprehensive care through the involvement of people living with HIV and CHBC teams (Hub and Heart of Continuum)

All the countries had national guidance on CHBC and/or people living with HIV involvement (Table 12). However, the involvement of people living with HIV as care providers and peer supporters was more systematic in some countries than others. In Cambodia, for example, most ART sites established 'MMM' (Center for Friends Help Friends) that were managed by people living with HIV. The 'MMM' members organized monthly meetings involving people living with HIV, CHBC teams and local stakeholders.

In Thailand, people living with HIV were playing a vital role in providing HIV care and treatment at least in 367 government hospitals in 878 districts in collaboration with the Comprehensive Continuum of Care Centers led by people living with HIV. CHBC services in Nepal were linked with NGO-managed HIV prevention and care services, as well as with provincial/zonal hospitals in areas where HIV was most prevalent. In Papua New Guinea, people living with HIV involvement in CHBC was promoted only in a few pilot sites.

Table 9. Access to HTC among key populations

	Cambodia	Myanmar	Nepal	PNG	Thailand	Vietnam
Service availability						
Geographical areas of out-reach services*	46 districts for FSW, 33 districts for MSM, 1 city for PWID	(Districts covered by NGO for PWID and FSW)	(For PWID, FSW, MSM, TG and migrants)	National Capital District and Madang.	All districts	More than half of total districts for PWID and FSW.
Total no. of VCT sites*	246	480	204	411	1316	272
Provinces with VCT sites*	24/24 provinces	14/14 provinces	14/14 zones	20/20 provinces	76/76 provinces	63/63 provinces
Districts with VCT sites*	77/77 districts	212/325 townships	75/75 districts	89/89 districts	878/878 districts	175/697 districts
VCT sites at lower than district (township) level*	166/997 health centers	Few	Few	121	Few	Few
Districts with VCT sites (%)*	100 (77/77 districts)	65 (212/325 townships)	100 (75/75 districts)	100 (89/89 districts)	100 (878/878 districts)	25 (175/697 districts)
Linking approach						
Approaches to accelerate access to testing and counseling and referrals to care among key populations*	- Peer educators refer key populations to VCT - OST sites refer PWID to VCT - On-site HIV testing initiated in hot spots for FSW and MSM	- Peer educators refer key populations to VCT - OST sites refer PWID to VCT - Drop-in centers refer key populations to VCT	- Peer educators refer key populations to VCT - OST sites and drug treatment and rehabilitation centers refer PWID to VCT - Drop-in centers refer key populations to VCT	- Peer educators refer key populations to VCT	- Peer educators refer key populations to VCT - OST sites refer PWID to VCT - Drop-in centers refer key populations to VCT.	- Peer educators refer key populations to VCT. - OST sites refer PWID to VCT - Drop-in centers refer key populations to VCT
Performance monitoring						
HIV testing coverage among key populations (%)**						
FSW	81.5 (2010)	71.1 (2008)	54.6 (2011)	46.4 (2010)	50.4 (2010)	43.8 (2011)
MSM	34.0 (2010)	47.6 (2009)	42.0 (2009)	55.8 (2010)	29.2 (2010)	30.2 (2011)
PWID	35.3 (2007)	27.3 (2008)	21.4 (2011)	Not available	40.8 (2010)	29.1 (2011)

Source: * National HIV programs of 6 countries as of 2010,
** AIDS Progress Report 2012 of Cambodia [95], Myanmar [96], Nepal [97], PNG [98], Thailand [99], Vietnam [100].

Remark: Province refers to the health administration, one level higher than so called district. District refers to the health administration level with the first referral-hospital (Operational district in Cambodia, Township in Myanmar, District in Nepal, PNG, Thailand, and Vietnam).
FSW: Female sex worker, MSM: Men who have sex with men, PWID: People who inject drugs, TG: Transgender people, OST: Opioid substitution therapy, HTC: HIV testing and counseling, VCT: Voluntary testing and counselling, CHBC: Community- and home-based care.

Table 10. Chronic care management

	Cambodia	Myanmar	Nepal	PNG	Thailand	Vietnam
Service availability						
Total no. of ART sites	51	90	36	61	1014	217
Provinces with ART	21/24 provinces	13/14 provinces	13/14 zones	20/20 provinces	76/76 provinces	63/63 provinces
Districts with ART	44/77 districts	59/325 townships	30/75 districts	61/89 districts	878/878 districts	167/697 districts
Districts having ART (%)	57	18	40	69	100	24
Districts with VCT having ART (%)	57	28	40	69	100	95
District with CHBC / District with ART	44/44 (848/997 health center)	15 or more/59	13/30	2/61	400 or more / 878	(185 teams) / 167
Linking approach						
Testing and counseling (post-test counseling) to pre-ART care linkage	PLHIV referred to pre-ART care, but often in distant location. CHBC team offering referral support	PLHIV referred to pre-ART care, but often in distant location	PLHIV referred to pre-ART care, but often in distant location	PLHIV referred to pre-ART care, but often in distant location	PLHIV referred to pre-ART care. VCT and Pre-ART care located in the same facility	PLHIV referred to pre-ART care, but often in distant location
Generating a daily patient appointment list for ART	32 sites electronic, 19 sites paper-based system	Most sites paper-based system	Most sites paper-based system	4 sites electronic, 57 paper-based system	All sites electronic system	Most sites paper-based system
Performance monitoring						
Monitoring of pre-ART care through national program reporting	Enrolment: 7,391 Attrition: 2,249 (Lost and died monitored from 4th quarter of 2010)	Enrolment: 30,615 Attrition: not available	Enrolment: 15,443 Attrition: not available	Enrolment 2,541 Attrition 414 - Lost 278, - Died 136	Enrolment 28,264 Attrition 11,185 - Lost 6,892 - Died 4,293	Enrolment: 8,729 Attrition: Available only from selected sites
Monitoring of appointment keeping for ART	Annual facility survey in 42 sites, Local quality improvement in 16 sites.	Not yet operational	Not yet operational	Not yet operational	Annual facility survey in 38 sites	Annual facility survey in 30 sites
ART retention at 12-month (%)	93	87	N/A	78	83	82

Source: National HIV programs of 6 countries, AIDS Progress Report 2012 of Cambodia [95], Myanmar [96], Nepal [97], PNG [98], Thailand [99], Vietnam [100].

Remark: Province refers to the health administration, one level higher than so called district. District refers to the health administration level with the first referral-hospital (Operational district in Cambodia, Township in Myanmar, District in Nepal, PNG, Thailand, and Vietnam). CHBC: Community- and home-based care.

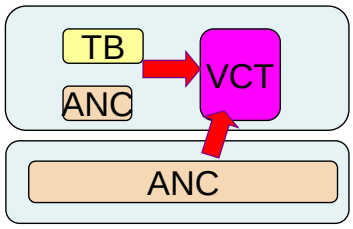
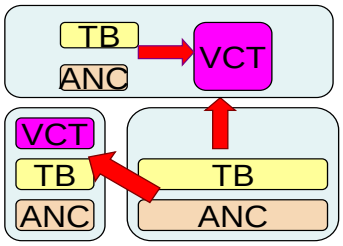
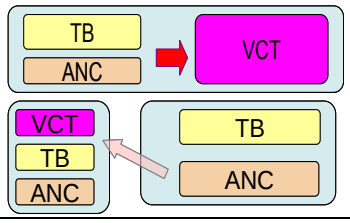
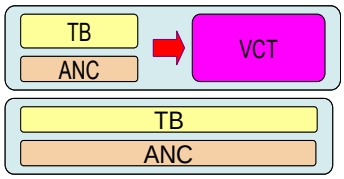
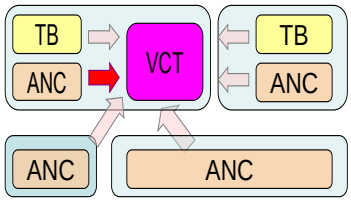
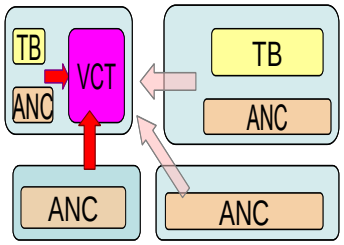
Country	Illustration of availability and linkages	Geographical distribution and decentralization of services	Linking approach for HIV testing of pregnant women and TB cases
Thailand District Sub-district		- All districts offer VCT - All districts offer PITC for pregnant women and TB cases - All sub-districts offer PITC for pregnant women	- Systematic referral within a district facility - Systematic referral from a sub-district to a district facility
Cambodia District (Operational district) Sub-district (health center)		- All districts offer VCT - All districts offer PITC for pregnant women and TB cases - 1/6 of sub-district facilities offer VCT - Most sub-district facilities offer PITC for pregnant women and TB cases	- Systematic referral within a district facility - Systematic referral from a sub-district to a district facility - Systematic referral between sub-district with VCT and without VCT
PNG District Sub-district		- All districts offer VCT - Most districts offer PITC for pregnant women and TB cases - ¼ of sub-districts offer VCT	- Systematic referral within a district facility
Nepal District Sub-district		- All districts offer VCT - Only a fraction of districts offer PITC for pregnant women and TB cases	- Systematic referral within a district facility
Myanmar District (Township) Sub-district		- 2/3 of districts offer VCT and PITC for pregnant women (and much fewer for TB cases)	- Systematic referral within a district facility
Vietnam District Sub-district (Commune)		- 1/3 of districts offer VCT and PITC for pregnant women (and fewer for TB cases) - Sub-districts under the districts with VCT offer PITC for pregnant women	- Systematic referral within a district facility - Systematic referral from a sub-district under a district with VCT to a district with VCT

Figure 5. Operational linkages between HIV, TB, and MNCH services for HTC in 2010

Remark: Size of each box indicates the extent of availability (e.g. ¼ of sub-districts with VCT in PNG). A red arrow indicates systematic referral and a light-colored arrow indicates ad-hoc referral. ANC: Antenatal care.

Table 11. Performance monitoring of linkages between HIV, TB and MNCH

	Cambodia	Myanmar	Nepal	PNG	Thailand	Vietnam
Pregnant women who know HIV status (%), 2010*	74	35	13	24	94	52
TB patients who know HIV status (%), 2010**	77	3	NA	7	77	43
ARV coverage for pregnant women to prevent mother-to-child transmission (%), 2011***	64	55	12	12	94	44
HIV positive TB patients who received ART and TB treatment (%), 2011***	33	NA	NA	25	26	30

Source:

* Global HIV/AIDS response: epidemic update and health sector progress towards universal access: progress report 2011 [33].

** Global tuberculosis control, WHO Report 2011 [143].

*** National HIV programs of 6 countries, AIDS Progress Report 2012 of Cambodia [95], Myanmar [96], Nepal [97], PNG [98], Thailand [99], Vietnam [100].

Table 12. ART sites providing comprehensive care through the involvement of PLHIV and links to CHBC

	Cambodia	Myanmar	Nepal	PNG	Thailand	Vietnam
Linking approach						
National guidance and framework	- Framework and SOPs on continuum of care - SOPs for 'MMM' (center for friends help friends) and CHBC	Strategy on comprehensive continuum of care for PLHIV	- Strategy to initiate CHBC - Guidelines and SOPs for CHBC	- Strategy of greater involvement of PLHIV	- Policy of National Security Office to support PLHIV network	- Action plan on care and treatment - ART protocol - SOPs for CHBC
Features of collaboration between ART sites, PLHIV and CHBC	- 'MMM' established inside ART sites and managed by a few PLHIV - Monthly meetings of 'MMM' involving patients, health workers and often hospital management - PLHIV working as part of ART team - NGO-led CHBC teams involving PLHIV and attending 'MMM' meetings and local coordination meetings	- NGO clinics covering about 75% of PLHIV on ART - In all NGO clinics, PLHIV working as part of care team - PLHIV having some role in government run clinics too - Local coordination meetings involving CHBC	- PLHIV workers of NGOs visit ART sites on clinic days to complement services provided by health workers - Most CHBC teams involve PLHIV and are based at NGO-run HIV prevention and care centers	- ART sites established continuum of care centers as pilot project - PLHIV peer educators in ART sites - The continuum of care centers linked to CHBC teams	- Comprehensive Continuum of Care (CCC) Centers run by PLHIV - CCC Centers located inside ART sites in some areas, outside in other areas - CHBC led by PLHIV as part of activities of CCC Centers	- ART sites involving PLHIV as member of ART team and facilitating PLHIV peer support groups - A number of CHBC models including ART sites based; Stand-alone model run by PLHIV groups and local NGOs; Led by Women's Union; and Commune health station based.
Scale	- Most ART sites having MMM - 356 CHBC teams linked to 848 sub-district health centers	- PLHIV as care provider in all NGO run clinics - CHBC at least in 15/325 townships	- All ART sites supported by PLHIV workers - More than half of ART sites linked to CHBC - CHBC in 13/75 districts	- 4 ART sites established the centers - 5 ART sites having PLHIV peer educators - CHBC in 2/89 districts	- 367 CCC Centers operational - CHBC at least in 400/878 districts	- More than 100 ART sites involve PLHIV as member of ART teams and linked to CHBC - 185 CHBC teams

Remark: SOPs: Standard operating procedures, CHBC: Community- and home-based care.
Source: National HIV programs of 6 countries as of 2010

3.4. Discussion

This study revealed that the HIV service availability and the linking approaches served as supporting factors in some cases while as constraints in others for the performance of each continuum.

3.4.1. Vertical continuum

Regarding the vertical-community continuum, HTC coverage among key populations ranged from 20% to 80% across countries and across populations. In five countries, HTC coverage was low among men who have sex with men and people who inject drugs compared with that among female sex workers. Low coverage in Myanmar and Vietnam could be partly due to geographical distance from hot spots to VCT located in other districts. To effectively serve key populations, it is critical to make a range of relevant HIV services convenient to their communities [67,145]. However, this becomes challenging when donor funded projects for prevention among key populations and those for diagnosis and treatment have different geographical scope. In Myanmar and Vietnam, for example, limited access to HTC by key populations may be related to geographical discrepancy in service provision and possible sub-optimal linkages across these projects [144,146-148]. Among different key populations, countries have more extensive experiences in providing services for female sex workers than for men who have sex with men and people who inject drugs in Asia and the Pacific [67,149]. HIV testing coverage among female sex workers tends to be higher than those among men who have sex with men and people who inject drugs in these countries [57].

3.4.2. Chronological continuum

The chronological continuum has shown a visible progress. All of the countries established case management procedures for those on ART in line with the chronic care principles [117].

They then achieved a high level of ART retention. However, this study revealed significant attrition from and lack of data on the process from HIV diagnosis through pre-ART care. It also found low proportion of districts with VCT having pre-ART care and/or low proportion of districts having pre-ART care in all countries except Thailand. In these countries, no information was available to know how effectively referral services were working from HIV testing to pre-ART care. Monitoring of retention in pre-ART care was not well established in all study countries. In the last decade, global efforts to expand HIV care and treatment have prioritized ART provision while less attention has been paid to the process between HIV testing and ART initiation [33,150-152]. Many studies reported significant attrition from the process [134,153,154]. According to a systematic review, barriers to accessing pre-ART care include transport costs and distance, fear of disclosure, long waiting times, and shortage of health workers [155]. Activities that may decrease attrition include streamlining services to minimize facility visits, introducing point-of-care CD4 testing and peer support, and providing incentives [156]. In the study countries, little was known about access to and retention in pre-ART care. A possible challenge was the requirement for many people living with HIV to travel long distance to access pre-ART care in other districts.

3.4.3. Horizontal continuum

The analysis on the horizontal continuum identified a number of challenges. HIV testing and counselling coverage among pregnant women and TB cases was less than 70% except in Thailand and Cambodia. ARV coverage for PMTCT was less than 70% in all countries but Thailand. TB treatment and ART coverage among HIV positive TB patients was low at around 30% or data unavailable across study countries. In Thailand, all districts had VCT,

TB and ANC services and established systematic linkages with sub-district health centers for HIV testing and counselling. In Cambodia, limited availability of VCT was complemented by extensive blood sample referral systems between health centers and district hospitals and across districts.

In Myanmar, Nepal, PNG and Vietnam, HTC for TB cases and pregnant women was constrained by sub-optimal linkages between district and sub-district levels and between districts with VCT and districts without VCT.

A challenge for PMTCT and TB/HIV collaborative activities is expanding PITC based on local context and available resources [151]. Sub-optimal linkages between districts with and without VCT in Vietnam appeared to be related to operations of donor-funded projects [144]. Where donor funded projects exited, VCT and PITC were available at the district and sub-district levels. However, districts not supported by these projects had no VCT/PITC or linkages with districts supported by the projects. To address the issue of linkages between district and sub-district levels, national HIV programs of Thailand and Cambodia proactively guided local health facilities across the country to establish blood sample referral systems between district and sub-district levels [157,158].

3.4.4. Hub and heart of continuum

The progress on the hub and heart of the continuum varies across the study countries. Comprehensive care sites have been expanded more systematically in Cambodia and Thailand than in other countries. All the studied countries introduced certain mechanisms to involve people living with HIV in providing care and treatment services and link them with CHBC, but to varying degrees. people living with HIV and CHBC networks were established during the 1990's prior to the ART introduction in Thailand and Cambodia [67]. These countries proactively used existing people living with HIV and CHBC networks to

expand ART services [157,158]. In other countries, these networks were developed and expanded along with the ART scale-up [115,144,159,160].

3.4.5. Utility of the COPC framework

This study revealed some similarities and considerable variations in HIV service availability, linking approaches and performance monitoring across the study countries. The COPC analytical framework can be a useful tool for respective national HIV programs to critically review the current status of HIV service delivery. The framework can also help countries identify evidence-informed measures when adapting global guidance and recommendations on decentralizing, linking and integrating HIV services [161,162]. The COPC analytical framework could be introduced as part of a broader periodic assessment of HIV situation and response, such as a national HIV program review, and an evaluation of national HIV strategic plan implementation. The COPC framework could complement other assessment methods including analyses on program impact, stigma and discrimination, human resources, budget allocation, cost-effectiveness, policies, and legislations.

As observed in this study, the COPC analytical framework reflects innovative features of HIV health service delivery. These features could benefit the rest of heath care system including the non-communicable disease services [163,164]. For example, the national HIV programs established the following chronic disease management systems [133]. Services were integrated within public health care facilities and liked to the communities. Patients play a central role in promoting self-care, treatment adherence, and peer support by reaching affected communities and involving them as co-service providers [67]. Longitudinal patient follow-up systems have been introduced with registers and individual patients' cards and files [90]. Furthermore, linkages with other relevant services have been developed to meet the

multiple needs of patients. The COPC analytical framework could be used to engage a wide range of stakeholders in the health sector to adapt and adopt these HIV service delivery features in order to strengthen the overall health care system and expand non-communicable disease services. This process may in turn promote HIV service sustainability by integrating the HIV chronic care management into the overall health care system [59].

3.4.6. Limitations of this study

This study attempted to capture the wide range of HIV service delivery processes by using the COPC framework. However, not every element of HIV health services has been addressed. For instance, services for children born to HIV positive mothers have not been included in this analysis.

Another limitation was that the reviewed literature included unpublished information obtained through the national HIV program office of each country. It was therefore not easy to ascertain the same level of data quality across the study countries. Also, interpretation of the findings might not be completely objective as country review teams included those involved in program development strategies for expanding service delivery in the study countries. However, active participation of the national HIV program officials and partner agencies in different stages of this study resulted in access to unpublished program information and gaining insights in interpreting collected data from program management perspectives. Their participation also enhanced their understanding on HIV service delivery as implementers in program development, not just passive recipients of study results. Furthermore, by assigning a focal point of the regional team to work with the country team in each country, efforts were made to examine data critically and reflect each issue presented in this paper from multi-country perspectives.

This study looked into the contribution of service availability to the continuum, linking approaches taken to improve the continuum, and performance monitoring of the continuum concerning HIV across six countries. However, the performance of the continuum might be influenced not only by service availability or linking approaches related to HIV, but also by access to health services, health infrastructure, socio-economic situation and other factors that were beyond the scope of this study. Data quality might also be affected by these factors. The study results across the study countries, therefore, should be interpreted with cautions considering various health and socio-economic challenges.

Study countries were not chosen randomly as it was intended to compare service delivery models among the countries which had similar characteristics and could work in collaboration easily. Nevertheless, the study results suggest that the COPC framework might be useful beyond the study countries.

3.5. Conclusions

The review of six Asian and Pacific countries identified similarities and variations in service availability and linking approaches across the countries. Similarities include well established case management procedures for those on ART and underdeveloped process between HIV testing and ART initiation. Considerable variations were found in availability of VCT and pre-ART/ART care at district level; linkages between district and sub-district levels and between districts with VCT and districts without VCT; and extent of involving people living with HIV in providing care and treatment services and linking them with CHBC. HIV service availability patterns and the linking approaches served as supporting factors in some

cases while as constraints in others for the performance of each continuum. Furthermore, the continuum appeared to be more coherent in some countries than in others.

Before conducting these studies, there had been very limited opportunities to compare HIV service delivery models across countries. Through the participatory process of the implementation research, awareness has been enhanced among national HIV programs and partner agencies involved in these studies on the potential of learning from other countries for improving HIV service delivery.

As next step, the study countries could consider the following options. For the vertical-community continuum, it would be useful to review linkages between prevention and HIV testing services. Special attention need be paid to service linkages across multiple projects. Outreach HIV testing should be introduced in line with global recommendations [161,165]. To improve the chronological continuum, it is critical to enhance the monitoring of patient flow from HIV testing to ART initiation. Study countries should explore ways to minimize attrition from this process learning from other countries [157,166,167]. Regarding the horizontal continuum, measures need to be taken to strengthen linkages between districts and between district and sub-district levels according to local need [150,165,168,169]. People living with HIV and CHBC networks need to be better engaged and supported as part of the hub and heart of continuum, and in enabling retention in HIV care services. They could also help address emerging needs such as ART as prevention for discordant couples [135,136].

As a result of this study, opportunities now exist for cross-fertilization among these six countries as well as national HIV program reviews to adjust geographical distribution and decentralization of HIV services and to systematically strengthen multiple linkages. These efforts will promote early HIV diagnosis, early access to and retention in pre-ART care and long-term retention on ART.

4. OVERALL CONCLUSIONS

The COPC analytical framework was instrumental in identifying system-related strengths and constraints of HIV service delivery in Vietnam. The framework was also helpful in articulating similarities and variations in service availability and linking approaches across the six Asian and Pacific countries. Service linkages appeared to be more coherent in some countries than in others, partly dependent upon service availability patterns. As implementation research dealing with implementation of HIV service development, national HIV program officials and partner agencies participated in different steps of these studies and identified options to maximize HIV case detection and retention in care in respective countries.

These study results suggest that the COPC analytical framework could help each country identify evidence-informed measures when applying global recommendations on decentralizing, integrating and linking HIV services to move towards 'Zero AIDS-related deaths'. The COPC analytical framework should be considered when countries review HIV service delivery in other parts of the world where different types of HIV epidemics are ongoing and different levels of health care system resources are in place. The framework could also be used to strengthen the overall health care system through adapting and adopting innovative features of HIV service delivery, such as chronic care management, patient involvement in service provision, and linkages across relevant services.

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