

Original  
articleWillingness to participate in HIV-1 vaccine trials  
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**Objectives:** Willingness to participate in HIV-1 vaccine trials and associated factors were investigated in a sample of 2670 Royal Thai Army conscripted recruits.

**Methods:** Self administered questionnaires were used. Data were collected during the final visit of a longitudinal cohort study of HIV-1 epidemiology. Cross sectional analysis of data from this visit was performed.

**Results:** 32% of the respondents reported they would “definitely” join an HIV-1 vaccine trial. Greater willingness was associated with perceived risk of HIV-1 infection and a desire to help Thai society, although tangible incentives and intentions to reduce condom use in a vaccine trial also were associated with increased willingness. Concerns about physical harm and anticipated social pressure from family not to join were the most substantial impediments to willingness. Concerns about “social harm” (for example, participation would give appearance of having AIDS virus, a partner might refuse sex) also appeared to inhibit interest in joining trials and approached significance.

**Conclusions:** Willingness to participate was somewhat greater than in other investigations of non-injection drug user (IDU) cohorts in Thailand, with fewer concerns expressed about physical harm. Motivations appear to involve tradeoffs among perceived risk, anticipated social pressure, altruism, and tangible rewards. The absence of significant problems associated with vaccine trials to date, along with the presence of educational interventions in the study may help explain the lower level of concerns here relative to other Thai studies.

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Keywords: HIV; vaccine; Thailand

## Introduction

A growing body of literature has investigated willingness to participate in preventive HIV-1 vaccine trials.<sup>1–10</sup> Besides providing estimates of interest, assessing willingness may identify conditions which foster or inhibit the motivation to join trials, as well as identify important population differences. Thailand is one of several countries where preparations for HIV-1 vaccine efficacy trials have been under way and a number of studies of willingness to participate in trials have taken place. One study in Thailand, conducted with medical centre employees who had received an informational briefing about a proposed trial, found that only 6.3% were willing to take part, although 40.4% reported at least some interest in joining.<sup>6</sup> Subsequent studies have found that 25–51% of participants would definitely join such a trial.<sup>2,3,8</sup> Unlike the medical centre study, these other investigations were epidemiological cohort investigations of HIV-1 incidence to evaluate the feasibility of HIV-1 vaccine trials and were conducted in populations believed to be at elevated risk. Seroprevalence in these investigations varied from 2.5% to 38.3% and incidence ranged from 0.0/100 person years to 8.1/100 person years.<sup>3,8,11</sup> With one exception,<sup>8</sup> participants in these studies did not receive vaccine trial education before their willingness was assessed. Regardless of the population studied in Thailand, concerns about vaccine product safety and “social harm” (for example, participation would give appearance of having AIDS virus, a partner might refuse sex) have

emerged as significant barriers to joining trials.<sup>2,3,6,8</sup>

Several questions about willingness to participate emerge from reviewing previous studies from Thailand. Both the highest and lowest levels of willingness occurred where education was provided and self administered questionnaires were used<sup>6,8</sup>; however, the sample with the lowest willingness was drawn from a population not considered to be at elevated HIV-1 risk.<sup>6</sup> The greatest willingness occurred in a sample of in-treatment injection drug users (IDU) who had stable prevalence levels of over 30%.<sup>8</sup> Hence, it is unclear whether population characteristics matter as much as data collection methodology or education concerning vaccine trials.

The present investigation evaluated willingness to participate in HIV-1 preventive vaccine trials using a self administered questionnaire in Royal Thai Army (RTA) recruits. These young Thai men were participants in a longitudinal epidemiological cohort study of HIV-1 incidence. General information about HIV-1 vaccines was provided as part of didactic and small group behavioural interventions. In addition, the investigation assessed risk relevant behaviour, HIV-1 knowledge, and attitudes regarding HIV-1 prevention practices, factors which have not been assessed in most previous investigations of willingness in Thailand or elsewhere

## Methods

## PARTICIPANTS

A total of 2674 HIV-1 seronegative RTA conscripted soldiers participated in the assess-

ment of willingness to participate in vaccine trials, as part of a 2 year study of HIV-1 incidence. The sample included three consecutive cohorts of soldiers who had entered the RTA in November 1994, May 1995, and November 1995.<sup>12</sup> Assessments occurred between October 1996 and October 1997, during each cohort's final data collection. The study was part of a research protocol that had been reviewed and approved by institutional review boards at the US Army Medical Research and Materiel Command and the Royal Thai Army Medical Department. Written informed consent was given before data collection took place at each visit during the incidence study. All participants had received general education about HIV-1 vaccine trials during a programme of educational and behavioural interventions for HIV-1 prevention. Topics included mechanisms of vaccine action, HIV-1 vaccines currently under study, guidelines for the conduct of HIV-1 vaccine trials in Thailand, and limitations of vaccine trial participation (for example, absence of assured protection, potential for social harm due to vaccine induced seropositivity).

Two instructional formats were used. One unit, which included approximately 40% of the sample, received large group didactic sessions (five sessions of about 2 hours each that included audiovisuals, discussion, and group exercises, but devoted substantial amounts of time to lectures; these sessions were facilitated by professional HIV researchers and health educators). The remainder received instruction in small groups based on a model developed with RTA conscripted recruits in northern Thailand,<sup>13</sup> conducted by paraprofessionals (medics, chaplains, squad leaders) who had been trained to deliver this information by the study staff and provided with health education materials. The small group format included five monthly themes (which paralleled the didactic content). The themes provided the basic content for the paraprofessionals' activities (for example, medics would discuss medical aspects of risk, chaplains would address Buddhist teaching relevant to risk, etc).

Table 1 Univariate analysis of sociodemographic characteristics and willingness to join an HIV vaccine trial (n=2674; overall, 32.0% were "definitely willing to join" a vaccine trial)

	"Definitely willing to join"		OR	95% CI	p Value
	No	%			
Age at induction					
22–29 years (n=169)	55	32.5	1.03	0.82–1.29	0.87
21 years (n=2498)	797	31.9	1.00		
Age at 1st sex					
≤15 years (n=626)	206	32.9	1.04	0.92–1.19	0.53
>15 years (n=2002)	633	31.6	1.00		
Educational attainment					
Primary school or less (n=2015)	681	33.8	1.28	1.11–1.48	<0.001
Secondary or vocational school (n=652)	172	26.4	1.00		
Marital status at induction					
Single (n=2005)	639	31.9	0.99	0.87–1.13	0.89
Married (n=661)	213	32.2	1.00		
Domicile—during 2 years before induction					
Urban (n=1053)	302	28.7	0.84	0.75–0.94	0.003
Rural (n=1609)	558	34.2	1.00		
Region of residence—during 2 years before induction					
North east (n=1184)	446	37.7	1.37	1.23–1.53	<0.001
Other regions (n=1480)	406	27.4	1.00		

#### MEASURES (QUESTIONNAIRE INSTRUMENT)

Participants completed a self administered questionnaire proctored by a civilian research staff. Questionnaire items included frequencies of different partner types, patterns of recent commercial sex worker (CSW) patronage, perceived HIV-1 risk, attitudes and opinions regarding condom use, HIV-1 transmission knowledge, willingness to participate in HIV-1 vaccine trials, concerns regarding trial participation (that is, side effects, social discrimination, family pressure; see table 2), and opinions regarding possible incentives for vaccine trial participation (for example, monetary reimbursement, insurance, social recognition; see table 2). Items were administered in Thai and had been developed through pretesting with RTA recruits.

#### DATA ANALYSIS

Data analysis utilised SPSS 7.5 for Windows (SPSS, Inc, Chicago, IL, USA). The Kuder-Richardson 20 coefficient (KR20)<sup>14</sup> was used to compute the internal consistency of responses, where data reduction through additive scaling was performed.  $\chi^2$  Analyses were used to investigate bivariate relations among nominal measures. Univariate odds ratios and 95% confidence intervals were used to evaluate correlates of willingness to participate in trials. A multivariate logistic regression model of willingness to participate was constructed from variables that were significantly associated with willingness in the univariate analysis.

## Results

#### SAMPLE CHARACTERISTICS

At entry into the RTA (2 years before data collection), the study participants had been predominantly 21 years old (93.7%), single (75.2%), and had the national norm of 6 years or less of education (75.6%). Most (60.4%) had been living in rural areas before joining the military. Nearly half had been living in northeastern Thailand before entering the military, while one quarter had been living in the Greater Bangkok area, and the remainder had resided in the lower central or upper south regions. The sample available for analysis included 70.9% of those who had participated in the incidence study at baseline. This proportional loss to follow up was similar to that found in other research with RTA recruits<sup>15</sup> and occurred for similar reasons (for example, reassignment after initial basic training). The sample available for follow up did not significantly differ from the rest of the cohort in terms of key baseline variables (that is, sociodemographics, age at first sex, CSW experience, condom use, IDU experience, alcohol use). HIV-1 prevalence in the initial sample was 1.8%, while incidence was 0.46/100 person years in those available for follow up.

#### WILLINGNESS TO PARTICIPATE IN VACCINE TRIALS

Overall, 32.0% indicated they would "definitely" be willing to join an HIV-1 vaccine trial. Another 12.9% said they were "very likely" to join and 45.0% said they might join. In

Table 2 Frequencies of endorsement: concerns about participating in an HIV vaccine trial and possible incentives (n=2674)

	Yes	No	Not sure
<b>Concerns:</b>			
<b>Physical harm index items:</b>			
Side effects from vaccine injections	20.8%	31.6%	47.5%
Long term side effects	18.0%	33.7%	48.3%
Getting AIDS from the vaccine	13.9%	48.5%	37.6%
Handicap or death from the vaccine	13.0%	52.9%	34.1%
Becoming sick sooner if I ever get AIDS virus	17.6%	47.2%	35.2%
AIDS vaccine might contain AIDS virus	11.3%	52.3%	36.3%
<b>Social harm index items:</b>			
Taking part may be seen as having AIDS	15.1%	56.1%	28.9%
Wife/partner might refuse sexual relations	15.3%	50.2%	34.5%
<b>Other concerns (not included in indices):</b>			
My family may not want me to take part	15.3%	52.5%	32.2%
Having to sign a consent form	9.8%	63.6%	26.6%
Time necessary to be in a medical study	9.5%	67.1%	23.4%
<b>Incentives:</b>			
<b>Tangible incentives:</b>			
Lump sum payment (5000 baht cash)*	6.1%	67.8%	26.3%
Health insurance for 5 years	27.8%	39.3%	32.9%
Medical care for 5 years	31.8%	35.2%	33.0%
Reimbursement for travel to vaccine clinic	15.7%	50.9%	33.4%
Recognition from family or friends	39.4%	28.0%	32.6%
<b>Other incentives:</b>			
Knowing you help Thai society	43.2%	28.6%	28.2%
Would not want any incentive	45.4%	22.4%	32.2%

\*\$200 at the time of data collection; approximately 150% of the minimum wage for 1 month, for those living outside of Bangkok (125% of the Bangkok minimum wage).

Table 3 Univariate analysis of incentives and concerns associated with willingness to join an HIV vaccine trial (n=2674)

	"Definitely willing to join"		OR	95% CI	p Value
	No	%			
<b>Physical harm concerns (composite)</b>					
1+ endorsements (yes/not sure) (n=2171)	623	28.7	0.62	0.55–0.70	<0.001
None (n=503)	233	46.3	1.00		
<b>Social harm concerns (composite)</b>					
1+ endorsements (yes/not sure) (n=1550)	400	25.8	0.64	0.57–0.71	<0.001
None (n=1124)	457	40.7	1.00		
<b>Time necessary to be in a medical study</b>					
Yes/not sure (n=880)	198	22.5	0.61	0.53–0.70	<0.001
No (n=1794)	658	36.7	1.00		
<b>Having to sign a consent form</b>					
Yes/not sure (n=973)	225	23.1	0.62	0.55–0.71	<0.001
No (n=1701)	633	37.2	1.00		
<b>My family may not want me to take part</b>					
Yes/not sure (n=1267)	276	21.8	0.53	0.47–0.60	<0.001
No (n=1407)	581	41.3	1.00		
<b>Tangible incentives (composite)</b>					
1+ endorsements (yes) (n=1037)	416	40.1	1.49	1.34–1.66	<0.001
None (n=1637)	440	26.9	1.00		
<b>Recognition from family or friends</b>					
Yes (n=1053)	439	41.7	1.62	1.45–1.80	<0.001
No/not sure (n=1621)	418	25.8	1.00		
<b>Knowing you help Thai society</b>					
Yes (n=1157)	492	42.5	1.77	1.58–1.98	<0.001
No/not sure (n=1517)	366	24.1	1.00		
<b>Would not want any incentive</b>					
Yes (n=580)	196	33.8	1.07	0.94–1.22	0.31
No/not sure (n=2094)	662	31.6	1.00		

1 = See table 2 for content of composite index.

contrast, 6.7% said they would "very likely not join" and 3.3% would "definitely not join."

#### SOUIDEMOGRAPHIC FACTORS AND WILLINGNESS TO PARTICIPATE

Univariate analyses indicated that education and region of residence before entry into the army were related to willingness to participate (table 1). Those with a primary school education (or less) were significantly more willing to participate, as were participants who had been living in northeast Thailand before entering the RTA. Those who had been living in urban areas before their military service reported less

willingness to participate in vaccine trials than those from rural areas.

#### POTENTIAL CONCERNS AND INCENTIVES RELATED TO VACCINE TRIAL PARTICIPATION

Frequencies of responses regarding potential concerns and incentives are noted in table 2. Major concerns regarding HIV-1 vaccine trial participation involved vaccine side effects and anticipated social pressure from family not to join. Many indicated they were "not sure" regarding safety risks, particularly injection related side effects and possible long term side effects. The most frequently endorsed incentives involved helping Thai society and recognition from family and friends. Medical care and insurance also received frequent endorsement and were chosen more often than receiving a lump sum monetary payment. Although nearly a half of the recruits endorsed an item that indicated a willingness to accept no incentive, many of these respondents did, in fact, endorse some tangible incentive. Controlling for these other endorsements, only 21.7% appeared to truly want no incentive and this revised variable was used in subsequent analyses.

Conceptually related items were collapsed into composite indices for further analysis, to improve the efficiency of logistic models. A "physical harm" index (vaccine might contain AIDS virus, vaccine could make one sick sooner, one could get AIDS from the vaccine, handicap or death could result from the trial, concern about injection related side effects) and a "social harm" index (participation would give appearance of having AIDS virus, a partner might refuse sex) resulted from this data reduction. Items that represented "tangible incentives" (that is, wanting lump sum payment, health insurance, medical care, or financial reimbursement of expenses as incentives for joining a vaccine trial) also were collapsed into a single index. "Yes" and "not sure" responses were treated as affirmative endorsements of concerns, while only "yes" responses were treated as affirmative responses for "incentives."

Table 3 summarises univariate odds ratios and 95% confidence intervals for concerns and incentives in relation to willingness to participate in HIV-1 vaccine trials. Concern about family influence produced the largest negative odds ratio in relation to willingness, although concerns about social and physical harm, as well as practical considerations also had significant negative associations with willingness. Among incentives, helping Thai society and gaining social recognition yielded the largest odds ratios, although differences in the sizes of the individual odds ratios and associated confidence intervals were small. Wanting no incentive was not significantly related to willingness to participate.

#### HIV-1 RISK RELEVANT BEHAVIOUR, ATTITUDES, AND KNOWLEDGE

Table 4 summarises univariate odds ratios and 95% confidence intervals for HIV-1 risk relevant behaviour, attitudes, and knowledge, in relation to willingness to participate in

Table 4 Univariate analysis of recent HIV risk relevant behaviour, attitudes, and knowledge as associated with willingness to join an HIV vaccine trial (n=2670)

	"Definitely willing to join"		OR	95% CI	p Value
	No	%			
Past 6 months—CSW partner					
Yes (n=347)	95	27.4	0.84	0.70–1.04	0.12
No (n=2323)	760	32.7	1.00		
Past 6 months—girlfriend partner					
Yes (n=504)	133	26.4	0.79	0.68–0.93	0.003
No (n=2170)	725	33.4	1.00		
Past 6 months—male or <i>kathoei</i> * partner					
Yes (n=42)	19	45.2	1.42	1.01–1.99	0.07
No (n=2632)	837	31.8	1.00		
Past 6 months—alcohol use					
daily/almost daily (n=550)	178	32.4	1.02	0.89–1.16	0.82
Weekly or less (n=2115)	675	31.9	1.00		
Knowledge—recognises proved transmission routes					
1+ Errors (n=209)	83	39.7	1.27	1.06–1.51	0.01
No errors (n=2465)	774	31.4	1.00		
Knowledge—endorses HIV transmission via casual contact (sharing crockery, etc)†					
1+ Endorsements (n=1417)	490	34.6	1.18	1.06–1.33	0.003
None (n=1257)	367	29.2	1.00		
Negative attitudes towards condom use‡					
Endorsed 4 or more of 8 items (n=1767)	551	31.2	0.93	0.83–1.04	0.21
Endorsed 3 or fewer of 8 items (n=907)	305	33.6	1.00		
Perceived risk (are you at risk of getting HIV?)					
A lot (n=515)	226	43.9	1.51	1.34–1.69	<0.001
No/some risk (n=2151)	626	29.1	1.00		
Would use condoms less in a vaccine trial					
Yes (n=944)	277	29.3	0.88	0.78–0.99	0.03
No (n=1730)	580	33.5	1.00		
Know HIV+ person(s)					
Yes (n=754)	230	30.5	0.93	0.82–1.06	0.28
No (n=1920)	628	32.7	1.00		

\**Kathoei* is most easily translated as male to female transsexual person. They are regarded as a "second kind of woman" or "third sex" in Thailand.<sup>16</sup>

†See "HIV-1 risk relevant behaviour, attitudes, and knowledge" under "Results" for a full listing of content.

Table 5 Multivariate logistic analysis of willingness to participate, with demographic, HIV knowledge, attitudes, risk relevant behaviour, concerns, and incentives (n=2661)

	OR	95% CI	p Value
Education (primary school or less)	1.24	1.00–1.53	0.05
Urban v rural (2 years before entering RTA)	0.88	0.73–1.07	0.20
Region (NE v elsewhere; 2 years before entering RTA)	1.38	1.14–1.66	<0.001
Partner-girlfriend (past 6 months)	0.69	0.55–0.86	0.001
Knowledge—known transmission (1+ errors)	1.49	1.08–2.05	0.01
Knowledge—endorses casual contact (1+ endorsements)	1.22	1.02–1.46	0.03
Would use condoms less in a vaccine trial	1.28	1.04–1.57	0.02
Perceived risk of HIV infection (a lot v some/no risk)	1.84	1.49–2.27	<0.001
Incentive—family/friends' recognition	1.23	0.99–1.54	0.06
Incentive—tangible (1+endorsements)	1.33	1.08–1.65	0.009
Incentive—help Thai society	1.72	1.38–2.14	<0.001
Concern—physical harm (1+ endorsements)	0.62	0.49–0.80	<0.001
Concern—social harm (1+ endorsements)	0.81	0.65–1.02	0.07
Concern—family wouldn't want them to join	0.51	0.40–0.64	<0.001
Concern—signing consent form	1.12	0.84–1.50	0.43
Concern—time required by trial	0.98	0.74–1.31	0.90

HIV-1 vaccine trials. Recent sexual behaviour had little association with willingness, except for sex with girlfriends.

Negative attitudes toward condoms, based on an additive composite scale of eight dichotomous (agree or disagree) items; (KR20 = 0.70) were unrelated to willingness. The scale items included condoms cannot provide 100% protection, condoms reduce sexual pleasure, sex workers do not like condoms, girlfriends do not like condoms, wives do not like condoms, condoms are too expensive to use regularly, condoms only used when a partner requests them, request to use condom suggests that partner is HIV+, condoms make sex last longer (scored negatively). In contrast, intending to use condoms less, if enrolled in a trial, was significantly associated with less willingness.

Endorsements of casual contact as a source of HIV-1 exposure (sharing crockery, breathing near an HIV+ person, coughing or sneezing by an HIV infected person, mosquitoes carrying infected blood from person to person, deep kissing) were associated with somewhat increased willingness to participate. The small number of recruits with errors in transmission knowledge (that is, not recognising commonly accepted routes of transmission) also were significantly more willing to participate.

Inconsistent condom use with CSW and girlfriends was investigated, but has not been included in the table, because these analyses involved separate, though overlapping, subsets of the sample. Inconsistent condom use with CSW occurred among 23.6% of those who reported CSW partners, but was not significantly associated with willingness to participate (p = 0.16; OR = 0.76, 95% CI = 0.52–1.12). Inconsistent condom use with girlfriends was reported by 67.6% of those with girlfriend partners and was not significantly related to willingness to participate (p = 0.45; OR = 0.91, 95% CI = 0.70–1.17).

#### WILLINGNESS TO PARTICIPATE: MULTIVARIATE MODEL

In the multivariate model (table 5), the largest odds ratios were produced by a conceptually diverse set of variables which included: perceived risk, the desire to help Thai society, residence in northeastern Thailand, errors in transmission knowledge, desire for tangible incentives, and the intention to use condoms less often if enrolled in a trial. Other significant correlates of increased willingness included endorsement of casual contact as a means of HIV-1 transmission and relatively low education, while the desire to receive recognition from family or friends yielded a nearly significant trend. It is notable that the direction of the association between willingness and intentions to use condoms less often in a vaccine trial was the reverse of that found in the univariate analysis.

Factors which appeared to inhibit willingness to participate in trials included concern that family members would not want them to join a trial and concerns about possible physical harm from trial participation. Concern with social harm yielded a nearly significant trend, while concerns about time required by the study and the need to sign a consent form were not significantly related to willingness.

#### Discussion

This study found that nearly one third of participants would "definitely" be willing to join an HIV-1 vaccine trial. The multivariate model indicated a mix of associated motivations, whereby "altruism" (that is, wanting to help Thai society) existed side by side with a desire for "tangible gain" and/or social recognition. Worries about HIV-1 exposure adversely affected willingness, as did the possible opportunity to reduce the use of condoms. Anticipated social pressure from family exerted a substantial counterweight against participation

in trials and this suggested that vaccine education should go beyond informing only discrete target populations.

The association between willingness and lower educational attainment suggests the need for more attention to field testing vaccine education materials for low levels of education and ensuring that oral presentations recognise vernacular terminology and the educational level of their audience. Similar concerns were raised in a study with injection drug users (IDU) in Bangkok, where vaccine trial knowledge was evaluated after an educational programme.<sup>8</sup> The findings here also indicate that vaccine trial education and counselling programmes need to continually reinforce condom use and other forms of protection and to underscore the lack of protection offered by trial participation. Accurate assessment of personal risk needs to be emphasised, along with efforts to correct misconceptions about HIV-1 transmission.

A major concern for planning HIV-1 vaccine trials has been the possibility of behavioural side effects. Unfortunately, it has been difficult to predict the frequency of unprotected intercourse and other HIV-1 exposure risks during trials, relative to behaviour at enrolment. Some vaccine feasibility studies have shown evidence of risk reduction with behavioural intervention (for example, Koblin *et al*<sup>7</sup>); however, studies of HIV-1 risk behaviour during preventive vaccine trials have yielded mixed results.<sup>18–20</sup> Several studies of willingness to join trials have examined behavioural intentions,<sup>4,9</sup> but only Meyers *et al*<sup>6</sup> and the present investigation have reported analyses of HIV-1 knowledge or sexual risk behaviour in relation to willingness to participate. MacQueen *et al*<sup>6</sup> reported a borderline significant relation between recent injection risk behaviour and willingness in Bangkok IDUs, although directionality was not noted. Most areas of recent risk relevant behaviour were unrelated to willingness to participate in the multivariate model. The main exception was sex with girlfriends, which has become increasingly common among young Thai men<sup>21</sup> and was associated with diminished willingness to participate here. Perhaps because perceived risk was lower among those with girlfriend partners than among those with CSW partners (data not shown) the need for a vaccine may be less apparent to those with non-commercial partners. Another possibility is that participation may be perceived by some respondents as requiring them to change their sexual behaviour, which may be unattractive. This hypothesis becomes more tenable when one also considers the borderline significant univariate association between decreased willingness and recent sex with a commercial sex worker (CSW). However, sex with a CSW was not included in the final multivariate model, after an alternate analysis indicated that it was not significant when other factors were controlled.

The level of willingness to participate found in the present investigation was slightly higher than that obtained in RTA recruits from Thailand's epicentre region in the upper north.<sup>2</sup> It

also was slightly higher than the levels of willingness found in female CSWs from the upper north, male STD clinic attendees from the upper north,<sup>2</sup> and male and female STD clinic attendees in Bangkok.<sup>3</sup> Willingness to participate was expressed by 25–29% in these cohort samples, although prevalence and incidence varied widely. One might have expected differences between this study and findings from the upper north, where data were collected at the epidemic's peak and prevalence was severalfold higher.<sup>11</sup> Greater willingness was expressed by in-treatment Bangkok IDU,<sup>8</sup> who represented a population with stable and much higher prevalence. Even so, comparisons among studies suggest that the association between prevalence and willingness is not necessarily linear. For example, the Bangkok IDU<sup>8</sup> reported more willingness than CSW in Thailand's upper north, who had similar prevalence<sup>11</sup> and resided in a higher prevalence city.

The similarity in levels of willingness to participate among this study and most other investigations in Thailand also is of interest with regard to the data collection methodology. The self administered questionnaire format might be expected to yield less willingness and more frequent expression of concerns relative to interview studies in Thailand because interviews may tend to elicit acquiescent response biases.<sup>22</sup> The level of willingness here was much higher than that reported by Bangkok health facility workers<sup>6</sup>; however, that sample was not assumed to be at high risk, no serological data were collected, and the sample was composed of hospital personnel whose socioeconomic status (SES) tended to be much higher than in the present investigation. Willingness was less than that reported in a clinic based study of Bangkok IDU which provided more targeted HIV-1 vaccine education (which concerned a specific vaccine product) and used self administered questionnaires.<sup>8</sup>

Compared with most other investigations in Thailand,<sup>2,3,6</sup> specific concerns about social discrimination and possible side effects (short term and long term) were reported less often. Even so, most participants endorsed at least one area of concern regarding physical harm, and worries about "social harm" also were common. Levels of concern were similar to those expressed in a study of Bangkok IDU.<sup>8</sup>

One can speculate that a number of factors may override apparently "straightforward" motivators of willingness. Data from this study were collected after the completion of Thailand's first three vaccine trials and it might be assumed that this has diminished public fears about trials. The relatively low frequency of specific concerns about trials might reflect this, although one might have expected that willingness would be much higher than in previous investigations. Although sociodemographic variables were of limited importance here, they have proved important in studies where more variance in these variables has been present. For example, sex differences have been particularly important in a number of investigations with high risk populations in Thailand<sup>5</sup> and in

other countries<sup>1-5</sup> where the greater willingness of women to join trials may have reflected their limited control over other means of protection. The only other study to investigate educational level<sup>6</sup> also found that willingness was greater among less educated participants, as was the case here.

The present investigation is the only study in Thailand which has investigated regional differences. It is unclear how cultural differences might have affected the willingness of participants who had been living in northeastern Thailand before entering the RTA, although this would be worthy of further investigation. A related factor could be language because the spoken language in this region is Lao, rather than central Thai ("standard" Thai), although the two are closely related. On the other hand, educational instruction, mass media, and almost all forms of written language in northeastern Thailand occur in central Thai. In addition, extended migration to Bangkok and other central Thai locales from this region is commonplace<sup>23</sup> and may have occurred among those who had resided in the north east before induction. If language were a consideration, one also might have expected that participants from the south would show differences compared with those from central Thailand, because they speak a distinctive dialect; however, this was not the case.

The type and amount of information provided to study participants may be another factor affecting willingness. Studies conducted outside of Thailand have shown the direct effects of these variables on willingness to participate in trials. Providing more information (for example, introducing the typical double blind placebo design) has been associated with reduced willingness,<sup>5</sup> as has pointing out possible side effects.<sup>9</sup> The present investigation did not provide an experimental test of how education affects willingness to join trials, and so it is necessary to be guarded about inferences drawn from the data regarding vaccine education. Two different instructional methods were used; however, there were no differences on willingness or key variables between them.

While specific concerns about vaccine trials were expressed less often than in other Thai studies,<sup>2-3,6</sup> the level of willingness was similar to most other studies drawn from populations under study for vaccine trials.<sup>2-3</sup> Concerns were similar in their prevalence to those obtained in a study of Bangkok IDU where education was provided regarding a specific vaccine product and overall willingness was greater.<sup>8</sup> Hence, the role of education with respect to willingness is not entirely clear although it would seem to mitigate some vaccine related worries.

Overall, when one considers results from this study, as well as those from other work in Thailand and elsewhere, several implications are evident. General education programmes about vaccine trials may not fully address misconceptions about trials (for example, limits of disease protection) and more attention needs to be given to specific concerns and towards ensuring that material is well matched to public understanding and comprehension of vac-

cine related issues. While there is some evidence from other research that the provision of information may reduce initial willingness to participate in trials, it would appear that substantial numbers of people are willing to volunteer for trials even after fairly detailed education has been provided. Still, the role of educational interventions needs to be more rigorously evaluated so that trial planners can more efficiently deliver their vaccine education messages and better estimate any attrition that may occur in response to education. Future studies also need to be designed to better identify demographic, informational, and methodological factors that may moderate willingness to join trials and that have implications for the planning and promotion of trials.

The relatively similar levels of willingness to participate in trials across studies of young adults from lower SES backgrounds (including this one) regardless of method, geography, local prevalence, and risk behaviour would suggest that the present investigation may have some generalisation,<sup>2-3,6</sup> although the somewhat lower levels of physical and social concerns may have less generalisability than the overall level of willingness to participate in trials. Sample differences between investigations of willingness and actual vaccine trials make it difficult to generalise from one line of research to other. Vaccine trials have generally been conducted in urban areas and have enrolled either in-treatment IDU<sup>8,24</sup> or low risk individuals who are older and more educated and of higher SES backgrounds<sup>19,25-27</sup> than those in this and other investigations of willingness.<sup>2-3,6</sup> Findings from vaccine trials that report data on study recruitment suggest that multiple methods of recruitment may be necessary and that a substantial number of prospective volunteers do not pursue pretrial medical and behavioural screening.<sup>25,27</sup> In addition, a minority of people who are screened decline to join or are lost to follow up.<sup>25,27</sup> Once enrolled, it appears that very high levels of retention have been achieved. Findings from trials would suggest that willingness to take part in trials may be somewhat "soft" and becomes challenged by the recruitment process.<sup>25,27</sup> None the less, trials have proved feasible and attrition during recruitment may be declining over time.<sup>25,27</sup>

As samples used in cohort preparation studies begin to be used for recruited for actual trials (see Graham *et al*<sup>28</sup>; MacQueen *et al*<sup>6</sup> for examples) evaluation of whether attitudes, motivations, and opinions about vaccine trial participation predict recruitment, compliance, and risk relevant behaviour can occur. The predictive validity of these variables also can be evaluated with surrogate outcomes, such as enrolment into non-HIV-1 trials (see Tello *et al*<sup>10</sup> for an example, in which willingness to join HIV-1 vaccine trials corresponded highly with enrolment into a genital herpes vaccine trial). Targeted education, attention to methodology, and moderating variables, as well as efforts to evaluate predictive validity, may increase the usefulness of attitudes towards trial participation in the planning of future trials.

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