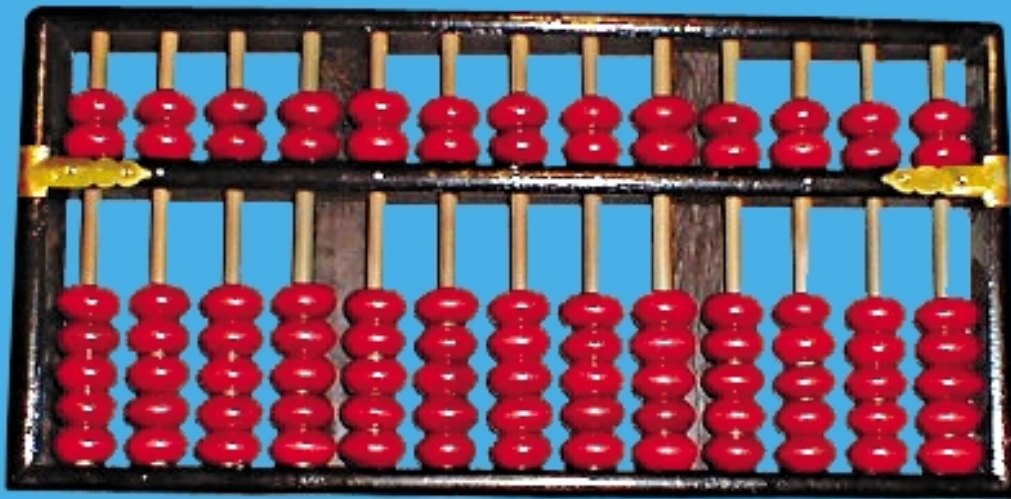




United Nations Development Programme
South East Asia HIV and Development Project

The Potential Costs and Benefits of Responding to the Mobility Aspect of the HIV Epidemic in South-East Asia A conceptual framework





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A conceptual framework**

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April 2002

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Cover picture from: David Bernazzani
www.gis.net/~dber/Abacus/Abacus.htm

National Library of Thailand catalogue in publication ISBN: 974-680-206-2

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FOREWORD

Although HIV/AIDS came to Asia later than in Africa, by now Cambodia, Myanmar and Thailand HIV prevalence all surpassed 1%. In view of the rapidly growing HIV/AIDS epidemics throughout South East Asia, currently available national resources and service systems cannot keep pace with the increasing demand, both in terms of the overall epidemics as well as the projected increasing volume of population movement within and between countries in this region.

Previous efforts in the region focussed on the socio-economic impact of HIV in general, but did not include the mobility aspect. The first step in political recognition of mobility related HIV vulnerability has been achieved by the end of 2001 through two major events:

1. The signing of a Memorandum of Understanding by the GMS countries and China with the commitment for joint actions to reduce mobility related HIV vulnerability.
2. The ASEAN Heads of States Declaration on HIV/AIDS, which acknowledged the necessity for regional collaboration in dealing with mobility related HIV vulnerability.

This paper presents a methodology to estimate the costs and potential benefits of responding to the mobility aspects of the HIV epidemic in South East Asia. One of the steps in strengthening the countries' capabilities for appropriate policy and programmatic decisions in resource allocation for HIV/AIDS programmes to reduce mobility related HIV vulnerability, it is important to have costing information on responses, or lack thereof, to mobility related factors in HIV prevention & mitigation of the impact of AIDS.



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1. INTRODUCTION

South East Asia's growing HIV epidemics now expand beyond high risk groups and in several countries it has already reached the UNAIDS classification of a generalized epidemic [1]. Over 1.7 million are estimated to be infected in the region and 137,000 to have died as a result of AIDS [2]. There is substantial potential for the epidemic to spread rapidly and become generalized in other countries in the region. For example, in China, the number of reported HIV infections has risen by 67% during the first six months of 2001 compared with the same period last year. It is estimated that by 2010 China may have 20 million people who are HIV infected [3]. Adequate prevention measures on a large scale are required responding to situations and behaviours that put people vulnerable to or at risk of HIV infection. Given the limited resources available to implement these activities and to ensure the most far-reaching effects of funds, planning should aim to be not only effective but also achieve value for money. Economic analysis provides the tools with which to help understand how this can be achieved.

2. THE ROLE OF ECONOMICS IN RESPONDING TO HIV/AIDS

Analyses of the socio-economic impact of the disease have provided strong messages to national governments and the international community for intervening and providing care and prevention services by quantifying the potential effect of the HIV epidemics. They have assisted in gaining commitments of increased funding on a global scale for prevention of HIV, for people living with HIV/AIDS and their carers.

In making policy choices and programming for HIV/AIDS, the instruments of economic evaluation can further help the priority-setting process. By providing an understanding of the costs and consequences of investing in different programme areas, decision-makers are better informed in making choices regarding the allocation of resources. Economic evaluation thus helps in achieving value for money as well as making the priority setting process transparent. With economic information at hand, decision-makers are able to clarify the most efficient¹ methods of implementing a programme. For example, models of the cost-effectiveness of HIV/AIDS programmes have demonstrated that targeting interventions and investing resources in HIV prevention for highly susceptible population groups is the most cost-effective way of preventing a widespread epidemic [4].

This paper sets out to present an overview of the costs and potential benefits of responding to the mobility aspects of the HIV epidemic in South East Asia. In order to do so, the paper first describes the link between HIV and mobility in South East Asia. Next the potential nature of the response to mobility aspects of the HIV/AIDS epidemic is summarised. The framework of evaluating the costs and benefits of the response is then presented. The methodology used for modelling the effect of HIV prevention actions and a cost-benefit analysis are described. Finally the implications of the analysis are discussed.

¹ In this context efficiency is defined as the method of production that achieve a particular outcome at least cost or maximises the outcome given a set budget.

3. MOBILITY AND DEVELOPMENT IN SOUTH EAST ASIA: PATTERNS, CAUSES AND RISKS OF HIV INFECTION

3.1 Mobility

Mobility describes the movement of an individual by choice or by force to another location from their home either permanently or temporarily either internally or internationally for a host of reasons, voluntarily or involuntary. This includes but is not the same as migration, in which there is a permanent or semi-permanent change of residence [5]. In looking at the spread of HIV here we ascribe to the approach to population mobility described by Skeldon [6], which includes all aspects of mobility.

Patterns of population mobility in South East Asia have been described in detail elsewhere [6-10]. Key cross-border movements have been mapped for mainland South East Asia [11]. Massive population movements have occurred in the region since the 1970s, reaching a peak in the early 1980's. For example, Thailand is a country that acts as both a source and a destination country for migrants. The country received more than 1 million migrant workers from Myanmar, Cambodia and Lao PDR. It hosted more than 1 million refugees from Indochina during the 1980s. Further, it is estimated that at least 1 million Thais reside abroad as migrant workers. During the period of 1992-1995 there were over 500,000 refugees repatriated within the region and currently there are 120,000 asylum seekers along the Thai-Myanmar border. In China it has been reported that over 750,000 persons in Yunnan were mobile with 260,000 of these crossing national borders [9]. Official statistics on this movement are summarised in Table 1. However it should be noted that this is an underestimate due to the quantity of undocumented movement and the less well documented movement of people within countries.

Table 1: Estimated number of foreign workers in Asian labour-importing countries and areas, latest year available (thousands)

Country	Number of workers by country of origin+(estimate of illegal migrants)					
	Total foreign workers	Indonesia	Philippines	Thailand	China	other Asia
Malaysia	2500	50+(1000)	100+(400)	79+(33)	—	305
Thailand	1260	—	5	—	60	944*
Singapore	450	100	60	60	46	—
Japan	1354	—	84+(43)	18+(39)	234+(38)	680**+(88)
Hong Kong, China	—	50	120	18	—	39
Taiwan, China	297	9	84	138	21	—
Republic of Korea	210	15	23+(15)	9+(6)	28+(49)	56+(20)

Sources: The Social Impact of the Asian Financial Crisis, Bangkok, International Labour Office for Asia and the Pacific, 1998

Notes: * mostly from Myanmar.

** There were some 680,000 registered Koreans in Japan.

In an attempt to summarise the complex array of causal factors, Samuels gives five reasons for population movement: obtaining employment, for the purposes of

employment, education and training, urbanisation, income differentials, communication and transport and conflict or natural disasters [5]. Diversity is the rule when it comes to patterns of mobility. In the case of migration, it is often linked to the reduction in poverty and economic development. For poorest families the movement may be an option of last resort; those who are less destitute may move to reduce vulnerability and for some investment [12]. Temporary mobility of the non-residential type is also often economically tied for reasons such as business and market transactions.

3.2 Mobility and risk of HIV infection

Just as poverty and economic development are linked to vulnerability to HIV [13-15], there is a link between poverty, economic development and mobility. The causes, action and consequences of movement, often resulting from poverty or development, may put an individual in a situation in which they are more likely to engage in high risk behaviours. The dislocation of families or individuals from their households and communities resulting from mobility can further lead to an increase in susceptibility and vulnerability to HIV infection. Susceptibility relates to the concept of increased risk of infection due to certain factors and vulnerability refers to the increased likelihood of greater costs, financial or otherwise, as a consequence of increased morbidity and mortality associated with the epidemic [14,16].

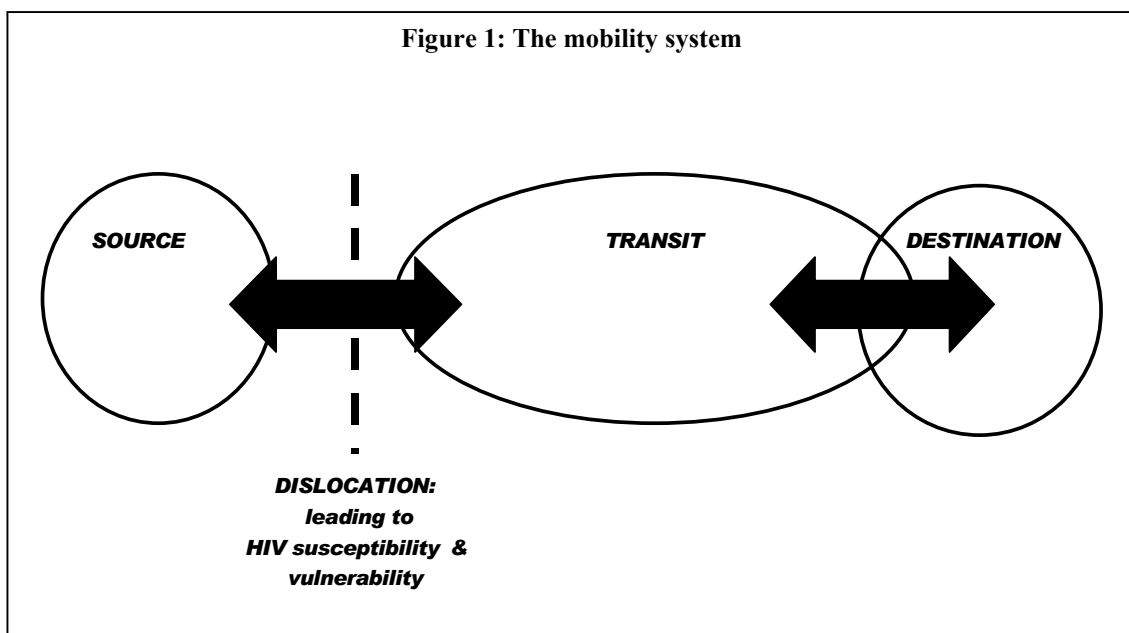
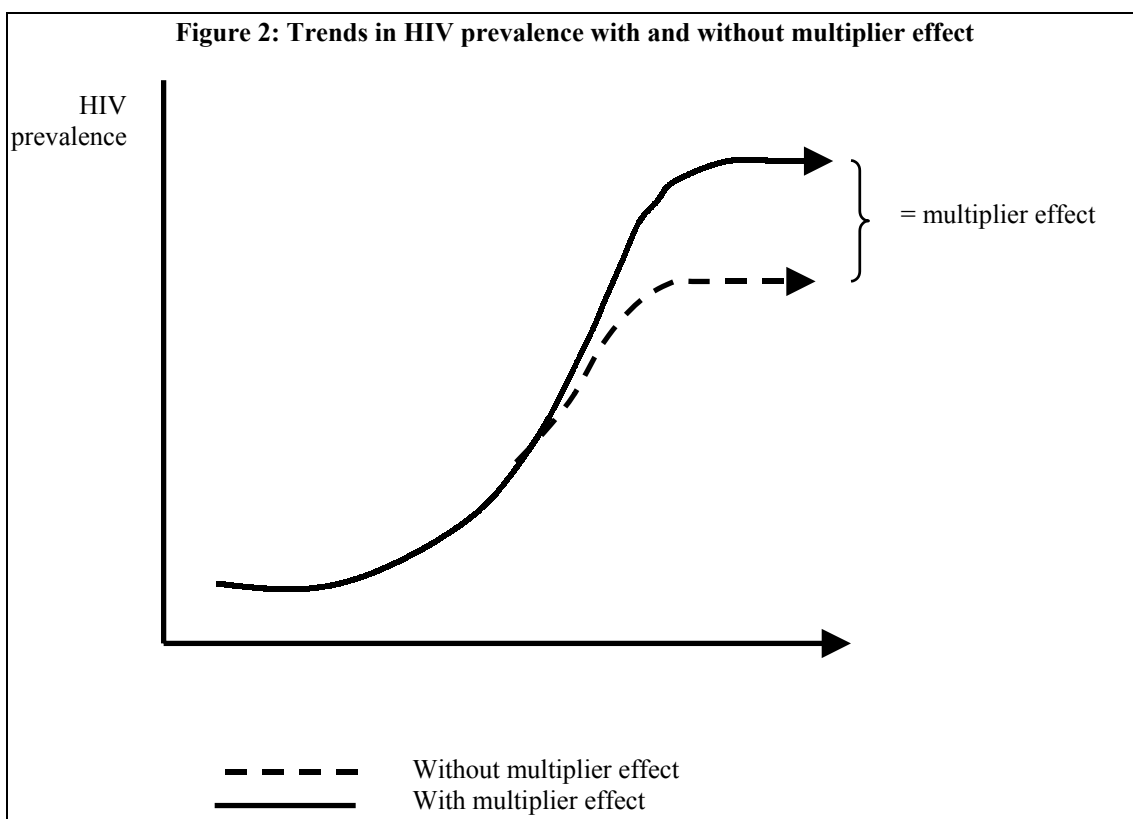


Figure 1 above provides a simple representation of a model of the mobility system and the links between nodal points in such a system. The arrows represent population movement across the system. The source is the community from which a mobile person originates, the transit is the community through which a mobile person may move before reaching a final destination where the individual is moving to or before returning back to the source. Hotspots of HIV infection can start to develop at any point within this mobility system. Hotspots are defined as key points in networks of mobile populations where mobile populations interact with other mobile populations and local communities and high risk behaviours occur. Some of the key reasons this increased susceptibility occurs are:

- Limited access to health and social services
- Cultural and linguistic barriers
- Purchasers of sex services and/or drugs as a result of cash income
- Exploited by sex or drug trade due to poverty/ dislocation
- Discrimination associated with migrant status and/or HIV status
- Away from traditional norms and constraints binding social behaviours

It is the links between these hotspots, established through population movement, that can lead to the much more rapid spread to become a sub-regional pandemic as shown in Figure 2. [17] This could arise out of economic integration, including such initiatives as the special economic trade zones, and infrastructure development, such as the trans-regional highway network. The changes created could, if the conditions are appropriate, lead to population and individual vulnerabilities that will extend the epidemic.



The mobility system is potentially vulnerable to the spread of HIV infection. The economies of the source, transit and destination communities are all dependent on the benefits mobility can generate. In particular remittances could lead to investment and the transfer of knowledge. Of particular concern are the source communities, which depend on the wealth generated by their mobile populations. Once falling ill, a mobile person may return home to the source community for care. These communities already have relatively high levels of health expenditure relative to overall household expenditures, which are dependent on drawing on savings and borrowing. Table 2 documents household health care expenditures in Thailand and Cambodia. Both countries have a large number of communities from which populations are moving, we can see that the costs associated with losing a breadwinner and increased health care expenditures could have catastrophic effects on household livelihood. Falling incomes

and rising expenditures tied with caring for terminally ill income earners may completely drain household resources as income falls and expenditures rise.

Table 2: Health-related expenditures and financing in Thailand and Cambodia

	Cambodia	Thailand
Household expenditure/ year (US\$)	1236	2238
Health expenditure /year (US\$)	134 (all)	973 (AIDS illness)
		63 (travel)
		1537 (funeral costs)
Financing of expenditures		
Household savings	44%	60%
Sale/mortgages of assets	13%	19%
Borrowing		
from relatives/friends	63%	11%
from money lenders	45%	—

Sources: [18] and [19]

4. RESPONDING TO THE INCREASED HIV RISK ASSOCIATED WITH MOBILITY IN THE REGION

4.1 What constitutes HIV prevention?

A number of HIV prevention activities have been shown to be effective [20]. These relate to the provision of education and condoms, strengthening sexually transmitted infection (STI) treatment services, prevention of mother to child transmission (PMCT), voluntary counselling and testing (VCT), harm reduction for injecting drug users and ensuring the safety of blood in transfusion services. These forms of activity can be tailored and targeted towards specific sub-populations highly susceptible to infection such as sex workers and their clients, highly susceptible occupational groups such as miners, truck drivers, the military or injecting drug users. In addition, population based strategies include focussing on the antenatal population, national blood transfusion services or youth complemented by the dissemination of information, education and communication (IEC) materials through various mass media channels. By encouraging interests in seeking health care services, the development of options for appropriate care for people living with HIV/AIDS is also seen as a core part of prevention activities.

A much broader approach to HIV prevention is now also promoted and implemented from the national to the grassroots levels. These structural interventions take a multi-sectoral approach [21], [22] and emphasize the importance of environmental, social, mobility system and personal changes that promote health and prevent the onset and development of disease. By first addressing a community's developmental needs, these interventions act on the primary factors that lead to susceptibility to infection (such as poverty) as well as facilitating access to HIV prevention services. Thus, these programmes enable communities and/or individuals to make informed choices.

From an implementation point of view, these interventions can be instigated at different levels of the system and in parallel or in combination with other existing interventions. The different levels from which interventions can be driven are:

- Micro: direct work with population at potential HIV hot spots
- Meso: sub-national and sectoral responses
- Macro: national, regional, international strategies

4.2 Addressing the relationship between HIV and mobility

a. Adaptations of the prevention models

Given the association between HIV and mobility of population, new models of interventions address mobility specifically. Certain adaptations to the traditional prevention models have been made to take into account the different stakeholders involved and associated with mobility and the dynamic nature of the population movement. The effective design and implementation of these approaches depend on good information on the dynamics and behaviour of the population(s) and the epidemiology of the disease, appropriate programmes including language and culturally sensitive programmes and capacity for monitoring, evaluation and coordination of all partners – local, regional, private and public.

At the source community, programmes might include income generation or literacy programmes in order to reduce the propensity to move or, in the latter case, ensure that those that move are better educated. These types of programmes are likely to lead to reduced risk of infection but also reduced vulnerability if a mobile member of the community who is providing remittances to the community falls sick. Examples of interventions within transit and destination communities include: firms involved in the recruitment of mobile workers working with local NGOs to provide reproductive and sexual health programmes or facilitate the movement of an employee's family with the migrant labourer.

b. Interventions focussed geographically on “hot spots”

Based on addressing the mobility aspects of the HIV, planning of interventions would need to take into account total systems of population mobility, as well as risk behaviours at key points in those networks [6]. It is further suggested that implementing prevention programmes at these “hot spots” would necessarily be more cost-effective than a purely population based approach due to the ability to reach a wider range of the population involved in high risk behaviours. This geographical focus could include the cross-border and inter-regional co-operation to harmonize contracts, policies and programmes for certain mobile groups [23].

5. A FRAMEWORK FOR ECONOMIC EVALUATION OF HIV/AIDS PROGRAMMES

5.1 A general framework

Economic evaluation is concerned with choices and the comparison of alternatives in order to make decisions about methods for implementation or production. An economic evaluation is used to identify the most efficient method of achieving a particular objective i.e. that intervention or combination of interventions that maximizes the benefit subject to a specific budget constraint or minimizes the cost of achieving a given outcome. The two most common techniques used for doing so are the cost-effectiveness analysis and cost-benefit analysis. In both, costs are compared with outcomes of an intervention and presented as a ratio.

In the evaluation of health services, cost-effectiveness analysis (CEA) is the technique of economic evaluation most commonly used for this purpose. CEA compares the costs and consequences of a programme, measuring the effect of the programme in the form of a health outcome, such as cases treated and cured, infections averted or deaths avoided. The results are presented in the form of a ratio of cost per unit of effect, thus giving an indicator of relative resources needed to achieve particular outcomes. An alternative method used in economic evaluation of programmes is the cost-benefit analysis (CBA). This differs from CEA in that the outcomes or benefits are measured in monetary terms. For example, a CBA would value the number of HIV infections averted, by assigning a monetary value for each infection averted. CBA is frequently used in the evaluation of development projects as it allows for comparisons across many different sectors. However, CBA is less often used in health care due to the difficulties in valuing health benefits². For many projects, especially in the social sector, it is not possible to measure all the benefits in monetary terms. For example, the benefits of a programme to provide school inputs (textbooks, classroom furniture, preschool programmes) would be increased learning. Instead of measuring monetary outcomes, learning achievement scores could be used to quantify the benefits and therefore would result in a cost-effectiveness analysis.

The main steps of cost-benefit and cost-effectiveness analysis are to identify all project costs and benefits and then compute a cost-to-effectiveness or benefit ratio. In calculating costs, the resources used to deliver the intervention itself should be included, such as administration and investment costs (discounted to the net present value), and the monetary value of freely provided goods or services. For a CBA, the social costs such as environmental deterioration and health hazards should be included.

Benefits can be monetary, such as gain in income, the number of units delivered, test scores or health improvements. Once the costs and benefits have been determined, the cost-benefit/effectiveness ratio (R) is then:

² The techniques used to do so include the human capital approach in which the loss in potential life time earnings of an individual are used to value a reduction in health status. An alternative method uses a willingness to pay approach in which a population is surveyed to assess the value they put on the prevention of different degrees of illness.

Cost Benefit Ratio = Costs of Intervention : Benefits Associated with Intervention

Cost-Effectiveness Ratio = Costs of Intervention per Unit of Outcome

To ensure that like is compared with like when carrying out evaluations, standardized techniques for CEA are recommended. UNAIDS guidelines have been developed for the costing of these interventions [24] to encourage this and UNAIDS also provides recommendations for the cost-effectiveness analysis of HIV prevention strategies [25].

A standard framework used to define the costs and consequences of a programme is shown in figure 3. The measurement of each of these elements can then be carried out using the standard guidelines.

Figure 3: A framework for identifying the economic costs and consequences of an intervention *

Costs
<ol style="list-style-type: none"> 1. Organisational and operational costs 2. Costs borne by the clients of the services <ul style="list-style-type: none"> - Out of pocket expenses/ clients input to service - Time lost from work 3. Costs borne externally to the sector of analysis
Consequences
<ol style="list-style-type: none"> 1. Changes in physical, social or emotional functioning (<i>outcomes</i>)[†] 2. Changes in resource use (<i>benefits</i>): <ul style="list-style-type: none"> Relating to organization and operation Relating to clients/ communities <ul style="list-style-type: none"> - savings in expenditure - savings in lost work time - relating socio-economic situation 3. Changes in the quality of life of clients and their families (<i>utility</i>)

* adapted from [26]

[†] the words in italics are explained in more detail in the text below.

5.2 Defining the costs

Which method is used and what is included in the measurement of costs and consequences is dependent on the question that is being addressed, the perspective of the analysis and the timeframe of the analysis. For example, results of a CEA performed from the perspective of a patient, in which only out-of-pocket expenditures are included, will be different from that of an analysis from the provider's point of view. Table 3 presents social and economic hierarchies and attempts to capture the different levels and units at which the impact of a disease could be felt and responses can be initiated.

Before embarking on an evaluation, we first need to identify the unit or perspective of the analysis – i.e. the unit that is likely to be vulnerable to HIV infections. Table 3 captures a number of generic categories that may be considered as the unit of analysis. In the case of a programme addressing population movement, the perspective may have to take into account of all the actors within the mobility system including source, transit and destination. Alternatively, it may cover only a partial analysis and include just one hotspot within the mobility system.

The calculation of intervention costs is well documented (for example: [24,28]). This paper reviews the cost literature for HIV preventive interventions in sub-Saharan Africa, critically reviews the methodologies used and reports unit costs for each. The UNAIDS guidelines [24] advocates the use of the “ingredients” approach, in which the total quantities of goods and services actually employed in delivering the activities were estimated, and multiplied by their respective unit prices. This is a particularly relevant approach where data may be missing and allows for gaps in the expenditure data to be filled.

Table 3: Indicative table of hierarchy of organization*

	Social	Economic	Spatial
MICRO	Individual	Consumer/producer	Living space
	Family	Household	Home
	Community	Unit of production	Village/ neighbourhood
MESO	Tribe	Subsector	Town/city
	Ethnic group	Sector	Province/region
	Nation	National economy	Country
MACRO	Region	Regional economy	Continent
	Mankind	Global economy	Earth

* Adapted from [27]

An example of a cost analysis that uses the UNAIDS costing guidelines is the evaluation of a needle exchange programme to reduce HIV incidence in Belarus [29]. First, the activities of the project were clearly described to ensure that all aspects of the intervention were covered. The perspective of the analysis was selected as that of the provider of services. Cost information was obtained from various sources, including administrative records, interviews and direct observation. Cost and outcome indicators (such as the number of syringes or condoms distributed) were collected from the start of the project in 1997 for a two-year period until the end of 1998. Resources, and hence costs, were categorised according to the standard classification of whether they are capital (one-time start-up activities, buildings and equipment) or recurrent items. In addition, a distinction was made between financial and economic costs. Financial costs represent actual expenditure on goods and services purchased. Economic costs include, in addition, the estimated value of goods or services for which there are no financial transactions or when the price of the goods does not reflect the cost of using it productively elsewhere. The information generated by a full economic costing is particularly important when considering replication or sustainability of a project in the long run. In the final analysis both total and unit costs for the time period of analysis are presented.

Thus the steps involved in a cost analysis are:

- State the perspective and the question addressed by the analysis
- Select the appropriate output indicator
- Describe all the activities of the project
- Identify all the inputs required to implement those activities
- Measure and value the costs of those inputs
- Calculate the total and average/ unit cost

Table 4 describes the types of data required to carry out the cost analysis.

Table 4: Examples of cost data required

Cost Data Required	Sources	Evaluation output	Comment to mobility
Costs of: <ul style="list-style-type: none"> • <i>Mobility related</i> intervention components e.g. encouraging movement of families with mobile groups; monitoring of population movements • <i>HIV related</i> intervention components e.g. IEC material development; condom distribution; peer education; clinic services; training; monitoring and evaluation • <i>Individual</i> costs 	Project/ programme documents Interviews with key staff Expenditure and staff records Survey of individuals within mobility system	Total cost Annual cost Cost per person covered	Need to take account of costs of programming networking, coordination & co-operation between different partners, provinces and regions. Costs can be incurred at source, transit and destination

5.3 Defining the consequences

Using the framework described above in Figure 3, we can classify the potential consequences of addressing population mobility in National AIDS programmes by four main areas moving from a more traditional health focussed approach to one attempting to capture a broader socio-economic perspective of analysis – outcomes, utility, benefits and welfare.

a. Outcomes

The health-related consequences of a programme or intervention, reflect changes in physical, emotional or social well-being. Indicators used may be disease episodes averted, patients treated and cured, STI infections or HIV infections averted. [25]

b. Utility

Changes in utility are captured in measures such as the DALY (Disability Adjusted Life Year) and the QALY (Quality Adjusted Life Year), measures of disease burden that capture both mortality and morbidity, weight adjusted to take account of different levels of ill-health and its impact on quality of life. [25] Their measurement falls beyond the scope of this study.

c. Benefit

Benefits are defined as the consequences of an intervention measured in monetary terms. Standard health economics approaches calculate benefits using either a cost of illness or willingness to pay approach to valuations. We can adapt these concepts in order to change to the perspective from a health sector focus to that of a mobility system. In this way, we can think of the cost of illness as equivalent to measuring the costs associated with mobility. Using this approach, direct benefits of an intervention would be captured as the operational and organisational savings and reduction in expenditures derived from changing mobility decisions that may result in lower HIV

incidence at any point in the mobility system. Indirect consequences estimates the savings related to lost work-time for the individual and the household associated with these changes in mobility decisions.

Using a willingness to pay approach would require estimates of the monetary value a population puts on the prevention of mobility or mobility-related behaviour that may lead to higher HIV incidence within the mobility system. This would be measured through population-based surveys.

d. Welfare

Welfare improvements may occur in two ways: the averted loss in public and private investment in people including food, housing, education, training and skills development as well as the prevention of the potential increasing inequalities observed when poorer households are affected by ill-health: as those in lower income quintiles are more susceptible to infection and vulnerable to the economic impact, spending a larger relative portion of their income and savings on treatment and associated care costs than those with higher incomes.

5.4 Measuring benefits

For the purposes of this paper, we concentrate on a cost benefit approach using, as described above, a “costs of mobility-related decisions” method for the evaluation. Table 5, outlines some of the areas in which benefits of intervening would be likely to accrue.

Table 5: Areas of potential savings through prevention of HIV infection within a mobility system

Source community	Transit/ destination community
<ul style="list-style-type: none"> • <i>Health care expenditures</i> • <i>Prevention of reduced remittances</i> • <i>Prevention of reduced productivity/ income as a result of sickness and reduced remittances</i> • <i>Prevention of reduced savings/ increased debt</i> • <i>Improvement of capacity for educational development</i> • <i>Improvement of capacity for development and growth</i> 	<ul style="list-style-type: none"> • <i>Prevention of health care expenditures</i> • <i>Prevention of reduction in income/ productivity as a result of sickness</i> • <i>Prevention of reduced savings</i> • <i>Prevention of business sector costs such as:</i> <ul style="list-style-type: none"> - <i>increased absenteeism</i> - <i>health care & death related expenditures</i> - <i>recruitment and training costs</i>

It should be noted, firstly, that these areas of impact should be observed at all points in the mobility system. In order to measure these benefits a number of different data sources will be required and in some areas, such as remittances, data may be very weak. Due to the nature of the mobility system these data sources may also be in different regions, or even countries. Table 6 lists potential sources of data for some of these.

Secondly, any notion of benefit is associated with the fact that HIV infections have been averted. Thus the analysis requires an understanding of the potential patterns of epidemic spread and its inter-relatedness with the mobility system.

Table 6: Data for estimating the benefits of mobility oriented HIV prevention programmes

Type of data	Possible data sources
Remittances	<i>Mobile population surveys/ source community surveys</i>
Household income, savings and debt	<i>Household surveys/ national statistics</i>
Business sector costs	<i>Salary, personnel and medical records Records of staff turnover due to sickness, recruitment, training, productivity and profit</i>
Education and literacy levels	<i>Population-based surveys</i>
Health sector costs	<i>Ministry of Health/ health service providers – data on HIV prevalence, disease progression and costs of inpatient & outpatient stays</i>
Health care expenditures	<i>Ministry of Health/ health service providers/ patient surveys – data on patient charges, costs of drugs, accessing health care (e.g. travel costs), opportunity cost of caring for sick.</i>

5.5 Timeframe for the analysis

Particular care must be also taken to ensure that the time period selected for the costing of any intervention corresponds to the time period over which consequences are accrued. For example, programme A, introduced to reduce susceptibility within the mobility system, may be implemented over 2 years but may have a sustained effect such that the benefits continue to be generated over a 5 year period. In evaluating programme A, the analysis should attempt to include the programme costs of 2 years and the direct benefits for the full 5 years as well as the indirect benefits which could accumulate into the future. Conversely, the total benefits of the 2 year programme should not be attributed to an annual cost of the programme. In contrast, for programme B, a programme to prevent vertical transmission of HIV may be implemented over 2 years. In this case, if measuring benefits, both the costs and benefits measured over the two year implementation period should be included.

The next section outlines the ideal approach for the calculation of a cost-benefit ratio of a mobility related intervention and the application of such an approach using existing models of HIV transmission. We then make recommendations for further work in this area.

6. THE POTENTIAL COSTS AND CONSEQUENCES OF PREVENTING HIV/AIDS ASSOCIATED WITH MOBILITY

6.1 Method of cost-benefit analysis

The ideal approach to a CBA in the context of reducing the spread of HIV associated with mobility would require:

a. Estimation of the costs of such an intervention

The total provider costs (e.g. governments/health service/NGOs) of delivering an intervention are calculated using standardised methodologies as described above [24].

b. Calculation of the benefits of intervening

To estimate the benefits associated with intervention, projections or estimates of HIV/AIDS illness and death are needed. Next, the areas in which benefits can be seen to accrue should be identified. As mentioned above, in a CBA, benefits are defined in monetary terms as the total savings, both direct and indirect. First, the definition of benefit must be clarified, in particular, in relation to the limits of the analysis and the methodology used. For example, an analysis could take the perspective of the health sector alone in one location and include only the direct benefits in terms of treatment costs saved. Alternatively a mobility system wide approach could be taken which may include the benefits associated with preventing lost productivity to all sectors as well as to the losses to individuals and households at all points in the system as described in section 5.

Benefits can be divided into direct (those associated with treatment costs and care costs saved) and indirect (those associated with productivity losses averted).

Each HIV infection will be associated with a monetary loss as defined by the limits of the analysis, for example, remittances to source community lost due to HIV-related sickness. A monetary value can then be assigned to the cost of an HIV infection for each area of loss identified. In the case of remittances, it would be the expected stream of remittances not earned as a result of a migrant labourer falling sick. The probability of this occurring should also be assigned. For example, the cost of caring for an HIV person in the source community may be zero if the probability of returning to the source community for care is zero.

Thus the steps for estimating the potential benefits of a mobility focussed HIV prevention intervention are:

- (i) Describe the intervention, its timeframe and the areas within the mobility system to be analysed.
- (ii) Estimate the likely range of infections associated with mobility.

That is to say, the difference in the HIV prevalence outside the mobility system and what would likely happen in a region whose development is characterised by a mobility system. To make this estimation, the direct measure or 'gold-standard' for quantifying impact is a randomised controlled trial (RCT). However, RCTs are expensive and difficult to implement and so far have only been conducted in a limited number of settings. In particular, there have been very few RCTs conducted to assess interventions to prevent HIV infection [30, 31]. Without these data, estimates of the potential impact of different interventions are difficult to make. This is because of the dynamic nature of infectious disease transmission and calculating the full impact of mobility

requires the evaluation of both the new infections among people in high-risk locations, but also the “secondary infections” which result as the multiple community prevalence influence their disease exposure rates. Estimation using computer models to simulate transmission dynamics of HIV infection have therefore been increasingly used to assess HIV transmission e.g. Avert, Epi model, HIV tools and Maximum Likelihood Estimation [32-35].

- (iii) Estimate the likely effect or impact of an intervention to reduce the effect of the mobility system on epidemic spread and its impact.

Now consider an intervention to avert the spread of transmission associated with the mobility system and estimate the infections averted. A number of studies have used model-based approaches to estimate the impact and cost-effectiveness of interventions on HIV prevention in low and middle-income countries [29, 36-39]. The models differ in terms of the nature of the epidemiological and behavioural data inputs as well as the way in which they model the interaction of different sub-populations with each other through time. Ideally these models would include the effect of structural interventions on the patterns of mobility. However, such models have yet to be developed.

The total benefits would then be calculated as the sum of the monetary values associated with each HIV infection averted multiplied by the probability of this occurring given an HIV infection and by the number of infections averted for each sub-population group or each point in the mobility system.

6.2 Evidence of the costs and benefits of intervening in the region

Macro-economic models have shown the potential economic impact and hence costs that may be avoided through intervention at the national level in China and Cambodia [18, 40]. These studies do not explore the mobility affects of the spread of disease or vulnerability to HIV infection.

The most promising areas to obtain evidence on costs and consequences of interventions are the current interventions themselves. However, interventions are few and evidence is weak. In light of this absence of data, it was decided to carry out a threshold CBA. We assumed that the cost of an intervention should not exceed the benefits it may generate. Thus the value of total potential benefits of an intervention can be seen as the threshold cost of an intervention or the budget constraint for an intervention addressing the mobility aspects of HIV.

In calculating the net direct and indirect benefits of an intervention, information is required to estimate the potential costs saved by the household and productive sectors, as well as the health sector. Again evidence was weak. Table 2 summarises the data identified for Cambodia and Thailand. Per capita gross national product was used to reflect productivity. However it should be remembered this is an aggregate and may not reflect the situation within a mobile system.

National data on costs of care were available from Thailand [41] and home based care costs from Cambodia [42]. Household impact costs are not available. Due to the

difficulty of obtaining longitudinal data, few studies, even on a global scale, have explored this. [important examples include 15, 16, 19, 43-49]. For the productive sector, again no cost data identified were available and the costs will vary hugely according to the likelihood of having a workforce with high-risk behaviours, the different benefit packages and the skills level of the workforce.

6.3 Estimation of the impact of mobility on HIV infections

a. Available models

In order to estimate HIV infections in this context, we adopt a modelling approach. The basic assumption in our model is that there is a continuation of independent national AIDS programmes, focussing HIV prevention on hot spot areas and on population groups who may be more susceptible. To include the mobility-related aspects of the epidemic, we would want to model HIV transmission in a number of different locations (and the nature of sexual mixing within a population, including interaction with the mobile and resident populations) as well as the mobile population and their sexual partners at source community, destination community and in transit. This would require a characterization of the various mobile and resident sub-populations to describe a risk profile. Factors that would contribute to the characterization would include by socio-economic status, availability of disposable income while away from source community, duration of period away from source community, frequency of trips away from source community, number of stops in transit and number of dependencies travelling together, all of which may influence the likelihood of non-regular partnership and high risk behaviours. However, there is currently no model available to allow us to estimate this.

In order to approximate a partial mobility system effect at the micro level, we adopt an existing model, *SCHOOL 3.1*, part of the London School of Hygiene and Tropical Medicine's HIV Tools Suite of Models [50]. The *SCHOOL* model was designed to simulate the transmission of HIV and STI infection between male and female in school youth, male and female out of school youth, and older males and females both in the presence and absence of prevention interventions [51]. The model estimates HIV and STI trends among youth, in non-regular partnerships, who interact with a more susceptible sub-population (older males and females).

In consultation with the authors of the model, it was decided that it was appropriate to adapt this model to our current analysis. We could do so by proxying the transmission of HIV and STI, in a particular location, for a general population interacting with mobile groups where there is a mixing of those in non-regular partnerships with highly susceptible sub-populations. As mobility can be assumed to be equivalent to the introduction of a population in non-regular partnership, we could then construct a base scenario with some level of existing HIV prevalence, proxy mixing and limited interaction with an existing susceptible population. We can then estimate the likely effect of mobility on HIV infection in one location within the mobility system (hence partial model). Thus, the *SCHOOL* model can be used to estimate the likely path of HIV transmission for a given set of circumstances in a particular location.

It is important to note that this approach does not let us estimate the full extent of the mobility effect of HIV infection among the mobile population itself and their partners in other locations. Thus using *SCHOOL*, we will have an under-estimate of the mobility effect on HIV transmission. In order to improve on this estimate we would need a specialised model mimicking the transmission dynamics linked with mobility situation and able to capture the infections averted in the complete mobility system.

b. Estimate of a partial mobility effect on HIV transmission

Using the *SCHOOL* model, we adopted the parameters and boundaries for the model simulation. The values in each scenario were selected to reflect current knowledge of various situations. The baseline is similar to the current situation, based on available data in Vietnam [1] and HIV prevalence is similar to the Cambodia-Thai border locations with a considerable in and out, permanent and temporary population movement as presented in box 1 [52]. However, there are weaknesses in this data, in particular related to STI prevalence for which estimates are quite sparse and there is no consistent methodology across countries [53]. We have therefore performed sensitivity analysis on the STI prevalence rates.

The modelling allows us to present two scenarios in Box 1, where the only difference is in the nature of the interacting population groups. The second scenario reflects an increase in susceptibility to HIV and STI transmission resulting from increased mobility. Thus, even under a partial mobility effect we see that the numbers of new HIV infections over a five-year period is 3-fold higher without any additional intervention addressing the mobility aspects of transmission. If it were possible to include the total impact of the mobility system, this would be significantly higher.

There are limitations to this approach primarily based on the lack of a model that specifically takes mobility into account. Firstly, the estimates are driven by the relationship between the initial values of HIV and STI prevalence and focuses on the disease related risk factors. Socio-economic factors that are intricately tied up with the mobility system as well as an individual's susceptibility to HIV infection also need to be explicitly considered in the model. Factors such as length of time away from home, socio-economic status and education level directly affect both the susceptibility and vulnerability to infection and their inclusion would further strengthen the model results. Secondly, there is no way to capture the full effect of preventing rising HIV incidence in the mobility system as a whole, thus the analysis is only partial. Thirdly, the model includes only the impact of sexual behaviour change (i.e. frequency and consistency of condom use) to the reduction in new infections.

A more complete analysis would demonstrate the changing in mixing as a result of changes in the mobility system derived from income generation, literacy and other structural interventions directed at the source communities. Finally, the absence of baseline and follow up behavioural and sero-surveillance data limits the strength of the conclusions from such a modelling exercise.

c. *Estimate of the impact of prevention interventions*

As described in section 4, there is a range of prevention interventions, the impact of which depends on the likely effectiveness of such interventions in changing risk-behaviour and reducing the situations in which the likelihood of HIV transmission is increased.

Box 1: Estimation of the mobility influence on HIV transmission

Scenario 1: Baseline estimate of HIV transmission

In this scenario, we have a population with a relatively low prevalence of HIV. However, there is a small sub-population classified as susceptible with higher levels of HIV and STI prevalence than the population as a whole (assumed to be 3.5% and 20% respectively).

Using the following scenario, we can estimate the likely increase in HIV infections:

- Population size is 100,000 people who are in non-regular partnerships.
- General HIV prevalence is 1% among males.
- Assume that individuals are in non-regular relationships for two years, before entering regular relationships.
- The *SCHOOL* model breaks the population into three groups: those with low numbers of sexual partners, those with medium numbers of sexual partners and those with high numbers of sexual partners. Assume that average number of sexual acts is 2 per month.
- There is currently some minimal level of condom use.

Results

Initial population HIV prevalence is 1%, with 1000 people currently HIV infected.

In five years, population HIV prevalence is 1.37%, with 1370 people infected.
There are 370 people with new infections.

Scenario 2: Estimate of HIV transmission with a partial mobility effect

In this scenario, we have a population with a relatively low prevalence of HIV. However, now increases in mobility have led to population mixing of different sub-groups in non-regular partnerships one of which is assumed to have higher levels of HIV and STI infection (assumed to be 27.5% for HIV and 35% for STI).

Using the following scenario, we can estimate the likely increase in HIV infections:

- Population size is 100,000 people who are in non-regular partnerships.
- General HIV prevalence is 1% among males.
- Assume that individuals are in non-regular relationships for two years, before entering regular relationships.
- The *SCHOOL* model breaks the population into three groups: those with low numbers of sexual partners, those with medium numbers of sexual partners and those with high numbers of sexual partners. Assume that average number of sexual acts is 2 per month.
- There is currently some minimal level of condom use.

Results

Initial population HIV prevalence is 1%, with 1000 people currently HIV infected.

In five years, population HIV prevalence is 2.3%, with 2287 people infected.
There are 1287 people with new infections.

We examine the impact of three possible interventions:

- a) An intervention that increases condom use as part of a general awareness-raising campaign where there is a partial mobility effect – *general awareness* – e.g. a national mass media campaign
- b) An intervention targeted at mobile populations, that lowers HIV prevalence in the more susceptible sub-population groups – *population focussed* – e.g. a female literacy programme in source communities or an education and condom distribution campaign in urban textile factories or on construction sites.
- c) An intervention that reduces HIV prevalence in these susceptible groups and simultaneously increases condom use in the general population of the source community– *geographically focussed*.

For all three interventions, we will assume that although all the population is targeted, 70% of the population is reached.

d. *Estimating the costs of intervening*

No cost data was identified in the published and grey literature for the estimation of the costs of HIV prevention interventions addressing the mobility aspects of the epidemic.

e. *Estimating the benefits of intervening*

Following the ideal model of a CBA as outlined above, we would like to consider the potential direct and indirect benefits accruing as a result of the mobility based intervention, attributed to the prevention of the loss in income and HIV related sector costs. Other benefits that could be included may be associated with the business sector and other points in the mobility system, particularly in the source community where the devastating impact of HIV infections can account for a high percentage of monthly expenditures and lead to considerable borrowing as has been observed in Northern Thailand [19], thus also affecting the capacity for socio-economic development. Unfortunately data do not allow this further analysis.

Direct benefits are equivalent to health care costs avoided. The annual cost of palliative and low cost management of opportunistic infections was found to be 177 USD per person [41] in Thailand. The average cost per patient per month of home based care in Cambodia is 25.5USD in urban areas and 37.6 USD in rural areas [42]. It is assumed that the costs of patients and their carers have been subsumed into these figures and that a person living with AIDS will need care and treatment for a period of 2 to 5 years.

Indirect benefits are equivalent to the avoided future productivity losses as a result of HIV related illness, including reduction in remittances and investment. We assume that the average age at infection is 25 years; the length of time from infection to death is 8 years; the average age at retirement is 55 years and that an individual will remain productively active for 3 years after infection – after which their income declines to a half of full income for a further 3 years as a result of lower productivity. For the last 2 years of life, it is assumed the individual has zero income.

Box 2: Estimates of the impact of prevention interventions with mobile population

Impact of condom use intervention with a mobile population (General Awareness)

Here we assume that the entire population of the destination community is targeted and the programme is carried out for 5 years. The impact of the intervention is to improve the consistency of condom use to 60%, and increase the use of condoms in all non-regular sexual partnerships. In particular, we assume that for those whom the programme has reached, that 30% of men and 40% of women use condoms for all non-regular partnerships. We use *SCHOOL* to estimate the impact of the intervention, for scenario 2 above. Sensitivity analysis on the consistency of condom use using values from 40% to 80%.

Result

Estimated HIV prevalence is 1.54% (range: 1.52% – 1.59%)

Estimated number of infections averted is 377 (range: 327 – 397)

Impact of an intervention that prevents HIV transmission among the mobile population (Population Focus)

Here we assume that the highly susceptible sub-populations are targeted i.e. those socio-economic and cultural characteristics of those more likely to practise risk behaviour. Interventions might range from general literacy to income generation and to education regarding the risks as well as encouraging families to travel with mobile individuals. The impact of the intervention is to reduce HIV prevalence to 21.5% and STI prevalence to 33% in the mobile population. We use *SCHOOL* to estimate the impact of the intervention, for scenario 2 above. Sensitivity analysis was carried out on the impact of the intervention on HIV and STI prevalence with values ranging from 18.5% and 32% to 24.5% and 34%, respectively.

Result

Estimated HIV prevalence is 1.59% (range: 1.37 – 1.77)

Estimated number of infections averted is 327 (range: 147 – 547).

Impact of condom use intervention and multi-sectoral intervention in hotspot within mobility system (Geographical Focus)

Here we assume that the entire population is targeted. The impact of the intervention is to improve the consistency of condom use to 60%, and increase the use of condoms in all non-regular partnerships. In particular, we assume that for those whom the programme has reached, that 30% of men and 40% of women use condoms for all non-regular partnerships. The impact of the intervention is to reduce HIV prevalence to 21.5% and STI prevalence to 33% in the more susceptible sub-groups. We use *SCHOOL* to estimate the impact of the intervention, for scenario 2 above. Sensitivity analysis was carried out on the parameters using the same values as in the first two scenarios.

Result

Estimated HIV prevalence is 1.06% (range: 1.25 – 0.90)

Estimated number of infections averted is 861 (range: 667 – 1,017)

f. *A cost-benefit analysis*

First we established the costs associated with the development of the HIV epidemic in a population of 100,000 that is a hotspot within the mobility system (scenario 2) as compared with a setting where mobility does not have this strong influence (scenario 1) in Box 1. Next, in the absence of intervention cost data, we carried out a threshold analysis to establish the maximum an intervention could cost in order to generate overall cost savings i.e. where the CBA = 1:1. We call this maximum cost the threshold cost level. These values are presented in table 7 for Cambodia and Thailand. It is interesting to note the different order of costs associated with mobility between the two countries. This is related to the fact that avoided productivity losses are the major part of the benefits and the GDP per capita in Thailand is approximated ten times that of Cambodia. However, these figures cannot capture the vulnerability of households to the impact of disease. Households with lower productivity and fewer saving are more dependent on the earnings of migrant labourers and the loss of this breadwinner and/or the costs of caring for them are more likely to fall into debt and poverty. Those households with higher productivity levels are more likely to have savings and be more resilient to such economic shocks.

Table 7: Threshold intervention costs for prevention of HIV addressing mobility aspects of HIV epidemic

Scenario	HIV prevalence % after 5 years (infections averted)	Potential benefits (million USD)	
		Cambodia (home based care)	Thailand (facility based care)
Limited mobility	1.37		
Mobility hotspot	2.30	3.3 – 4.0*	21.9 – 22.3*
General awareness campaign	1.52 – 1.59 (520 – 590)	1.2 – 1.7	7.8 – 9.6
Population focussed intervention	1.37 – 1.77 (147 – 547)	0.5 – 2.4	3.5 – 13.3
Geographically focussed intervention	0.9 – 1.25 (667 – 1,017)	2.4 – 4.4	15.9 – 24.6

* the costs associated with the increase in HIV prevalence associated with mobility

7. CONCLUSIONS

Population mobility has been a strong component in the economic development of the region of South East Asia, both as an impetus for growth as well as resulting from the growth itself. Diversity has characterized this population movement, comprising internal and international movements, permanent and temporary, circular and step-wise. Alongside this population movement the HIV epidemic has emerged in Asia, and as in many regions of the world, infection appears to be growing faster in areas where there is a high degree of mobility. The increasing rates of infection and HIV associated disease have the potential to impact not only the health sector, in terms of increased burden, but also on households, businesses and agriculture through rising health care costs, funeral costs and reduced productivity.

Interventions to address the mobility aspect of the HIV epidemic have the potential to forestall an epidemic and its spread, through population movement, to other parts of the region.

Using an adaptation of a model from the HIV Tools set, we estimated the increase in HIV prevalence resulting from mobility over a 5-year period. There was an approximated 3-fold increase in prevalence. As stated earlier, this is an underestimate but it still shows the importance of the mobility system in the spread of HIV.

We then evaluated the potential effectiveness of a general awareness campaign that leads to increased consistency in condom use, a focussed intervention that reduces HIV and STI prevalence among those susceptible populations in the mobility system and a geographically focussed programme that combines the two. It was found that, in terms of HIV infections averted within the hotspot, the intervention focussed on the susceptible populations would not prevent as many infections as the general awareness campaign but the combination of the two approaches achieved as much as the prevention of twice the number of infections of either of the approaches implemented alone.

The complementarity of general awareness and targeted interventions is underscored by this analysis. This is particularly the case for geographical locations where there is an interaction of mobile and susceptible populations interacting with the general population. In practical terms what this implies is that infrastructure development projects or industries that act as pull factors for migration should not only introduce workplace interventions but work with the local communities to develop general awareness campaigns and provide HIV prevention education to the local population. This prevention work could be further reinforced by working with source communities in areas of income generation, education and HIV prevention.

There are limitations to the approach we have used for estimating the cost-benefit of responding to the mobility aspects of the HIV epidemic in South East Asia. These are primarily related to the lack of a model that specifically takes into account mobility and the fact that there is no way to capture the full effect of preventing HIV incidence. The results could therefore not include the impact on those regions linked to the hub through the population mobility and therefore both the impact of the population and the geographically focussed interventions are under-estimates. In addition, the model only allows us to explore the effect of changing behaviour within the general population and for interactions between the different sub-populations within the mobility system. Interactions between individuals within particular susceptible population groups are not included in our scenarios and therefore, again, the model is likely to underestimate both mobility effect and the impact of the interventions.

Further limitations relate to the absence of baseline and follow up behavioural and sero-surveillance data limiting the strength of the conclusions from such a modelling exercise.

Clearly the collection of cost data related to these interventions should be a priority. To enable this, a clearly defined set of best practice interventions specifically addressing the mobility aspect of HIV will be useful. In looking at HIV infections averted by

these interventions in the absence of trial data, it will be necessary to develop a mathematical epidemiological model that incorporates population movement, to help us gain an insight into controlling the HIV epidemic affected by mobility.

It is recommended that these data requirements for evaluating the costs and developing a model for estimation of benefits are considered at the design stage of any programme and taken into account during implementation. As new interventions are developed systems should be included for monitoring key information:

- economic costs of the programme
- the size of the general and mobile populations
- the population targeted and reached by a particular intervention
- the patterns of mobility
- mobility system factors which affect susceptibility to HIV infection: the behavioural characteristics and change in behaviour of these populations in relation to mobility, injecting drug use, unsafe sex and the relationship between these
- STI and HIV prevalence of these populations
- mobility system factors which affect vulnerability to HIV infection: this would include evaluation in source, destination and transit communities of current systems of support for individuals, families & communities affected by HIV, household socio-economic characteristics, health-related expenditures as a proportion of total expenditures and income and savings related to mobility as a proportion of total income.

With such information planners are better able to estimate both the current situation and the needs in relation to HIV prevention services and provision of care as well as select the more efficient combination of prevention and care services to control and alleviate the impact of the epidemic in the region.

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ANNEX 1 : VALUES USED IN SCENARIO ESTIMATION

Values for Key Model Input Parameters Used in Estimation Different Scenarios	
	Parameter Value
Baseline Scenario	
Population Size	100,000
Initial Population HIV prevalence	1%
Susceptible population HIV prevalence	3.5%
Susceptible population STI prevalence	20%
Partial Hub Effect Scenario	
Population Size	100,000
Initial Population HIV prevalence	1%
Susceptible population HIV prevalence	27.5%
Susceptible population STI prevalence	35%
Condom use intervention with partial Hub Effect Scenario	
Population Size	100,000
Population HIV prevalence	1%
Susceptible population HIV prevalence	27.5%
Susceptible population STI prevalence	35%
Consistency of condom use	0.6 (range 0.4–0.8) among non-susceptible population
Multisectoral intervention working with susceptible population (assuming leads to effective reduction in HIV prevalence)	
Population Size	100,000
Population HIV prevalence	1%
Susceptible population HIV prevalence	21.5% (range 18.5%–24.5%)
Susceptible population STI prevalence	33% (range 32%–34%)
Consistency of condom use	0.6
Combined condom use and multisectoral intervention working with susceptible population (assuming leads to effective reduction in HIV prevalence)	
Population Size	100,000
Population HIV prevalence	1%
Susceptible population HIV prevalence	21.5% (range 18.5%–24.5%)
Susceptible population STI prevalence	33% (range 32%–34%)
Consistency of condom use	0.6 (range 0.4–0.8) among non-susceptible population

ANNEX 2: BENEFITS OF REDUCING HIV PREVALENCE THROUGH MOBILITY FOCUSED PROGRAMMES

	Baseline	Mobility effect	Gen Awareness			Population intervention effect			Geog. Intervention effect		
Baseline											
Population	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
Initial HIV prevalence (males)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
No. of cases	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
After 5 years											
HIV prevalence	1.37%	2.30%	1.52%	1.54%	1.59%	1.37%	1.59%	1.77%	1.06%	1.25%	0.90%
No. of cases	1,370	2,287	1,520	1,540	1,590	1,370	1,590	1,770	1,056	1,250	900
New infections	370	1,287	520	540	590	370	590	770	56	250	-100
Infections averted		-917	397	377	327	547	327	147	861	667	1,017

Assume all HIV infections lead to on average same loss of income

Scenario 1: Cambodia with home based care model

Lost income stream		-\$2,787,926	\$1,206,987	\$1,146,181	\$994,168	\$1,663,027	\$994,168	\$446,919	\$2,617,784	\$2,027,859	\$3,091,953
Health sector costs - HBC		-\$1,214,860	\$525,953	\$499,457	\$433,216	\$724,676	\$433,216	\$194,749	\$1,140,719	\$883,655	\$1,347,342
Total		-\$4,002,786	\$1,732,940	\$1,645,638	\$1,427,384	\$2,387,703	\$1,427,384	\$641,668	\$3,758,503	\$2,911,514	\$4,439,295

Scenario 2: Cambodia with home based care model (2years)

Lost income stream		-\$2,787,926	\$1,206,987	\$1,146,181	\$994,168	\$1,663,027	\$994,168	\$446,919	\$2,617,784	\$2,027,859	\$3,091,953
Health sector costs - HBC		-\$561,204	\$242,964	\$230,724	\$200,124	\$334,764	\$200,124	\$89,964	\$526,955	\$408,204	\$622,404
Total		-\$3,349,130	\$1,449,951	\$1,376,905	\$1,194,292	\$1,997,791	\$1,194,292	\$536,883	\$3,144,738	\$2,436,063	\$3,714,357

Scenario 3: Thailand with facility based care model

Lost income stream		-\$21,552,814	\$9,330,935	\$8,860,863	\$7,685,682	\$12,856,477	\$7,685,682	\$3,455,031	\$20,237,482	\$15,676,911	\$23,903,176
Health sector costs - facility		-\$702,713	\$304,228	\$288,902	\$250,586	\$419,176	\$250,586	\$112,649	\$659,828	\$511,134	\$779,345
Total		-\$22,255,527	\$9,635,163	\$9,149,764	\$7,936,268	\$13,275,653	\$7,936,268	\$3,567,680	\$20,897,309	\$16,188,044	\$24,682,521

Scenario 4: Thailand with facility based care model (2 years)

Lost income stream		-\$21,552,814	\$9,330,935	\$8,860,863	\$7,685,682	\$12,856,477	\$7,685,682	\$3,455,031	\$20,237,482	\$15,676,911	\$23,903,176
Health sector costs - facility		-\$324,618	\$140,538	\$133,458	\$115,758	\$193,638	\$115,758	\$52,038	\$304,807	\$236,118	\$360,018
Total		-\$21,877,432	\$9,471,473	\$8,994,321	\$7,801,440	\$13,050,115	\$7,801,440	\$3,507,069	\$20,542,289	\$15,913,029	\$24,263,194

Capacity Building 🚫 Social Mobilization 🚫 Institutional Partnership 🚫 Advocacy & Information



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Development is the process of enlarging peoples' choices to live long and healthy lives, to have access to knowledge, and to have access to income and assets: to enjoy a decent standard of living.

ISBN : 974-680-206-2