ECONOMIC INTERVENTIONS IN THE FIGHT AGAINST HIV/AIDS: A CASE STUDY OF NORTHEAST THAILAND

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This study investigates the links between human-immuno deficiency virus (HIV) acquired immunodeficiency syndrome (AIDS), migration, and rural enterprises. We establish a strong positive statistical relationship between migration and HIV/AIDS. Given this relationship, we explore economic interventions to reduce the level of out-migration from rural villages. Using a case study of Northeast Thailand, our study focuses on the impact of emerging rural industry in raising household incomes and thereby reducing incentives for at-risk people to migrate. We note that this impact of rural industrialization may only be evident in the medium to longer term.

I. INTRODUCTION

Throughout the Greater Mekong Subregion (GMS), strong economic and social pressures are spurring labor migration. Whether an intended result of economic reform or a consequence of adverse income shocks, large-scale movements of populations are often a rational response to changing economic circumstances. The transfer of labor from one region to another, however, can come at a cost if migrants spread a localized HIV epidemic to other areas.

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By their very demographic characteristics, migrants represent a high-risk group in the transmission of HIV. They tend to be young — or at least sexually active, and are away from the influences of their families and traditional communities for extended periods. Geographical separation from these social networks increases the likelihood of risky behaviors, such as injecting drug use, and reduces the natural inhibitions present in the home environment (Carael 1997, Ford and Kittisuksathit 1996). Increased disposable income may also facilitate purchases of commercial sex by migrants. Some migrants might even themselves become sex workers. The fear is that contagion by migrants exacerbates existing health problems in rural communities. In the early days of the Asian financial crisis, for example, provincial community groups became increasingly concerned about HIV/AIDS infection among migrant laborers returning home (Robb and Zhang 1998). Following Lim, Taweekul and Askwith (2004), the key is to break the migration-HIV/AIDS link with pivotal economic interventions — particularly the creation of rural employment and incomes — in order to reduce the need to migrate. In this paper we explore how large outside businesses, nongovernment organizations (NGOs), and local villagers can cooperate to stem rural outmigration and the risk behaviors associated with HIV/AIDS.

There are several reasons for this line of research. First, investigating how income and employment generation can reduce HIV infection is a relatively new area of research (United Nations Development Programme [UNDP] 2000). Until recently, poverty alleviation measures have been designed to help vulnerable households to cope with income shocks resulting from HIV infection (e.g. see Kongsin 1997, Greener 2000, Loewenson and Whiteside 2001). We invert this approach by proposing rural industrialization initiatives to reduce migration, and thus reduce the economic and social conditions leading to HIV infection. In general, the distribution of HIV/AIDS is disproportionate, both spatially and economically (Barnett 2002). This is evident in Thailand, where the poorest regions — the Northeast and the North, account for a disproportionately high share of the sex workers migrating to major cities. Over time, however, the availability of alternative job opportunities should reduce the supply of commercial sex workers (Bond and others 1997, World Bank 1997). This and other issues relating to migration are explored in this paper.

Another reason for this research is that pursuit of innovative and novel approaches to the HIV/AIDS problem becomes increasingly urgent with perhaps 40–50 million people living with the deadly virus globally.

Recent decreases in public health funding in Thailand due to the Asian financial crisis (Pothisiri and others 1998) suggest a greater emphasis on non-state resource mobilization, including that of NGOs, community groups, and the private sector. We suggest that local villages and outside businesses often have complementary resources and interests that can bring the two together for mutual gain. If the gain is reflected in the opportune establishment of factories near villages, then the resulting local employment opportunities could serve to reduce out-migration and entry into the commercial sex industry. The key point is that the resources mobilized come directly from the private entities involved in the pursuit of their private interests, rather than from the government or aid agencies. Such self-financed activities may create future streams of private resources that generate income and contribute to the health of the community.

Finally, with Asia estimated to be the world focus of HIV infection by 2020 (Barnett and Rugalema 2001), and given the detrimental effect of HIV/AIDS on household income and labor supply (Kongsin and Watts 2000), it is important to understand more about the relationship between rural job creation, migration, and the HIV contagion. The relationships are surprisingly complicated. As will be discussed in the following sections, HIV infection can affect a household across a number of important dimensions, including its endowments, opportunities, activities, and outcomes. Outcomes, such as declining income, may induce rural out-migration. Key groups of migrants, such as transport workers and construction laborers, are susceptible to HIV/AIDS risk behaviors that further reduce endowments, opportunities, and activities, and generate a more adverse set of outcomes. Should this process result in a downward spiral of poverty and HIV/AIDS at the community level, interventions to bolster rural household incomes may be crucial in interrupting or even preventing the cycle. Job creation at the village level will be pivotal. But job creation can be a two-edged sword. Rising household income may increase the opportunity for (male) household members to increase their purchases of commercial sex. To date, very little research appears to have been done to integrate models of economic behavior with the endowments, opportunities, activities, and outcomes approach in the complex study of HIV/AIDS risk behaviors. It is this gap that we seek to fill in this paper.

II. BACKGROUND TO THE STUDY

To explore the linkages and interactions between HIV/AIDS and rural out-migration, the authors conducted several surveys and extensive stakeholder interviews in Northeast Thailand from June to October 2003. A general survey of households in two districts (Ban Phai and Phon) in southern Khon Kaen province was first conducted. This was followed by a survey of factory worker households from the Community-Based Integrated Rural Development Center in Ban Phai. The third survey was an individual survey of HIV/AIDS patients (both in-patients and out-patients) at Ban Phai and Phon hospitals, and at the Northeast Regional Infectious Hospital in Non Sombun. These three surveys, together with interviews of local nongovernment organization officials, factory managers, local academics, and other stakeholders, provide the framework and data presented in this paper.

Three teams of interviewers were recruited locally for the household survey and trained in data collection methods and interview technique. Recruitment of local interviewers ensured that interpretations and language used for the survey were consistent with those in use in the survey area. Stratified sampling identified the households selected for the survey. Three villages were selected by weighted random sampling from each of the ten sub-districts in Ban Phai district and each of the twelve sub-districts in Phon district.[1] All households in each village were enumerated and a sample of ten households was selected randomly. Participation in the survey was voluntary, but the refusal rate was extremely low. This provided an overall sample of 660 households from 66 villages in the two districts.

The sample of 48 factory workers was selected randomly from all workers at two factories at the Community-Based Integrated Rural Development Center in Ban Phai. Each factory worker was surveyed individually, and the household of each factory worker was administered the same questionnaire as the main household survey.

The survey of HIV/AIDS patients was conducted by three of the authors. HIV/AIDS patients sampled were those present on interview days at the district hospitals in Ban Phai and Phon, and at the Northeast

[1] Weightings were adapted from household numbers data from the Basic Minimum Needs survey conducted by the National Economic and Social Development Board of Thailand in 2002.

Regional Infectious Hospital in Non Sombun. Both in-patients and out-patients were sampled, providing a total of 72 observations. Information was collected about patients' household, and about the household they were living in either at the time they were diagnosed with HIV or at the time when they first began to show symptoms of AIDS, whichever was earlier. Patients were also asked about expenditures and costs associated with their care, and about their risk history — including migration, sexual history, history of blood donations and transfusion, and drug use.

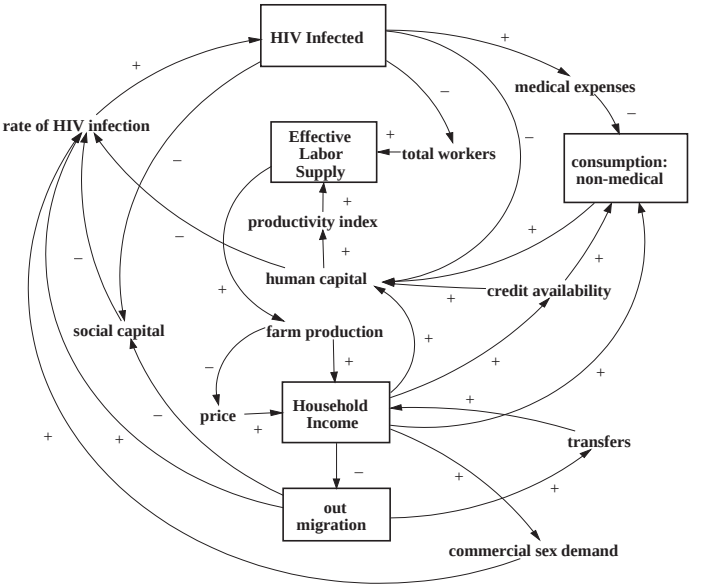
III. HIV/AIDS AT THE COMMUNITY LEVEL: A SHORT-RUN STYLIZED MODEL

On the basis of field observations and interviews, a community-level representation of short-run causative chains of events that impact on rural out-migration decisions and the adoption of HIV/AIDS risk behaviors was constructed (see Figure 1). The model will be important in analyzing why households make decisions that may place them at risk of HIV/AIDS. We do not intend to present all the variables that influence household behavior, only those believed to be most significant in affecting household incentives. The variables are described either in a broad sense (such as "human capital," which could include both farm skills and HIV/AIDS awareness), or presented in an "all other things being equal" context. As an example of the latter are the cultural aspects of the commercial sex industry in Thailand (Muecke 1992). Despite cultural elements, however, "the overwhelming motive behind the exchange of sexual services for the provider is economic opportunity," i.e. income (Tawil, Verster and O'Reilly 1995). In our simple framework, we shall allow income to vary, but other important factors will be held constant — such as cultural attitudes, which we will assume to be invariant over the short time period considered.

Note that outcomes in the model, such as HIV infection, are significantly determined by the activities in which the household engages, and are impacted by households' endowments, acquisitions, and the environment (see Desai [2000] for a full description of these concepts). For example, an outcome, "HIV infected," is at the top of Figure 1. This outcome sets in train a number of events, including a reduction in the community's endowment of labor power, i.e. "total workers." The arrow connecting "HIV infected" and "total workers" shows the direction of causation, with the negative sign attached to the arrow indicating an

adverse impact of one on the other. Similarly, the arrows linking "HIV infected" to "medical expenses," and "medical expenses" to "consumption: non-medical," have positive and negative signs, respectively. Thus, an increase in HIV infection reduces non-medical consumption, as higher spending on medical treatment reduces household expenditure on other goods and services.

Figure 1: Endowments, Opportunities, Activities and Outcomes



A. Households with Reduced Endowments

To begin, consider a household with at least one family member with HIV/AIDS. The household can expect its future endowments to be reduced as the infected household member becomes increasingly unable to work due to AIDS-related morbidity and eventually dies. Consequently, its future outcomes will be less favorable. Because the infected household member will become increasingly sick, the household might be required to cover large medical costs and the eventual funeral expenses. The household is then likely to seek to protect and increase its existing endowments. It

might reduce current consumption in favor of savings, in anticipation of higher future expenditures. While this may reduce the household's vulnerability to the future anticipated health shock of the infected household member's morbidity, it reduces the ability of the household to provide for its current needs. Further, it may only be possible for households with relatively higher wealth to modify their savings behavior appreciably.

These behavioral responses assume that the household is altruistic towards the infected individual. In reality this is not always the case. In areas where HIV infection is highly stigmatised, it is possible that the household might vilify or ostracise the infected household member, particularly if he or she is seen as some threat to the safety or security of the household. In these cases, the household might restrict the flow of consumption resources to the infected individual or even drive them out of the household.

Once a member of the household begins to show symptoms of AIDS, the household's endowments are more heavily impacted, as are the household's ability to take advantage of opportunities and to avoid poverty. These impacts occur in a number of ways, including reductions in labor supply and in investment in human and social capital. Women are generally the main caregivers for the sick. As infected household members become increasingly affected by AIDS-related morbidity, the household must increasingly transfer resources, in terms of women's labor supply, to the care of its sick members. This transfer of labor indentures women to their traditional role of caregiver, reducing their mobility and access to resources not provided by men, and reinforces previous gender inequality in labor supply and income. This reduction in female labor supply may also reinforce any negative nutritional effects of food insecurity, since women make up the majority of the agricultural workforce engaged in food production. In Thailand in 1990, for example, women made up more than 50% of the agricultural workforce, and over 69% of employed women were involved in agriculture (United Nations Economic and Social Commission for Asia and the Pacific [UNESCAP] 1996).

Households may respond to the reduction in labor endowment by increasing the intensity of labor supply by other household members. This is especially the case where the adult members of the household are suffering from AIDS-induced morbidity, and their labor supply or food production must be replaced by the other formerly unproductive members of the household. This may involve a reduction in leisure activity by the remaining adult members. It may also involve formerly retired or infirm

household members returning to active employment, or children may temporarily or permanently abandon education to earn income for the household.

As life expectancy falls as a result of HIV/AIDS, the marginal returns to both higher education and improved health care fall. It is possible that households will modify decisions about investment in human capital in the face of reduced returns relative to current productive activities. The household will almost certainly reduce any investment in human capital for the infected individual. This may mean removing the infected individual from school earlier than they would have otherwise. Even human capital investment in uninfected members of the household might be reduced. Not only is formal education affected by this reduction in investment, but the increasing morbidity and eventual mortality of adult household members also interrupts the natural transfer of production technology and know-how from adults to their children. This results in decreases in production efficiency and less-favorable future outcomes, either in terms of food or cash crop production, or in income-earning potential. Lower human capital accumulation will have a lasting effect on the household by reducing future endowments and the household's ability to take advantage of opportunities.

AIDS-related morbidity and mortality could also interrupt the accumulation of social capital by the household. As adult household members suffer AIDS-related morbidity, they become less able to maintain existing, or create new, social connections with friends, neighbors, and relatives. This reduction in social capital is exacerbated by the stigma associated with HIV infection — other members of the community may refuse to associate with or aid the household due to perceived health risks or "social evils" (Herek 1999, Busza 1999). Our interviewees living with HIV/AIDS reported a wide range of adverse community reactions to their health status, ranging from neighbors scrubbing chairs that the interviewees had just vacated, to the suicide of a spouse. Social capital is an important endowment for the household (Woolcock and Narayan 2000); its reduction makes the household especially vulnerable to future shocks, including the eventual death of adult household members to AIDS-related causes.

B. Households with Constrained Activities

So far we have discussed households that are directly affected by the HIV infection of a member of their own household. In contrast, there may

be households within the community that are not directly affected in such a way, and who modify their decision-making solely in response to the perceived risks of their environment. The most common changes in behavior for such households are likely to be modifications to their leisure behavior or social activities. Often, particularly in Thailand, leisure activities that will be affected by changes in risk perception are also activities that create enduring social capital between neighbors or within a village, particularly among a group of men. There is the possibility that a reduction in such behavior will lead to a consequent reduction in social capital.

Even more likely is that the spread of information on the risks of HIV/AIDS, unless carefully phrased and managed effectively, could lead to paranoia from some households. These households might, at least to some extent, close themselves off from others, thereby breaking or at least not maintaining bonds with other community members. The social capital of these households will fall over time. These households might even migrate to other regions where they may perceive themselves to be at lower risk, so forfeiting all accumulated social capital and forcing the household to create social ties in their new location. Our interviews with people living with HIV/AIDS suggest a high level of social ostracism facing them, with a consequent diminishing of social capital within the community.

C. Households with Reduced Opportunities

Some households are less directly affected by the HIV/AIDS epidemic than the households above. Such households might perceive themselves not to be at risk of HIV infection. But the HIV/AIDS epidemic may still have an impact on the decision-making process of households through the aggregate effects of changes in the decisions made by other households. The changes can cause market failures, leading to a reduction in market opportunities. There may be failures in financial markets, including the provision of savings and loan services, whether through formal banks, savings groups, or micro-finance projects, as fewer customers increase the marginal transactions costs of these institutions.

The inability to access credit has adverse implications for human capital development. A fall in aggregate human capital within the community may reduce labor productivity and consequently total farm output. Under the likely assumption that the percentage fall in community

food output exceeds the percentage rise in food prices, aggregate farm income in the community will fall. At the margin, falling community income may induce people to migrate. Social capital is further eroded, and increased use of commercial sex and other high-risk behaviors rise. The cumulative result is a further heightening of HIV infection and subsequent migration cycles.

IV. REDUCING OUT-MIGRATION: A STUDY OF NORTHEAST THAILAND

The issues highlighted in Figure 1 readily lend themselves to policy prescriptions. Indeed, since the early 1990s a number of interventions have been introduced in the Northeast that act on elements in Figure 1. The first significant initiatives to combat HIV/AIDS began in 1993 with education programs (raising "human capital"). For example, Khon Kaen University students were organized into travelling education teams to undertake lecture and discussion sessions at the village level. The villagers were separated during the talks: fathers were asked to not visit sex workers and discussed HIV/AIDS risk behaviors; mothers were instructed about condom use; and youths were warned about the dangers of pre-marital sex. The education programs were extended in different form to sex workers. But by 1994, in another intiative, the Thai government strove to close brothels in Thailand, driving the commercial sex industry underground and making education and health care of commercial sex workers more difficult, including in Khon Kaen province.

Migration and its attendant HIV/AIDS risk behaviors thus remain pivotal in affecting the growth rate of HIV/AIDS in the Northeast. During the early years of the HIV/AIDS epidemic, the rural areas of Thailand were found to be particularly susceptible to migration in the spread of HIV/AIDS (Fuller, Kamnuansilpa and Lightfoot 1990, Ogena and de Jong 1999, Singhanetra- Renard 1997). Ford and Kittisuksathit (1996) suggest that "the incidence of HIV/AIDS… highlights the vulnerability of young people who have moved from rural to urban areas as migrant workers." Singhanetra-Renard (1997) adds that "by bringing infected and uninfected persons into contact with each other, migration has become an important factor in the spread of HIV/AIDS in northern Thailand." The United Nations Development Programme (UNDP) has also recognized population mobility as a key risk factor for the spread of HIV in the GMS (Skeldon 2000,

UNDP South East Asia HIV and Development Programme 2002, du Guerny and others 2003).

The Northeast region has the greatest migration outflows (Larson and others 1993) and so is disproportionately affected by the risks that migrants may face. Our survey data suggest that migrants from the Northeast region are typically either young adults looking for their first employment, or parents seeking more gainful employment to support the increasing educational costs of their children. In between those two major episodes of migration, Northeastern parents usually return to their home village to bear and raise their children. But if the migrants had engaged in directly risky occupations, such as commercial sex, or indirectly risky occupations such as transport sector work (e.g. truck drivers), then HIV/AIDS comes to the village.

As illustrated in Figure 1, the impacts on the growth rate of HIV infection operate via an increase in income transfers that augment household income, which in turn help facilitate purchases of commercial sex. Out-migration also impacts adversely the formation of social capital. Social networks, including that of the family, can fall apart as adults suffer from AIDS related illnesses and become shunned by the community. People living with HIV/AIDS become further disenfranchised from market opportunities, worsening the social turmoil in which HIV infection grows (Mutangadura 2000, Brundtland 2000). Lastly, the migrants themselves, either as sex workers or purchasers of commercial sex, can contribute directly to the spread of HIV.

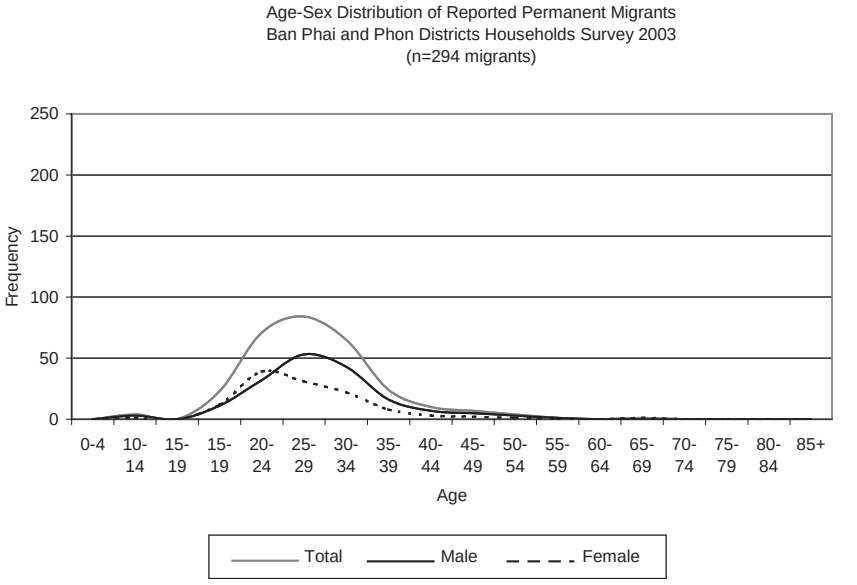
A. Migration Results from the Sample

Many of the households surveyed were affected by migration. In the main survey of 660 households, 294 (or 44.5%) had permanent migrants, i.e. people who were not part of the household at the time of survey. There were also seasonal or short-term migrants — i.e. people who were part of the household at the time of survey, but they appeared in less than 10% of the households sampled. The age and gender distributions of migrants from the two sample districts are summarized in Figure 2. It appears that the migrants tend to cluster within the 20–35 year old age groups.

Cursory examination of the data from the AIDS patient surveys suggest a significant positive link between migration and HIV infection. Of the patients surveyed, 51% were recent migrants at the likely time of their infection, and at least a further 14% were spouses of a recent migrant

(data on the migration history of the spouse was not explicitly collected, but was revealed by many respondents during the interview). Moreover, many of the HIV/AIDS patients cited migration as a key factor in HIV infection, or suggested that their partner was infected while working elsewhere.

Figure 2: Demographic Characteristics of Migrants



B. Econometric Results — Migration as a Risk-factor in HIV Infection

To further test whether migrants are at significantly higher risk of HIV infection, we compared the sample of HIV/AIDS patients with the representative sample from the general population. The sample included 2,536 people from the general population and 72 AIDS patients as described above. Of the HIV/AIDS patients, 71 were aged 18 years or older. This suggests that there may be some bias in the comparison due to the fact education and age are highly correlated for those aged under 18 years. To overcome this bias, we also compared data restricted to only those aged 18 years or older. This restricted sample included 1,787 people from the general population.

Table 1 below summarizes the sample characteristics for the general population and AIDS patients for both the full sample and the sample restricted to only those aged 18 years or older. Education was self-reported number of years of schooling, number of rooms in the household was used as a proxy of wealth, and the migration variable was a dummy variable indicating whether any member or previous member of the household had migrated, permanently or seasonally, within the previous five years.

Table 1 suggests that there may be significant differences between the two groups, particularly in terms of the migration history of their household. To explicitly test whether migration is a risk factor for HIV infection, the following binary logit regression model was used:

Table 1: Sample Characteristics

	General Population		AIDS Patients	
Variable	Mean	Std Deviation	Mean	Std Deviation
Full Sample				
(Sex (0=male)	0.522	0.500	.639	.484
Age	34.5	21.4	33.0	7.4
Education (years)	5.17	3.60	6.01	2.80
Migration	.200	.400	6.94	.464
Wealth (rooms)	2.79	1.14	1.89	0.96
Restricted Sample				
Sex (0=male)	0.527	0.499	0.648	0.478
Age	45.4	15.6	33.3	6.8
Education (years)	5.76	3.36	6.06	2.77
Migration	0.210	0.407	0.704	0.456
Wealth (rooms)	2.82	1.14	1.87	0.95

The model was run on both the full sample and restricted sample, with the assumption that the general population was not infected with HIV[2]. The results of the binary logit regressions are reported in Tables 2 and 3 below.

$$AIDS = \beta_0 + \beta_1 Sex + \beta_2 Age + \beta_3 Education + \beta_4 Wealth + \beta_5 Migrant + \varepsilon$$

[2] Since the proportion of the adult population of Thailand estimated to be living with HIV is less than 2%, this assumption seems plausable (Joint United Nations Programme of HIV/AIDS [UNAIDS], United Nations Children's Fund [UNICEF] and World Health Organization 2002).

The results from the full sample strongly suggest that migration is a significant risk factor for HIV infection (odds ratio 9.26), and that poorer households are at a lower risk. It also suggests that women are at a slightly higher risk than men (odds ratio 1.78).

For the restricted (adult) sample, migration is again confirmed as a significant risk factor for HIV infection (odds ratio 11.16). These results seem reasonable, with risk decreasing with age, education, and wealth. Women are again shown to have a higher risk of HIV infection, though this may be explained by the characteristics of our sample. Of our HIV/AIDS patient sample, nearly 64% (46 out of 72) were women whose husbands (already dead of AIDS-related causes) had infected many. Most of those men were also migrants, which again illustrates the significant HIV infection risk associated with migration.

Table 2: Logit Regression Results – Full Sample

Variable	Coefficient	Z	p-value	Odds Ratio	95% C.I.
Constant	(3.367)	(7.21)	0.000	–	–
Sex	0.568	2.21	0.027	1.78	[1.07, 2.97]
Age	(0.0053)	(0.79)	0.428	0.99	[0.98, 1.01]
Education	0.1162	3.39	0.001	1.12	[1.05, 1.20]
Migration	2.225	8.31	0.000	9.26	[5.47,15.65]
Wealth	(3.369)	(7.21)	0.000	0.43	[0.33, 0.55]

Table 3: Logit Regression Results – Restricted Sample

Variable	Coefficient	Z	p-value	Odds Ratio	95% C.I.
Constant	2.204	2.51	0.012	–	–
Sex	0.6413	2.26	0.024	1.90	[1.09, 3.31]
Age	(0.1031)	(6.71)	0.000	0.90	[0.88, 0.93]
Education	(0.1671)	(2.78)	0.005	0.85	[0.75, 0.95]
Migration	2.4125	8.34	0.000	11.16	[6.33, 19.67]
Wealth	2.2045	2.51	0.012	0.42	[0.32, 0.57]

V. MOBILIZING PRIVATE RESOURCES TO REDUCE OUT-MIGRATION

We now focus on the role of job creation near rural villages as an economic mechanism to reduce incentives to migrate. The key idea is that rural industrialization augments household income, which in turn reduces out-migration and entry into commercial sex work. Keeping the social structure of communities intact facilitates the perpetuation of social capital, which acts to both reduce the spread of HIV and to support the growth of human capital. Human capital in turn contributes to the productivity of labor, including that of farmers. To the extent that productivity increases farm incomes, all other things being equal, the incentive to out-migrate lessens (see Figure 1).

Drawing heavily on Lim, Taweekul and Askwith (2004), our rural industrialization study examines the activities of the Population and Community Development Association of Thailand (PDA) in Ban Phai district. PDA's efforts in reducing migration focus on its Community-Based Integrated Rural Development (CBIRD) program. CBIRD activities include income generation and employment, coupled with HIV prevention, information, and care. The CBIRD Center at Ban Phai includes a factory complex with three main employers — two garment factories that produce uniforms for export, and a Nike shoe factory (for additional details, see Lim 2001, Lim and Cameron 2003).

The integration of economic and public health objectives in the CBIRD program is clear from the interactions between large private businesses and local villages that have been initiated and mediated by CBIRD. A strategic activity within the program is the Thai Business Initiative in Rural Development (TBIRD). TBIRD's objectives are to encourage local and multinational businesses to assist rural development, transfer business skills to villagers, generate income for the rural poor, and encourage rural people to stay in or return to their home villages. The idea is to provide particular help to village women to find factory jobs set up by large outside businesses, near their villages, to reduce incentives to migrate to urban centers.

The PDA identifies villages that are suitable to host private sector investments, including investments by foreign multinationals. The companies involved in the TBIRD program gain access to relatively cheaper labor in rural areas, which more than compensates for the added transport costs of getting their products to Bangkok. Overall, wages are more than

20% lower, and land rentals are about 30% lower than in Bangkok. There is a strong gender bias in the overall employment figures for the TBIRD factories, which can be used to the multinationals' public relations advantage. Of the 1400 or so workers in three of the manufacturing companies operating in TBIRD-Ban Phai, 94% are female. Approximately 35% of the workers who work in factories at TBIRD-Ban Phai have returned from Bangkok and nearby provincial centers like Samutprakhan and Chachoengsao. Sometimes the number is even higher. In April 2000, for example, Ban Phai Union Footwear recruited 50 workers, of whom 35 were local people returning from Bangkok to jobs at the factory.

In our main survey of 660 households, 44.5% of those households had a member who was a permanent out-migrant. This is very close to findings in the factory survey of 48 respondents: 43.8% had a permanent out-migrant in the household. With no statistically significant difference in the out-migrant percentages between the general district households and the factory worker households, the impact of the TBIRD interventions in altering migration behavior may currently be low. This result is surprising. Nonetheless, there are also theoretical grounds for believing that providing more factory employment for rural women in their local area will not adequately solve the problems of commercial sex and HIV/AIDS, *at least at the moment*. For instance, the rising household income may have undesirable public health consequences. Given the widespread persistence of unsafe sexual practices among Thai men, despite their knowledge of HIV risks (Vanlandingham and Grandjean 1997), the boosts to household income from rural industry may even increase the spread of HIV/AIDS by facilitating increased purchases of commercial sex. On the other hand, if household incomes were still sufficiently low as to trigger out-migration, the migration itself may augment household income via transfers or remittances from the migrants. The remittances could also be appropriated for purchases of commercial sex.

Perhaps more importantly, even if more women initially opted for factory work over entry into the sex industry, the falling supply of sex workers could put upward pressure on the wages from commercial sex, attracting more sex workers in the longer run. The wage differential between sex work and rural employment could conceivably even widen, inducing more women to leave their villages. A survey of commercial sex prices in three and five-star hotels in Khon Kaen, the major city nearest to Ban Phai and Phon districts, indicated that sex workers receive daily earnings several times greater than that earned in factory work. In the five-star hotel, a single client paid Baht 1800 (roughly US$40) per episode

of sex, of which the sex worker received Baht 1200. In an informal side street bar, sex might cost Baht 800. Baht 800–2,000 seems to be the likely price range for commercial sex in Khon Kaen, both from our own interviews with sex workers and with public health professionals in the province. In contrast, an unskilled worker in the TBIRD factories receives around Baht 150 per day. It was becoming apparent even in the mid-1990s that employment in the textile industry, at significantly lower wages, was encountering problems in stemming the flow of young women into the commercial sex industry (Tawil, Verster and O'Reilly 1995).

Interviews with sex workers from a three-star hotel suggest a degree of irreversibility in labor supply decisions. The interviewees suggested that they would be prepared to switch from the sex industry to work in textile factories of the TBIRD type only if they could earn at least Baht1000–1500 per day. Our interviews thus indicate the importance of reducing the entry of women into the sex industry in the first place. Otherwise their labor choice may be subject to a path dependence that can be difficult to reverse, given the wage gaps that exist between commercial sex and unskilled factory work.

For rural industrial interventions to ultimately reduce migration, the wage gap must be narrowed over time. Here the human capital activities of PDA and the companies involved in the TBIRD program will be instrumental. Women have the opportunity to participate in training courses that the private companies and the PDA organize, such as family planning, HIV prevention, team building, business skills development, and interpersonal workplace relations. The building of business skills and human capital in general is crucial in raising the value of women's labor endowments, widening their opportunities sets, and allowing them to participate in a wider range of higher income-earning activities (other than commercial sex). Empowerment of women and improvements in girls' education are important sources of changes in HIV-related behavior (Husain, Badcock-Walters 2002), and economic empowerment is more likely to occur when new jobs become available that are outside traditional male fields. And it may well be easier for women to augment their human capital assets through access to knowledge and skills than to redistribute traditional resources to them, such as land and wealth (Keller-Herzog and Szabo 1997). It is here that the current mobilization of village labor resources must include a longer-term dimension of business skills acquisition by women.

Over time, to narrow the existing wage gap between unskilled factory work and commercial sex, the majority of the female factory workers may have to eventually leave the factories to set up their own businesses

with even higher value-added activities. It is here that the current business skills development programs of the companies and PDA are likely to yield the highest returns. Given the eventual shift of women into higher value-added activities, the wage gap could narrow significantly.

The key insight is that rural industrialization is not likely to be an immediate solution to the migration and commercial sex aspects of HIV infection. The solutions are more likely to emerge over time, as business skills development among women creates a much more attractive income alternative to commercial sex work. The increases in human capital will then become more self-reinforcing and self-financing. They will be self-reinforcing to the extent that the progression from surplus agricultural labor, to labor-intensive industrial labor to, finally, high value-added (self-employed) labor, will be the outcome of steady human capital investments that provide the basis for ongoing learning and development of the labor force. As more rural factories emerge, factory wages will eventually be driven up, inducing firms to adopt capital-intensive technologies that require continual training of the workforce. The upgrading of skills and higher wages, coupled with more advanced business skills acquisition, are likely to create a stream of human capital and financial resources that constantly expand productivity and narrow the wage gap. As production and incomes expand, the scope of and necessity for further human capital development increase, and so on. At least as important is the self-financing aspect of the process. Once basic physical infrastructure and educational levels have been provided locally, an active role of the government in stimulating or financing the process is unnecessary. Again, it is the self-interested activities of companies and villagers, mediated by NGOs such as the PDA, that generate the positive migration-related community health externalities.

VI. CONCLUSION

Thailand is often held as a shining example of successful HIV/AIDS prevention, with adult HIV infection rate peaking at an estimated 1.8% in 2001 and falling steadily since then (UNAIDS, UNICEF and World Health Organization 2002). The "100 percent condom program" has been credited with much of this success by reducing the risk associated with commercial sex (Rojanapithayakorn and Hanenberg 1996). However, despite this apparent success, Thailand continues to have a high number of HIV

infections. Many of these infections have been caused by the return migration of HIV-infected individuals to rural areas, resulting in the migrants' spouses becoming infected. With government fiscal constraints and dwindling aid, policy-makers are now looking for more cost-effective and innovative policies. We have presented a model of mutually reinforcing stakeholder interests in the long-term fight against migration and HIV/AIDS. The aim is to encourage the private sector to act in the broad interests of the villagers. By promoting an economic and financial interdependence between NGOs, villagers, and outside businesses, the major stakeholders cooperate in pursuing the objectives of eventually much higher rural income levels, reduced migration, and lower HIV/AIDS prevalence.

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