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HIV/AIDS Prevention on Southern China's Road Projects: A Case of Embedded Education

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SUMMARY

This is a case study of the Asia Development Bank (ADB)-sponsored HIV/AIDS prevention program implemented at expressway construction sites in Guangxi province from 2008 to 2015. The program delivered HIV/AIDS prevention education to migrant workers working at the sites, as well as to members of the communities near the sites. An ADB technical assistance task force embedded the education in the construction company's organizational structure through the training of company managers and work team foremen. These individuals benefited directly from this training and also passed on what they had learned to the migrant workers at various different "touch points" on the construction sites: health and safety orientations, work stoppages, and after work in the dining halls where the workers ate and the dormitories where they slept.

This case begins by providing background information on the link between the spread of HIV/AIDS and road construction projects. It then provides details on how the prevention education was provided. The paper concludes with a discussion of the governance and operational challenges faced by the ADB task force and those they trained.

BACKGROUND

Roads connect us, and the transport sector is an integral aspect of any country's development, bringing goods and services and economic opportunity to local communities, even in remote areas. They can also, however, carry threats. Studies have documented, particularly in Africa, a correlation between the availability of transport and the spread of HIV/AIDS.[1]

In the mid-1990s and 2000s, policymakers, scholars, and development agencies, among many others, became concerned that economic development in Southeast Asia and Southwest China would hasten the spread of HIV/AIDS, as roads and bridges linked cities with high rates of HIV to rural areas with low rates of infection. A 2001 study, summarized in table 1 below, showed increased HIV prevalence among intravenous drug users after the completion of a number of different highway projects in Myanmar, China, and Vietnam.[2]

Table 1: HIV Prevalence Prior to and Post Construction or Improvement of Transport Corridors

Highway Routes	**HIV Prevalence Before**	**HIV Prevalence After**
Myanmar, 1997	**Injecting drug users HIV+, 1996**	**Injecting drug users HIV+, 1998**
Mandalay	51%	88%
Lashio	34%	74%
Muse	86%	92%
China, 1996	**# of HIV+ cases, 1995**	**# of HIV+ cases, 1998**
Yunnan-Nanning, Guangxi	10	525
Viet Nam, 1998	**# of HIV+ cumulative cases, 1997**	**# of HIV+ cumulative cases, 1998**
Hanoi	51–100	101–1,000
Hai Phong	0–50	101–1,000
Ho Chi Min City	>1,000	>1,000

Notes: 1996 data is in percentage and changed to cumulative case numbers for 1997 and 1998. Although the estimates might not reflect the real levels of HIV infection, the changes over time are significant. Activity for China and Myanmar is the *construction* of the road, while for Viet Nam, it describes road *improvements*.

Studies revealed two basic conditions created by road construction that contributed to the spread of HIV/AIDS:

1. The concentration of men (single and married) living away from their families at road construction sites.
2. The movement of people along new road networks.

In both cases, according to Hsu and du Guerny (2000), the spread of HIV within populations was due to the same set of activities: unprotected sex, sex with multiple partners, and sharing IV drug paraphernalia.[3] In the first case, road and infrastructure construction teams traveled from one site to the next. The combination of disposable cash, leisure time, and distance from home drew workers to commercial sex establishments. In the second case, the flow of people to and from cities alone raised the risk of HIV infection, but, more specifically, men who used the roads frequently, such as truck drivers or migrant workers, were more likely to visit commercial sex establishments and spread HIV.

In 2008, the Independent Commission on AIDS in Asia identified men who buy sex from women as "probably the most important determinant of future rates of HIV" in Asia. However, studies also showed the possible protection and empowerment that could be achieved through collaboration with sex establishments and other efforts (e.g., in Brazil, Thailand, Uganda),[4] and called for similar efforts to be adapted to other local contexts.

In China as elsewhere "the link between road construction projects and paid sex is strong. The influx of unaccompanied men to build roads contributes to an increase in paid and transactional sex—some entertainment venues we met with actually follow construction companies around from site to site."[5] In a 2003 survey done in Southwest People's Republic of China (PRC), temporary female migrants were found to be 80 times more likely than non-migrants to sell sex. Literature review shows that unprotected paid sex can drive HIV transmission along transport routes with both seasonal and long-term population mobility.[6]

According to the 2014 report of the Asia Development Bank (ADB) technical assistance team 6321-7:

By the end of 2011, an estimated 780,000 adults and children were living with HIV in the PRC. Of these, 64% were infected by sexual transmission (47% by heterosexual transmission and 17% by same sex transmission). A further 28% had been infected by injecting drugs, 7% by transfusion of contaminated blood, and 1% by mother-to-child transmission. It was estimated that 20% (156,000) of HIV cases had progressed to AIDS, with about 28,000 deaths in 2011.

The estimated number of new infections for 2011 was 48,000, with 39,183 confirmed cases. The figures reveal the growing incidence of sexual transmission, particularly among men who have sex with men (MSM). The proportion of new cases resulting from sexual transmission increased from 33% in 2006 to 76% in 2011. The proportion arising from MSM increased from 3% to 14% over the same period.[7]

As of 2010–2011, in both Guangxi and Yunnan, thousands of people had died of AIDS, and tens of thousands of people were living with HIV. Up to 1,000 new cases were being reported every month (Table 2).

Table 2. HIV Prevalence in Guangxi and Yunnan, 2010–2011

Yunnan Province:	13,118 Deaths 70,477 Living with HIV, including 22,906 Cases of people with HIV infection 4,603 Cases reported in the first 5 months of 2010
Guangxi Province:	10,858 Deaths 57,356 Living with HIV, including 17,290 Cases full-blown AIDS 6,668 Cases reported in the first 6 months of 2010 (76% sexually transmitted)

In the 1990s, many UN agencies were already actively engaged in HIV prevention work in Asia (e.g., UNESCO, UNICEF). In 1998, the United Nations Development Program (UNDP) joined its sister agencies in the fight against the spread of HIV/AIDS, approaching the issue from a development angle. To this end, the UNDP established the Southeast Asia HIV and Development Program (UNDP-SEAHIV) to focus on the link between infrastructure development and the spread of HIV/AIDS. The program involved governments of the member countries of the Association of Southeast Asian Nations (ASEAN)

and China, the Asia Development Bank (ADB) and other multi- and bi-lateral development organizations, non-governmental organizations, and the private sector. The work of UNDP-SEAHIV resulted in the creation of the UN Regional Task Force on Mobility and HIV Vulnerability Reduction (UNRTF) in 2000, which was renamed as the Joint United Nations Initiative on Migration, Health and HIV in Asia (JUNIMA Taskforce)[8] in 2009.

These programs and task forces promoted a collaborative, cross-border approach to HIV prevention in the transport sector. According to an ADB report from 2010:

> In 1999, the members of the ASEAN Task Force on AIDS endorsed the *Chiang Rai Recommendation* requiring contractors, commercial developers, and investors in major construction companies to fund HIV prevention programs in their activities as a precondition for project approval. Two years later, the Greater Mekong Subregion (GMS) countries signed the *Memorandum of Understanding for Joint Action to Reduce HIV Vulnerability Related to Population Movement* that included a commitment to allocate 1% of construction costs to fund HIV prevention initiatives—if large infrastructure projects do not adequately address HIV-related issues during project preparation, nor earmark specific funding for HIV programming. This has been popularly called the "1% clause."[9]

The ADB was an active participant in the UNDP-SEAHIV program as well as a member of the UNRTF and the JUNIMA taskforce. In a 2007 report on its strategy for HIV/AIDS prevention and treatment, ADB listed 22 HIV-related projects it had funded between 1997 and 2006. In 2005 it laid out a strategic framework for tackling HIV in Asia, which included the following activity:

> Integrate HIV/AIDS activities in ADB supported infrastructure projects. All infrastructure projects consider the HIV/AIDS risk and incorporate mitigating measures as appropriate.[10]

At the national level, China had committed politically to global AIDS prevention efforts after signing the Paris AIDS Declaration at the World AIDS Summit. In 1997, the State Planning Commission, the State Science and Technology Commission, and the Ministry of Health orchestrated the Chinese Multi-sectoral Medium-/long-term plan for AIDS Prevention and Control. With these plans, they provided guidance to national and

international partners on programs to facilitate HIV/AIDS prevention work in China, and emphasized the need to keep HIV infection low throughout China so as not to thwart China's economic development and drive towards modernity.[11] In 1998, China joined the UNDP-SEAHIV and designated representatives from the Yunnan and Guangxi offices of China's Center for Disease Control (CDC) to attend its task force meetings. China signed on to the Memorandum of Understanding (MOU) in 2001 with Cambodia, Myanmar, Thailand, Vietnam and Laos, recognizing the HIV/AIDS pandemic as a threat to human security and economic development, and pledging to heighten "all types of collaboration" to reduce HIV vulnerability for mobile populations.[12]

CASE

As early as 2005, the ADB's first HIV prevention project related to expressway construction in Yunnan Province was underway, implemented as an "operational research" project to "further the knowledge base for HIV prevention in infrastructure projects."[13] At the sixteenth International AIDS Conference in Toronto, Canada, in 2006, ADB co-signed the "Joint Initiative by Development Agencies for Infrastructure Sectors to Mitigate the Spread of HIV/AIDS" together with 6 development agencies.[14] Subsequently, ADB focused on gathering experience in strategic approaches to HIV prevention in highway construction. For example, it adopted the "settings approach" from the World Health Organization, which takes into account the environment in which people live and work to identify potential health risks and resources for managing those risks. This was also the beginning of a series of road construction projects that incorporated HIV/AIDS prevention education and spanned over a decade and across two provinces in China: Yunnan and Guangxi.

From 2005 to 2015, the ADB ran three HIV prevention projects in Yunnan and Guangxi: TA4142 Baolong Healthy and Safe Action Project, which led HIV prevention activities on the Baoshan-Longling Expressway (Western Yunnan Road Project) from 2005–2008; TA 6321-7 Special Taskforce, leading HIV prevention activities along the Baise-Longlin (Long-Bai) Expressway in Guangxi and the Wuding-Kunming (WuKun) Expressway in Yunnan from 2008–2011; and along the Longling-Ruili (Long-Rui)

Expressway, also a component of ADB TA6321-REG: HIV Prevention in the Transport Sector in Yunnan and Guangxi.

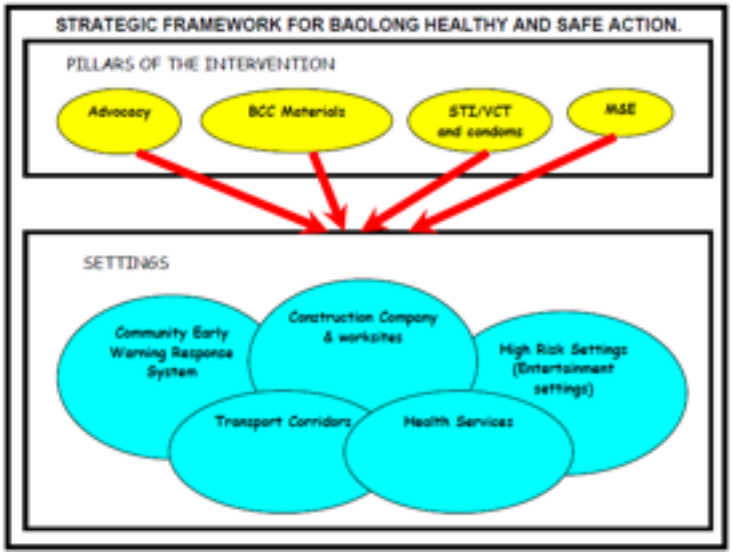
While similar in design principles, the three phases of the HIV/AIDS prevention project (corresponding to the three expressway projects) faced changes in their funding structure and the political environment in which they operated, and, as a result, differed somewhat in their approaches and experiences. This case study focuses primarily on the Guangxi Long-Bai phase of the HIV/AIDS prevention project, but also draws on data from the other phases.

Project Origins and Structure

Financed by ADB with support from the United Kingdom Department of International Development (DFID) under the Poverty Reduction Cooperation Fund (PRF), the Yunnan Baolong Highway Road Project was executed by the office of Yunnan Provincial Working Committee for HIV/AIDS Control, and implemented by Marie Stopes International Australia/China (MSIA/C) in a partnership with the Baoshan Bureau of Health, local government authorities, construction companies, and local communities.

Phase 1 in Yunnan provided valuable lessons and experiences for the Guangxi phase of the HIV prevention project. Katz presented a strategic framework that highlighted four pillars to support effective intervention: "advocacy, behavior change communication materials, access and promotion of health services and products, and rigorous monitoring and evaluation."[15]

FIGURE 1: STRATEGIC FRAMEWORK



The four pillars worked together and were applied in five different settings, which the special TA team identified and targeted: construction company and work sites, entertainment settings, transport corridors, local community settings, and health and pharmaceutical services. In addition, within the context of providing HIV prevention education at work sites, because the workforce was made up of a complex mix of workers that demanded different and targeted education, Katz recommended, for example, segmenting the construction workers on site; negotiating competing priorities (such as maximizing profits) with businesses; taking advantage of windows of opportunity for intervention within weather-and-technology-dependent projects; and clarifying concrete ways for companies to translate HIV policy into action.[16] Finally, the education materials and pedagogical practices developed for Phase 1 were adapted and used in Phase 2.

The ADB TA6321-REG: HIV Prevention in the Transport Sector in Yunnan and Guangxi was intended to mitigate transmission of HIV and other STIs in Yunnan and Guangxi Province, particularly among the construction workers and communities along the Expressway corridor. According to the TA6321-7 Final Report, the Longbai Expressway construction project ran from 2008 to 2011 and covered 177 kilometers, divided into 16 construction contracts or sections. The program had four "outputs":

- Extend existing contractor HIV/AIDS education with "value-added" activities;
- Mobilize communities to reduce threats of HIV/AIDS through "people-centered" methodologies;
- Develop measures to strengthen cross-boundary collaboration on mobility-related HIV/AIDS issues;
- Monitor and evaluate progress toward program goals.[17]

In Guangxi province, the HIV/AIDS Prevention and Action Program (HAPAP) was designed and conducted by the ADB TA 6321-7 Special Taskforce in collaboration with the PRC Government.[18] The funding for HIV prevention came from the ADB donor Grant (1% of the overall transport project funding),[19] plus a small portion of money from provincial and municipal safety management budgets.[20] The budget to carry out the HIV prevention program for Guangxi Longbai Expressway was far smaller than the $800,000 ADB provided to the first HIV prevention project in Yunnan Baolong Expressway.[21] The rationale in Phase 2 was to explore ways to institutionalize the practices developed in Phase 1 with more limited resources. For researchers and consultants leading the project, especially the TA team in Guangxi, the aim was to deliver a high-impact, cost-effective HIV education training that may appeal to transport companies to implement themselves, with a limited budget.

Design Elements

Embedded education occurs within existing relations between an organization and individuals who interact with it regularly, whether as customers, constituents, members, employees, or some other category of individual. These individuals constitute a particular set of learners, who are themselves members of a particular community.

As a result, an embedded education program pays attention to two sets of design elements: those related to the host organization or network in which the education will be embedded; and those related to the education practice itself. There are multiple individual elements within these two sets of elements. For the purposes of this case study, we will focus on the design elements related to the provision of education to construction workers, even though there were also efforts to target sex workers and residents of communities living near the road construction sites.

EXISTING RELATIONSHIPS

Road construction projects involve complex layers of contractors and sub-contractors who do the actual work. In China at the time of this case, these layers consisted of the Longbai Expressway project headquarters (LBHQ, a government entity); the contractors (mainly state-owned construction and private companies with accredited national construction qualifications that worked on each section); and construction work teams with accredited provincial construction qualifications and substantial road construction skills and experience. It was within this organizational context that the ADB Technical Assistance team sought to embed its HIV prevention education program.

As a government entity, LBHQ did not participate in the actual implementation of road construction projects. It tendered and approved the construction bidding for specific sections of the expressway, supervised the progress and quality of the construction, and monitored and controlled the flow of payments to the contractors. In addition, it managed relations with the local communities and villages impacted by the road construction (e.g., traversed land issues, relocation of communities, etc.).

LBHQ contracted with contractors who did the actual work to its specifications. For each section of the highway construction, there was a contractor that oversaw operations and production. Contractors focused on completing construction tasks on time, within budget, up to standards, and with minimum accidents or injuries.

One of LBHQ's commitments under the contract with ADB was to execute a number of training-related functions: training of managerial and administrative staff within the organization; facilitating training for the middle managers within the contracting organizations; and legitimating, mandating, and coordinating training activities to be carried out by contractors.

The contractors on each section had teams of workers. Work team leaders, or foremen, recruited workers through their own networks—often from their own community. Because they were typically trusted members of their communities who were skilled and experienced in road construction, they tended to have close relationships with the workers, with whom they shared a common dialect and culture. Further, they had considerable authority and power over their teams, as they controlled the distribution of salaries to workers.[22] Of the 80,000 employees on the Guangxi-Longbai Expressway

project, 97% were migrants, 37% came from outside of Guangxi, and 86% migrated alone. Almost all the employees were men with low levels of education.[23]

There were 16 construction sites along the Guangxi-Longbai Expressway. In addition to the usual company offices you would expect on a construction site, the sites also included dining halls and dormitories to feed and house the workers. As we will describe below, these spaces proved to be an important resource in the HIV prevention education of the workers.

EMBEDDED EDUCATION PRACTICE

Content, Learning Objectives, and Anticipated Change

Embedded education requires the training of non-educators to deliver the relevant content and tools. This essential component of any EE program calls for the development of a specific curriculum that will appeal to the frontline personnel who can and will deliver the educational messages effectively.

The TA taskforce had the following goals in mind:

- Improve HIV/AIDS knowledge on the part of contractors, managers, and workers;
- Mobilize communities to reduce threats of HIV/AIDS;
- Increase safe sex behaviors among migrant and local construction workers, migrant sex workers, and local communities (e.g., local women trying to have a relationship with migrant workers in order to "marry out");
- Improve workers' willingness to share their concerns and questions on HIV issues and safe sex behaviors, and encourage them to get tested and consult with educators.[24]

Pedagogy, Tools, and Activities

To raise awareness of the risks of unsafe sexual activity, change attitudes about condoms, and encourage behavioral change, the program taught the basics of HIV/AIDS transmission and progress, offered tools and knowledge for prevention and self-protection, and directed workers toward resources for HIV/AIDS testing and support. The goal was to ensure that road construction employees would become healthy and responsible community members who wore condoms correctly when having sex.

The site educators were provided a manual, *Health and Safety with Me: Peer Education Manual for Construction Workers*. Content was organized into a structured curriculum with sub-topics and modules that broke down topics into learning sessions, each of which included specific tools and activities that could be used as the basis for discussion (see appendix for outline of curriculum).

Materials were developed at the request of site educators (e.g., foremen, safety officers, etc.) and contained a range of training exercises on HIV/AIDS, suitable for the construction site context. This included a DVD with several videos, as well as instructions for the educators on how to draw out discussion based on the content of the videos. These materials were field-tested before being finalized, both by sending draft copies to sites for provisional use and by the use of exercises in trainings run by the TA team, and some refinements and clarifications were made prior to finalization. Trainers were also instructed to give pre- and post-training tests to the workers for comparison of results.

Members of the TA taskforce commented on how safety officers and foremen creatively used time on sites to provide education. Management teams offered training on HIV/AIDS prevention during worker orientations or introduction ceremonies. Such meetings were typically organized by TA taskforce and local government officers. Then, foremen and safety officers—as trainers on site—used lunch, breaks, and other leisure times to engage workers with interactive tools and activities and test their knowledge (see appendix for examples). Each safety officer or foreman was expected to reach about 10–20 workers.

Educators and Training of Trainers

The TA team's initial idea was to use site laborers to provide education to their peers but there were immediate problems with turnover rates; within three months, many of those initially trained had left the worksites. At this point it was the companies themselves who identified health and safety officers and other management-level staff as channels for providing workers with HIV prevention education. Those staff were also trained as master trainers to provide training to team foremen, who acted as primary educators of the workers. The companies believed the trust and respect foremen enjoyed from workers as well as their powerful position as disbursers of salaries

would make them more effective providers of health knowledge and skills than professional trainers or peers, who had varying levels of literacy. As a result, the workers were exposed to education from both management-level staff and foremen.

In order to prepare the management-level staff, the team originally brought in CDC and healthcare professionals to provide training on HIV prevention, but the managers did not enjoy the lectures full of difficult medical jargon that these professionals delivered. As a result, the TA team developed interactive training methods that engaged the management-level staff in ways that better facilitated their learning and modeled how they should provide training to the foremen and workers at the construction sites.

The training began with a two-day intensive workshop for upper and middle managers (master trainers). At the end of the training session, each participant gave presentations to their peers, who then provided evaluations and feedback. Repeated rehearsals of how to train the next tier of trainers were conducted. Written examinations were carried out for the master trainers to consolidate their knowledge of HIV prevention.[25] All site contractors formed teams of HIV prevention trainers led by master trainers. The HIV prevention teams were responsible for developing and implementing programs that involved different training activities, such as HIV training at orientation, health talks during regular meetings, and peer education at leisure times. Additionally, they were responsible for making promotional materials visible and condoms available (TA6321-7). These teams reported the number and type of activities performed to ADB.

One of our interviewees said:

> HIV prevention training . . . started from the top. The general managers, middle level managers will all participate in the training. Our slogan is Not to Miss Any Single Employee. We have first tier, second tier sometimes third tier trainings, because we need to reach thousands of workers in a short time span. Training the top management team will ensure our training work to be supported by road construction management. And training the tiers of trainers will enable the trainers to cover a big population of workers within a constrained time limit.[26]

This "cascade training" approach was implemented in a variety of settings, depending on the roles of the learners. Most training activities took place at the Expressway's 16 construction sites. Trainings of master trainers were conducted by

the TA team, with involvement of a CDC staff member, at a hotel, in the meeting rooms of local command offices (city/provincial level office in Nanning, and county/section level offices on sites), and in road construction company offices. Trainings of trainers (led by master trainers) took place at construction sites.[27] Worker trainings, involving more interactive and peer-to-peer activities, took place at construction sites and in dorms and dining halls. The training of master trainers and training of trainers took place in more public settings. The education of workers took place in more private settings, which allowed workers to feel comfortable in sharing information, knowledge, ideas, and skills, which in turn made the education more effective.

FIGURE 2: CASCADE TRAINING FOR ROAD CONSTRUCTION WORKERS

Note: There was a parallel CDC training process for HIV/AIDS prevention education whereby CDC health experts provided training to local CDC officers and village doctors in the community. It was largely through this process that the CDC provided education to members of local communities along the Expressway construction. The focus of this case is on the education provided to migrant workers on the construction sites.

TA team members observed a cross-section of training of trainer sessions and direct training with workers and provided feedback, which was also distributed to other sites. Both managers and workers responded more favorably to trainers who used interactive teaching methods. Observing the lack of engagement when trainees sat in lectures, TA taskforce specialists occasionally took over training sessions, engaging workers in games, role-playing, and demonstrations of how to use different contraceptives. The trainees became much more enthusiastic and willing to learn, which

produced better learning results and helped build confidence among the trainers that the previously unfamiliar participatory approaches were more effective.

SUMMARY

The design elements of the ADB's embedded education programs on road construction sites in China are summarized in the table below:

Table 3: Design Elements

Element	Description
Existing Relationships	
Host	Road construction companies, their sub-contractors, and work teams
Encounter	Health and safety training at start of employment (through a specially designed DVD), on-site education during lunch breaks and other work breaks, after work conversations with peers and team leaders in dining halls and dorms
Target individuals	Road construction employees: managers, administrative staff, skilled and front-line workers
Community	Construction sites, entertainment establishments, local communities along the expressway, home communities of migrant road construction employees
Embedded Education Practice	
Content	Information on HIV/AIDS prevention (e.g., condom use, safe sex, other self-protection skills)
Learning objectives	Improved knowledge and skills for better health
Anticipated change	More conscientious behaviors with respect to safe sex, increased use of condoms and HIV testing with the goal of eliminating the spread of HIV/AIDS
Pedagogy	Peer to peer education, trusted supervisor education (provided by work team foremen), participatory/interactive training, reinforcement through repetitive group discussion, multi-angle communication (receiving information from trainers as well as through informal discussions with peers)
Tools	Small group and individual education: playing cards with HIV/AIDS information, posters with messages specifically targeted at construction workers, illustration books/cards (pictures + simple text in Chinese + trainers' explanations in local dialects), illustrative tools for sex behaviors, condoms, DVDs, training manuals. Large group education: Films, movie clips, presentations, brochures, posters, tool bags
Activities	Educational films during worker orientations, role play and games, casual discussion
Educator	Master trainers: road project managers, company health officers, safety officers Trainers: work team foremen, selected construction workers, local NGO workers

Impact

Guangxi Academy of Social Sciences was hired to conduct research that was intended to provide an independent evaluation of the program, using the basic logical framework presented below.

Table 4: Project Logical Framework

Inputs	Activities	Outputs	Short-term outcomes (knowledge change)	Medium-term outcomes (behavioral change)	Long-term outcomes (changes in well-being)
• 1% Safety budget • Human resources • ADB-developed curriculum • Construction team resource and time commitments	• Training of trainers • Peer-to-peer training	• Number of master trainers trained • Number of workers trained • Number of pre- and post-surveys conducted	• Workers show an increased knowledge of HIV prevention	• Workers report increased use of condoms and other safe sex practices	• HIV rates decline amongst workers • Workers show increased agency over their lives

The ADB TA team implemented the program in all 16 sections of the expressway by mandating HIV/AIDS training into the safety induction training for all workers before they start work on construction sites. The team reached 100% of staff in three sections and 80% in others. Relevant HIV topics were included in 80% of the safety meetings, and through the managers and the foremen trained, they reached almost all 80,000 construction workers.[28] Two levels of changes were observed among those receiving the education:

Table 5: Knowledge Change of Three Methods of HIV Transmission

	Management Officers		Foremen		Workers	
Management Officers	Percentage	Sample	Percentage	Sample	Percentage	Sample
Pre Onsite Training	81%	237	57%	26	73%	245
Post Onsite Training	98%	165	100%	29	97%	278
Percentage Change	17%		43%		25%	

Note: ADB Survey Data 2008-2011, as cited in "Guidelines for undertaking HIV/AIDS Prevention work on construction sites—based on the successful model of Guangxi Longlin-Baise Expressway in China," 2010.

Table 6: Behavior Change: Condom Use

	Pre-intervention		Post-intervention		
Management Officers	Percentage	Sample	Percentage	Sample	Percentage Change
Sometimes	39%	67	41%	68	2
Everytime	31%	67	51%	68	20
Never	34%	58	9%	57	-25

The TA project was characterized by strong engagement on the part of the construction companies involved, with numerous examples of companies undertaking work beyond their contractual responsibilities, which lent evidence that interventions were creating positive changes in behavior. Moreover, no cases of HIV or sexually transmitted infections were identified in the small testing sample of workers involved in the project.[29] This was significant in view of the fact that seven sex workers in Baise tested positive for HIV early in the project and all reported having construction workers as clients.

DISCUSSION

Stakeholder Analysis

The project harnessed the collaborative efforts of multiple stakeholders including all the entities who participated in developing, implementing, and funding the program: the ADB; NGOs and consultants; public officials at different levels of government; private construction companies and their sub-contractors and employees; sex workers; members of the local communities; and members of migrant workers' home communities.

The ADB, with its stated goal of promoting "social and economic development" in Asia and clear focus on HIV/AIDS prevention, engaged other stakeholders in adopting and implementing HIV programs through funding and technical assistance. Specifically, Katz notes:

> Infrastructure development, particularly the construction of highways is one of the most important lending priorities of the ADB and hence ADB has a special interest and responsibility in mitigating the risks of HIV in infrastructure projects. It is therefore a strategic priority for the ADB to address HIV associated with the development of transport corridors and infrastructure projects.[30]

The middle managers (safety officers, budget officers, etc.) of each section, and work team leaders acted as primary educators in the program. They were a relatively stable fixture on the construction teams who retained the institutional knowledge of health and safety information and were viewed by other stakeholders as trustworthy

individuals. It was through their support and actions that the program was able to reach the many workers on the various construction sites.

The construction workers themselves were stakeholders who had an interest in staying healthy, employed, and safe. They had relatively little *formal* power compared to their employers, but the success of the program relied on their willingness and ability to learn and act on what they learned.

At the global level, the central government had been politically committed to the international AIDS prevention efforts since the 1990s, and organized a medium- and long-term plan for AIDS prevention and control at the state level, giving local governments autonomy in creating and adapting their own plans. While the central government's priority remained boosting the economy and retaining social order, it was aware that an HIV/AIDS pandemic would disrupt the economy and deter potential investors. At the turn of the century, when the number of HIV positive cases rose sharply, the central government was keen to establish rapport with China's neighboring countries, and was compelled to accommodate assistance from international entities to ensure the success of the country's development.

Bureaucratic legitimacy and support for the program came from the Guangxi Department of Transportation (GDT). Per the Memorandum of Understanding of the Chiang Mai Agreement, for ADB to give out loans for transport, the GDT had to include HIV prevention as part of safety measures for road construction companies. Thus the road construction companies, working on the expressway on different sections, were also directly hosting the EE practice.

The National Center for Disease Control (CDC), municipal CDCs, the Department of Public Health (DPH), and local city/county/village-level government/offices and village clinics and entertainment sites (e.g., hair salons, massage parlors, Karaoke bars) all played some role in the delivery system, whether by providing service support (local government), issuing certified clinic licenses (CDC and DPH), training doctors and master trainers (CDC), and providing medical care and health services (local clinics).

Individuals within the municipal governments who had the capacity to be key influencers were themselves powerful stakeholders. While there was no apparent systematic interest, they were concerned about their region's HIV/AIDS vulnerability and the continued social and economic development in their jurisdictions.

The users of the roads are also stakeholders with an interest in the quality and cost of the highways. The communities and families of the construction workers, especially the women in their lives, were also stakeholders with an interest in not only having the workers earn a stable income for, but also their own wellbeing.

For the program to succeed, ADB and the TA taskforce had to align the varied interests of stakeholders at and across three different levels: inter-organizational level, intra-organizational, and end recipient. It needed to rally the political legitimacy as well as the construction companies' cooperation to bring an HIV/AIDS prevention program into the construction sites. It then had to negotiate with middle managers and foremen to use time and space during and after work for the education of both foremen and workers. Finally, it had to engage the foremen and their workers not only to learn but to act on what they learned.

Governance Challenges

Developing, testing and fine-tuning a theory of change. People close to the project pointed out that it was very difficult to assess and evaluate the outcome/performance of the intervention in a systematic manner. The pre- and post-intervention surveys had small sample sizes, and it was difficult to get people to answer questions about their sexual behavior given the sensitivity of the topic. Even evaluating the training was difficult because once the work was done, people left, and sites dispersed. Often only anecdotal data were available to evaluate performance.

Developing and communicating a compelling value proposition. Construction companies often failed to see how the project could boost profits, and were thus unwilling to cooperate without the government's urging. Construction company leaders were skeptical of a program that involved disrupting work at the cost of money and time. Government departments, such as LBHQ, played an important supportive role in urging the contractors to attend the sessions.[31] The ADB TA team also chose to educate the senior leaders of the construction office first to ensure they understood the benefits of the program. Once top managers were on board, lower-level offices and companies were more likely to get involved to promote the programs. It also helped to point out that on-site training could take place on rainy days when work could not proceed.

Navigating national, provincial, and local government priorities and concerns. China's role in SEAHIV and the task forces that followed it was, nominally, an initiative of the national CDC. But the country's actual participation in these task forces was left to representatives from provincial CDC offices. However, the involvement of provincial officials from the CDC did not translate into immediate cooperation from the Guangxi Department of Transportation, for whom HIV/AIDS prevention was something very new. Why would HIV prevention be relevant to a road construction project? It took some time for members of the department to understand and acknowledge the importance of HIV/AIDS prevention. Additionally, it took some effort to get the relevant officials to realize that there actually was a preexisting agreement signed by the government, and that to receive funding from ADB for the expressway project, 1% of the budget should be set aside for HIV education.[32]

Institutionalizing the practice and making it sustainable. Since the implementation of the HIV prevention project in Yunnan and Guangxi, China has made it compulsory to include a clause in all expressway construction contracts stating that the construction companies will provide HIV prevention education. However, it is unclear whether that policy has been applied consistently or is sustainable. As one interviewee that worked on the Longrui Expressway in Yunan commented:

> We were only commissioned for this expressway construction. When the road construction was completed and the road was open for operation, our mission was done. It was program based, but I wish that the government would carry on and continue the program on other road construction works. Our expertise and resources would be definitely needed. The programs carried out in collaboration with international consultants seemed to be well managed and more effective.

One of the government officials did express that the government hoped that international organizations would continue to support such projects both technically and financially.

Operational Challenges

Finding space and time. On the construction sites, the construction teams were often pressed for time in trying to meet construction deadlines, and implementing programs

often disrupted production. Further, workers were often too tired to pay attention to the training.

Finding the right mix of educational tools and strategies. The tools and ADB programming materials (mostly adapted from international NGOs) needed to be updated and adapted to the needs and interests of Chinese construction workers.[33] The most popular materials were those items like playing cards and calendars that workers used routinely, printed in both Chinese and languages from bordering countries when applicable. Doctors offering training were thought to be too academic. Educators needed to be approachable and trustworthy to the workers.

Retaining employees for peer education to make the practice sustainable. Despite the relative stability of foremen, high worker turnover continued to pose challenges in evaluation, getting constructive feedback, or ensuring the sustainability of the program.

Creating trust, a sense of urgency, and incentives. Project leaders stated that it was difficult to explain to construction company managers why HIV education mattered to the workers and managers. It also took much time and effort to gradually reduce workers' sense of shame in discussing HIV issues with peers and trainers. Giving future-oriented incentives as a way to initiate conversations with workers, such as encouraging them to imagine the well-being of themselves and happiness of their family in the future, helped motivate workers to participate in the learning process.

Obtaining hard data to confirm the behavioral changes. Marshall & Fu discussed the difficulties in obtaining hard data. One interviewee who served as a researcher on the project described the challenge of behavioral change measurement:

> We conducted surveys in order to evaluate the possible changes in knowledge and hence the changes in behavior. Apart from baseline and end-line surveys, which were helpful, we could hardly find evidence that they did or did not change their behaviors. It was subtle and sensitive. It was almost impossible to ask a manager or worker when he last had sex and whether or not he wore a condom. We also did not know when responses to the questionnaires were true or half-true or not true at all. This is a real challenge. We took about 800 blood tests with

zero positive cases. It is clearly not sufficient only to test this one time-point. We needed to do it periodically in order to be scientifically accurate. But in reality, it is very difficult to do that.[34]

Negotiating with middle management. This was a delicate process to manage. A member of the TA team referred to the middle management as the "gatekeepers," who needed to be open-minded enough to entertain the implementation of the program when approached by the team. While there may have been a mandate from the top to implement the HIV/AIDS program, engagement often posed as a challenge. TA team members had to engage actively with the "gatekeepers" (safety officers, budget officers, human resources, etc.) to make sure that they fully understood that the TA team's goal was to help them achieve healthier, happier, and safer workplaces that would yield benefits to them in the long run in terms of productivity and sustainability.

APPENDIX

Method

Our study uses a multiple-case replication design, within which we investigate our topic of interest through in-depth research and analysis of multiple cases. Robert Yin notes that the "distinctive need for case study research arises out of the desire to understand complex social phenomena."[35] Embedded education is a complex phenomenon that includes multiple actors whose activities and frames of reference are shaped by both highly formal organizational systems and informal community norms. As such, we decided to use the case study method to ensure that we captured the rich complexity of the phenomenon. This is especially important because though there are many examples of embedded education from around the world, the research work we conducted was one of the first, if not the first, to explicitly focus on it as a phenomenon worthy of study in its own right.

We chose to study multiple cases to enable us to gather as much information about the phenomenon as possible. Using a literal replication strategy, we selected two cases in China, one in the U.S.A., and one in the Netherlands that we believed

were exemplars of embedded education in that the programs were clearly embedded in an existing system and were explicitly focused on educating a group of learners.[36] For the Chinese cases, two researchers—both fluent in Mandarin and English—first identified a pool of 18 cases that fit the working definition of embedded education. Subsequently, a subset of the research team developed a coding framework to operationalize the variables of *embeddedness* and *educational* according to our theoretical understanding of those concepts, and for the evaluation of the existing 18 cases. Using this coding framework and after intensive discussions the team created a list of exemplary cases, from which contacts were made by the bilingual team members to verify the existence of the programs and the accuracy of the descriptions in the secondary literature on which the team had relied for its coding. Based on these contacts we were able to confirm two cases based in China that would serve as the "extreme" cases to further our inquiry.

To explore how innovations happen in service delivery, our design encompasses multiple units of analysis, including service encounters, individual participants, communities, organizations, and inter-organizational relationships. For service *encounters,* we are concerned with the important variables to consider in designing a meaningful educational encounter as well as the challenges in doing so. For individual *participants,* we seek to identify evidence to show changes in knowledge, behavior, and overall wellbeing amongst the participants, with special attention paid to whether the design is concerned with the acquisition of critical thinking skills and personal empowerment. In a similar way, our focus on *communities* calls for attention to whether there is any demonstrated impact on the communities in which the participants live and work, and how effects are transmitted from individual to community. Our focus on *organizations* looks at their motivations for getting involved in the projects, and whether there is any evidence that embedded education has a positive impact on the operations of the host organization(s). Finally, our focus on inter-organizational relationships begins with an understanding that embedded education demands the (disruptive) integration of the intervention/program into the existing operations of a host organization. With this in mind, our focus is on the challenges of making such integration work, especially given that there are normally multiple organizations involved. More generally, we expect the research to yield insights into cross-sector collaboration and identify

whether embedded education creates the opportunity for the integration of other social interventions into the operations of existing delivery systems.

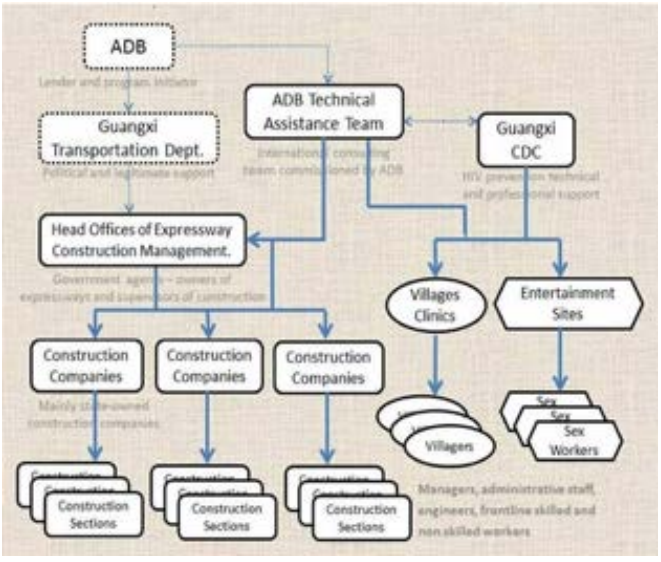
Our data collection relies heavily on information from individual interviewees at the organizations, but it also taps into a number of other data sources including public records, published reports, media materials, internal reports, and standardized curriculums for triangulation.

Data Sources

This paper draws from two sets of sources. The primary sources were interviews with key personnel in local CDCs in China, ADB officers and consultants, Marie-Stopes consultants, and officers affiliated with the UN. The secondary sources were reports and other publications and materials we collected in the field from research participants.

Project Structure

The chart below illustrates the delivery of embedded education in HIV prevention for road construction crews. Knowledge is disseminated in a top-down fashion with collaborations among ADB technical assistance teams, government agencies, construction companies, and local communities. ADB and the Transportation Department of Guangxi, shown in dotted boxes, are not themselves parts of the delivery system but are the originating agencies.



Pedagogical Tools

During social activities at worksites, trained foremen used specially designed playing cards as an interactive tool to engage with their team members on HIV/AIDS information, prevention strategies, and access to health services. During social time, foremen drew workers into poker games; using them as an access point, talking to workers as peers about future planning, family lives, and educating workers on how the disease spreads and ways to prevent and/or treat it.

- Tools (interactive, peer to peer, small group): Poker, billboards, illustrated books and cards (pictures with simple text), illustrative tools for sex behaviors, condoms
- Tools (mass trainings): Films, presentations, brochures, posters, tool bags

Health and Safety with Me: Peer Education Manual for Construction Workers	
Section 1: Guide to manual	1.1 What is peer education?
	1.2 Introduction of the manual
	1.3 Tips for trainers
Section 2: Basic information on HIV	2.1 What is HIV/AIDS?
	2.2 How is HIV transmitted?
	2.3 How is HIV/AIDS prevented?
	2.4 HIV/AIDS situation
Section 3: Starting a training	3.1 Introductions
	3.2 Making training rules
	3.3 Hopes, fears, and expectations
Section 4: Information on HIV and STIs	4.1 HIV/AIDS: Desensitization of sexual topics
	4.2 HIV/AIDS: Game of disease
	4.3 HIV/AIDS: Game of risky behaviors
	4.4 STIs: Game of answers
Section 5: Condoms	5.1 Condom game
	5.2 Alcohol and condoms — condom relay race
	5.3 Why people don't like to use condoms and the consequences of not using condoms — group discussion and role play
Section 6: Values, peer pressure, and drugs	6.1 Discussion of values
	6.2 Role play: How to deal with peer pressure
	6.3 Drugs: Group discussion
Section 7: HIV/AIDS prevention, starting with myself	7.1 Live and let live: Group discussion
	7.2 Make safe strategies for yourself

EXAMPLE OF GAME

In one of the popular games played during trainings, 8 glasses were filled with a clear liquid. Seven contained water. The eighth contained a substance that reacted to a particular solvent. When trainers added the solvent to all eight glasses, one turned purple. Eight glasses of clear liquid (seven water and one not) were then distributed to 8 trainees, who were instructed to mix their glasses with any three of the other seven. When the solvent was added to the glasses after mixing, all eight glasses turned purple. Trainers explained that casual sex without protection could quickly and exponentially spread an infection (represented by the non-water liquid). It begins with one infection, spreads to a second in the first mixture, infects four in the second mixture, eight in the third, then 16, 32, 64, and so on. "The trainees were stunned," said an interviewee. "This game had a huge impact on people's understanding of infection."[37]

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18. Interview notes, 10/2015.
19. This rule was established with the Chiang Rai Recommendation in 1999. In reality, this rule was loosely enforced and the actual expenses spent on HIV/AIDS prevention work may be less.
20. Interview notes, 10/2015.
21. Interview notes, 10/2015.
22. Interviews with respondents 1, 2, & 4, 10/2015.

23. According to Marshall (2014), two percent of the migrant workers were women, 46% of the workers were married, 92% were between 26 and 40 years of age, and 48.1% had an education level below 9th grade.
24. NOTE MISSING
25. Interview with respondents 1 & 2, October 2015.
26. Interview with respondent 3, October 2015.
27. We were not able to interview master trainers, so it is uncertain where precisely at the sites these trainings took place.
28. Marshall & Fu, 2014.
29. Ibid.
30. Katz, 2007, p. 2.
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36. A literal replication strategy is one that presumes the cases selected will yield similar results thus serving to confirm each other, according to Yin (p. 57).
37. Interview notes, 10/2015.

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