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PUBLIC HEALTH

Basing policy on evidence: low HIV, STIs, and risk behaviour in Dili, East Timor argue for more focused interventions

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Background: East Timor is a newly independent, poor nation with many internally displaced people and foreign peace keeping forces. Similarities with Cambodia, which now has Asia's worst HIV epidemic, caused donors to earmark money for HIV prevention in East Timor, but no data were available to plan appropriate programmes.

Objectives: To determine levels of infection with HIV and other sexually transmitted infections (STIs) and associated risk behaviours in Dili, East Timor, in order to guide resource allocation and appropriate prevention and care strategies.

Methods: In mid-2003, a cross sectional survey of female sex workers, men who have sex with men (MSM), taxi drivers, and soldiers was conducted. Participants provided biological specimens and all answered structured questionnaires.

Results: HIV prevalence was 3% among female sex workers (3/100), 0.9% among MSM (1/110), and zero in the other groups. All the HIV infected sex workers reported sex with foreign clients. Partner turnover reported by all groups was among the lowest in Asia, so was condom use. Access to basic HIV prevention services, including condoms and STI services, was extremely low in all groups.

Conclusions: A few sex workers are infected with HIV in East Timor, but the virus is not circulating widely among their clients, and sexual networking is limited. The risk of a generalised HIV epidemic in East Timor is minimal. HIV can be contained by the provision of basic services to the small minority of the population at highest risk, preserving resources for other health and development needs.

In the early 2000s, the government of the newly independent nation of East Timor (Timor Leste or Timor Lorosae) expressed concern about the possibility of an epidemic of HIV developing in the country.¹ East Timor is a poor country with low levels of education and poor health service delivery. In addition, violent conflict following a referendum on independence in 1999 destroyed much of the country's infrastructure and displaced thousands of families, and international peace keepers from countries with high HIV prevalence came to East Timor. This set of circumstances led many people to draw parallels with Cambodia in the early 1990s. HIV subtyping work indicates that it is unlikely that overseas peacekeepers sparked the HIV epidemic in Cambodia, one of Asia's most severe.^{2,3} None the less, many feared that East Timor may follow Cambodia's path in becoming a hot spot for HIV infection in Asia.⁴

By 2002, seven HIV infections had been reported in East Timor. No other information on HIV prevalence or risk behaviour was available, but indicators of "vulnerability"—poverty and mobility in a post-conflict situation—encouraged international donors to commit over US\$2 million to HIV prevention in the country, about US\$4 per adult of sexually active age and US\$285 000 per identified HIV infection. The government declared HIV one of its four health priorities, and collaborated with donor funded programmes to educate young people, to train village health workers in syndromic management of STIs, and to provide voluntary counselling and HIV testing services to the public. Only limited efforts have been made to provide HIV prevention services to subpopulations with highest risk behaviour.

In an effort to improve understanding of the current HIV situation in East Timor and the potential for further spread, the Ministry of Health supported a cross sectional survey of

HIV, STIs, and risk behaviour in the capital, Dili. This paper describes the survey and its implications for health programmes in East Timor.

OBJECTIVES

The survey aimed to measure levels of HIV and other STIs as well as risk behaviour in the populations most likely to be infected in East Timor. It was intended to help the government of East Timor and its partners allocate resources appropriately within HIV and STI programmes as well as between HIV and other development programmes.

A secondary objective of the survey was to give people with high risk behaviour the opportunity to receive information and counselling about HIV and STIs, to obtain a free HIV test with counselling, and to be screened and treated for STIs if necessary.

METHODS

In late 2002, a qualitative study was undertaken to inform survey design.⁵ The study found little evidence of injection drug use, and low levels of sexual risk among long distance bus drivers, truck drivers, or students. The qualitative study found indications of risky behaviour among recent military recruits as well as taxi drivers, who sometimes act as an access point for Dili's very hidden population of female sex workers. A small but active community of men who have sex with men (MSM) was also identified. The study found evidence of around 120 East Timorese and Indonesian female

Abbreviations: EIA, enzyme immunoassay; MSM, men who have sex with men; PCR, polymerase chain reaction; RPR, rapid plasma regain; SEALS, South Eastern Area Laboratory Services; STI, sexually transmitted infections; TPHA, Treponema pallidum haemagglutination assay

sex workers in Dili, serving mostly local clients from their houses or along the beach front; a handful frequent weekend bars and nightclubs. The study also identified a second network of commercial sex, in which foreign sex workers (charging around 10 times more than local/Indonesian women) sell sex to those who can afford the high fees—at the time almost exclusively expatriates. Since foreign sex workers don't interact with East Timorese, they are expected to have a limited potential impact on the nation's HIV epidemic and were excluded from the quantitative survey.

Sampling and data collection

Male taxi drivers, male soldiers, female sex workers and men who report having had sex with men in the previous 12 months (MSM) were included in the survey. Target sample sizes for all groups were informed by the qualitative study. Sample sizes for heterosexual male groups were calculated in order to be able to measure changes in risk behaviour should the survey be repeated. For MSM and female sex workers we aimed to recruit all willing members of the subpopulation in Dili.

Survey staff were drawn from the Central Statistics Office, a number of non-governmental organisations (NGOs) which had previously worked mapping groups at risk for HIV or implementing public education campaigns, and the central hospital in Dili.

Survey recruiters fanned out across the small city of Dili and approached taxi drivers cruising for passengers, explaining the study and inviting them to enrol at a data collection point close to the city's busiest intersection. All soldiers at Metinara training barracks were invited to contact study staff over a 4 day period to get detailed information about the study; most did so and were offered enrolment in the study.

Female sex workers and MSM were approached by NGO fieldworkers who had previously mapped commercial and male to male sex in Dili, and invited to a data collection point for enrolment. Those who enrolled were also given referral cards for their friends.

At the data collection point, supervisors explained the study procedures and sought informed consent. Willing participants were enrolled using a unique survey number that was attached to a questionnaire, to specimens, and to referral cards for free STI screening and treatment, counselling, and HIV and syphilis test results.

A trained interviewer administered a structured, precoded questionnaire in a private space. A nurse asked detailed questions about symptoms of STIs. If any current symptoms were reported, the participant was referred directly to a well known private clinic in Dili for free screening and treatment. Since military respondents did not have easy access to the clinic, they were given a physical examination at interview by

a non-military medical team, and treated immediately if necessary. After STI symptom screening, blood, and urine were collected from all respondents. Female sex workers provided self administered vaginal swabs, while MSM provided self administered rectal swabs. All female sex workers were treated presumptively for STIs with a single oral dose of 1 g of azithromycin, with the expectation that this would treat both chlamydia and gonorrhoea if present. Specimens were delivered to the Central Laboratory at the end of each day. Questionnaires were transferred to the Central Statistics Office for data entry and editing.

Laboratory procedures

Refresher training in specimen handling and diagnostic tests was provided to the Central Laboratory in Dili. The laboratory is not yet equipped to perform some of the tests necessary for the survey, and these tests were performed in the South Eastern Area Laboratory Services (SEALS) and Westmead Laboratories in Sydney, and the Cipto Mangunkusumo Hospital (RSCM) in Jakarta. In addition, all samples that tested positive for HIV or syphilis in Dili and a randomly selected 20% of negative samples were retested at the SEALS laboratory for quality control purposes, using different tests. The tests performed and the specimens are listed in table 1.

Statistical analyses

Behavioural data were double entered and compared using FoxPro software adapted for the questionnaires. Laboratory data were entered using Microsoft Excel. The data sets were merged and analysis was performed using Stata 8. Prevalence of HIV-1/HIV-2 antibodies and other STIs was calculated using simple proportions. A sample was considered positive for syphilis if both the RPR test and the confirmatory TPHA test were reactive. Associations between potential explanatory variables and behavioural outcomes, as well as between behavioural outcomes and prevalence of laboratory verified infections were explored, and differences in proportions were tested using the Pearson χ^2 statistic. Maximum likelihood estimates of the odds ratios were calculated and compared using the Mantel Haenszel test for the homogeneity of the odds.

Ethical issues

Dili is a small city where people are linked in extensive social and family networks. In order to protect people's privacy, the study design was anonymous. All study staff as well as those providing counselling, screening, and STI care to participants were extensively trained in confidentiality procedures, which were rigorously enforced. Military authorities were extensively consulted during the study design, but no military personnel were involved in data collection or results

Table 1 Biological tests performed during the survey

Infection	Test	Biological specimen	Testing site
Gonorrhoea	PCR (Roche Amplicor)	Urine (all), vaginal swab (women), Rectal swab (MSM)	SEALS
Chlamydia	PCR (Roche Amplicor)	Urine (all), vaginal swab (women), Rectal swab (MSM)	SEALS
Trichomoniasis	Culture (InPouch)	Vaginal swab (women)	Dili
Bacterial vaginosis	Gram stain scoring, Nugent criteria	Vaginal swab (women)	Dili
Candidiasis	Gram stained slide	Vaginal swab (women)	Dili
Syphilis	RPR (Wampole Impact), TPHA (Serodia)	Blood (all)	Dili
Herpes simplex virus types 1 and 2	Serology (Focus Herpes Select)	Blood (all)	SEALS
HIV infection (1 and 2)	Rapid test (Abbott Determine)	Blood (all)	Dili
HIV infection (1 and 2)	EIA (Genetic Systems)	Blood (all)	Dili
HIV infection (1 and 2)	Western blot (GeneLabs, Diagnostic Biotechnology)	Blood (determine HIV +ve specimens only)	RSCM, SEALS
HIV infection (1 and 2)	HIV subtyping	Blood (WB HIV +ve specimens only)	Westmead

PCR, polymerase chain reaction. RPR, rapid plasma reagin. TPHA, Treponema pallidum haemagglutination assay. EIA, enzyme immunoassay. SEALS, South Eastern Area Laboratory Services. RSCM, Rumah Sakit Dr Cipto Mangunkusumo. MSM, men who have sex with men.

Table 2 Survey populations and sample sizes

	Refused enrolment	Enrolled	Blood samples	Urine samples	Swabs	In-Pouch
Taxi drivers	43	210	207	207	NA	NA
Military	13	249	248	248	NA	NA
MSM	NA	110	110	110	87	NA
Sex workers	18	100	100	100	51	44

processing. All study participants reporting risk were referred for free STI screening and treatment; all participants were given the opportunity to access their test results.

The study protocol was approved by East Timor's Minister of Health. Ethical approval was also obtained from the protection of human subjects committee of Family Health International and the ethics committee of the London School of Hygiene and Tropical Medicine.

RESULTS

Not all types of specimens were available for all participants because of post-enrolment refusal or handling errors. A large number of vaginal and anal swabs were not collected because of procurement difficulties. The final number of participants enrolled and specimens analysed is shown in table 2.

As expected, the soldiers, recruited since independence, were overwhelmingly young (with a median age of 23 years) and just 17% were married. The demographic profile of men in the MSM sample was very similar. Taxi drivers were older, with a median age of 26 years, and close to two thirds were married. A quarter of sex workers were teenagers, while a third were 30 or older. Roughly a third of the sex workers were single, one third married, and one third divorced or widowed. Almost all soldiers have a secondary education, as do 85% of MSM. Over one third of taxi drivers and fully 70% of sex workers have no secondary education, and 43% of sex workers have no education at all. Some 13% of the MSM sample identified as transgendered ("waria").

HIV related knowledge

Over 90% of soldiers and around 85% of taxi drivers and MSM had heard of AIDS, but only 42% of sex workers had ever heard of the disease; half of those who had did not believe it could be prevented. Condoms are little known and poorly understood. While 63% of MSM and 60% of soldiers knew that condoms prevent HIV, just 42% of taxi drivers and 21% sex workers knew this, even after prompting. Fully 40% of sex workers could not identify a condom when shown one. Some 35% of heterosexual male groups could correctly identify abstinence, mutual monogamy, and condom use (the "ABC" message at the core of East Timor's national HIV prevention strategy) as correct methods for avoiding HIV.

Sexual behaviour

The survey confirmed the findings of the qualitative research—a high proportion of the selected populations reported non-marital sex, as shown in table 3. Condom use was universally low, even in commercial and anal sex. Most extramarital sex was commercial. In addition to commercial partners, 22% of the heterosexual high risk men reported sex with a "girlfriend" and 79% of sex workers reported sex with "boyfriends," but cash was also exchanged in around 30% of these transactions.

Female sex workers reported a mean and median of 12 clients in the last month, while clients reported a median of just three sex workers visited in a year. Men who sold sex reported a median of one male client in the preceding month.

Table 3 Sexual activity and condom use

	Taxi drivers	Soldiers	MSM	Female sex workers
Sexual activity				
Ever had sex	97%	94%	100%	100%
Sexually active in the last 12 months	94%	76%	100%	100%
Currently married or cohabiting	64%	18%	17%	34%
Sex with opposite sex girlfriend/boyfriend*	16%	27%	9%	79%
Sex with non-marital, non-cohabiting partner in last 12 months	48%	61%	95%	100%
Bought sex from woman* (median number of transactions)*	41%	54%	20%	–
Bought sex from man last month	4	2	Not asked	–
Sold sex to man last month (median number of transactions)	Not asked	Not asked	40%	100%
Recent anal sex*	16%	8%	66%	12
Bisexual behaviour last 12 months	16%	8%	46%	Not asked
Sex with foreigner last month	Not asked	Not asked	21%	31%
Condom use				
Condom used at last commercial sex between man and woman	16%	33%	14%	36%
Condom used in all recent heterosexual commercial sex	1%	1%	9%	0
Condom used at last anal sex with male	24%	14%	30%	Not asked
Condom used in all anal sex with male last month	Not asked	Not asked	7%	Not asked
Condom use in last heterosexual sex with girlfriend/boyfriend	15%	19%	17%	6%
Condom use in all heterosexual sex with girlfriend/boyfriend*	3%	0	9%	0
Overall risk				
Any unprotected commercial sex (heterosexual)	42%	51%	18%	100%
Any unprotected non-marital sex (heterosexual)	46%	60%	–	–
Any unprotected anal sex between men	12%	7%	62%	–

*In last 12 months for taxi drivers and soldiers, last month for MSM and sex workers.

†For taxi drivers and soldiers this is minimum, since consistency of condom use is not asked.

Table 4 STI infection rates in survey populations

	Taxi drivers	Soldiers	MSM	Female sex workers
Gonorrhoea (urine)	1.0% (2/207)	0.4% (1/248)	2.7% (3/110)	8.0% (8/100)
Gonorrhoea (swab)	NA	NA	16.1% (14/87)	19.6% (10/51)
Chlamydia (urine)	1.9% (4/207)	1.6% (4/248)	0 (0/110)	13.0% (13/100)
Chlamydia (swab)	NA	NA	14.9% (13/87)	13.7% (7/51)
HSV-2	29.0% (60/207)	11.7% (29)	29.1% (32/110)	60.2% (59/98)
Syphilis/yaws	13.0% (27/207)	8.1% (20/248)	15.5% (17/110)	16.0% (16/100)
Trichomonas	NA	NA	NA	15.9% (7/44)
HIV	0 (0/207)	0 (0/248)	0.9% (1/110)	3.0% (3/100)

Condom use was significantly higher with foreign than with East Timorese partners. Some 79% of female sex workers with foreign clients used a condom with their last foreign client, compared to 29% using condoms with their last East Timorese client, while 58% of MSM used condoms at last anal sex with a foreign partner, compared with 21% with local partners. Not a single sex worker reported using condoms with all her clients in the previous month; just 1% of male clients reported always using condoms with sex workers, and two thirds never used them at all.

Bisexual behaviour was not uncommon—nearly half of the men included in the study because they had sex with men also reported sex with women, while 12% of soldiers and drivers reported sex with men and women.

Men who knew the “ABC” of HIV prevention were just as likely to report unprotected commercial sex as those who did not.

STIs and HIV

Table 4 shows the rates of sexually transmitted and treponemal infections in the study populations. The gonorrhoea and chlamydia rates were higher in rectal and vaginal samples than in urine samples.

Overall, 78% of syphilis results in the survey that were confirmed with positive TPHA tests had RPR titres of 1:4 or less. Among female sex workers, there was more high titre syphilis—some 37% of syphilis among sex workers was reactive at titres of 1:8 or above, a level frequently used as a case definition of “active syphilis” in South East Asia. Concordance between Dili laboratory results and QC testing in the SEALS laboratory in Australia for syphilis results was over 95%.

Prevalence of the incurable viral infection HSV-2 is relatively high compared with other STIs. However just 16% of respondents infected with the virus reported a genital ulcer, the most common symptom of HSV-2, in the last year. No ulcers were found on in any of the male participants examined (all the soldiers and roughly half of each of the other groups).

No HIV infections were found among taxi drivers or soldiers. One MSM who identified as a transgendered sex worker tested positive for HIV antibodies. Three female sex workers were also found to be HIV infected. All of the HIV infected female sex workers reported having had sex with foreign clients. One was infected with HIV subtype G (commonly found in West Africa) and reported contact with African clients, while the others were infected with subtype C (which circulates in South Asia and parts of Africa). Both of these women reported white clients while one also reported sex with a non-Indonesian Asian. The transgendered respondent, who was infected with HIV subtype G, did not report any foreign partners in the last month. MSM were not asked about lifetime exposure to foreign partners. Concordance on confirmed HIV test results between Dili and the SEALS laboratory in Sydney was 100%.

Relation between sexual behaviour and sexually transmitted infections

No correlation was found between measures of sexual risk and STI status. There was no relation between infections with any of the curable STIs including high titre treponemal infection and unprotected commercial sex, or total number of vaginal or anal partners in the last month or year.

MSM were more likely to be infected with HSV-2 if they reported selling sex to foreigners in the last month (47% *v* 25%, *p* = 0.05), but there was no significant difference among female sex workers.

Availability and use of HIV prevention services

HIV prevention interventions were not well developed in East Timor at the time of the survey. Just one sex worker and 16% of MSM were carrying a condom when interviewed. Two thirds of both sex workers and clients who did not use condoms at last commercial sex said it was because condoms were hard to get, and 82% of MSM who mentioned obstacles to condom use cited difficulty of access. Some 29% of MSM had heard of water based lubricant but just 10% had used it.

The highest participation in HIV prevention activities was reported by soldiers. Just one sex worker in 10 said she had been approached with information about HIV, and just 16% had ever been screened for STIs. When services were offered as part of the study, uptake was relatively high. Close to half of the taxi drivers and sex workers referred for STI services turned up at the clinic for services, as did 86% of MSM. Seven out of 10 soldiers picked up their HIV and syphilis test results, while for other groups between a quarter and half of respondents learned their serostatus and were treated for syphilis if necessary.

DISCUSSION

The preparatory qualitative work for this study indicated that risky sexual behaviour is not a norm in East Timor even among some groups commonly believed to engage in risk such as truck drivers and students. The study identified a small number of female sex workers with high risk behaviour, and found that substantial proportions of taxi drivers and soldiers reported buying sex occasionally. A community of MSM was identified, and a high proportion of these men also reported sex with women.

Extensive mapping and qualitative work suggest that a high proportion of sex workers and sexually active MSM in Dili were captured in the study. However, the study was confined to the capital city, Dili, and truly random sampling was not possible. Pockets of risk behaviour may exist in other parts of East Timor, especially along the Indonesian border. Survey results may therefore not be generalisable to all members of high risk groups in East Timor. They are clearly not generalisable to the general population, having been chosen to reflect the highest risk.

Vaginal and anal swabs were not available for some participants. PCR tests perform with greater sensitivity on vaginal specimens than urine, while rectal STIs cannot be

detected without rectal specimens. This means reported STI rates for women and MSM may under-represent true rates. However, the measured STI rates among sex workers remain very low relative to neighbouring Indonesia (where 30–60% of sex workers were infected with at least one of gonorrhoea, chlamydia, or trichomonas in a seven city study in 2003).⁶ Syphilis data should be interpreted with caution because yaws—also caused by *Treponema pallidum* and indistinguishable using standard serological tests—was once endemic in East Timor.⁷ Most syphilis was low titre, suggesting latent syphilis infection or yaws, rather than acute, more recent syphilis infection.

Study results suggest that knowledge about HIV and its prevention was extremely low in Dili. Condoms were rarely used even in commercial sex, perhaps a reflection of religious teachings in this overwhelmingly Roman Catholic nation. Despite high proportions of men reporting non-marital sex, partner turnover was low compared to many other Asian settings. Men who sold sex to other men in Pakistan and Indonesia had eight and nine times as many clients a month as those in East Timor, on average. Female sex workers in Bangladesh, Cambodia, and parts of India reported six times as many clients a month as East Timorese sex workers, and Vietnamese sex workers 3.3 times as many.⁸ In Cambodia, around a third of clients of sex workers in 2003 reported sex with two or more sex workers in the last month alone, compared with East Timorese clients' median of just three sex workers visited in a year—a possible reason for low levels of STIs among clients of sex workers.

These findings have important implications for service provision. Effective HIV prevention programmes focus on situations where exposure is most likely to occur—where an HIV positive individual is likely to encounter an HIV negative individual and have sex or share injecting equipment with them.⁹ While this study provides evidence that a small number of individuals in Dili have become infected with HIV, there is no evidence that the virus is circulating widely among their local clients or partners. Fewer than 2% of married men who were recent clients of sex workers were infected with gonorrhoea, chlamydia, or high titre treponemal infection and none was infected with HIV. While other pockets of high risk behaviour may exist, it is unlikely that patterns of sexual networking that would carry the virus into the general populations differ greatly across this small and culturally homogeneous country. The likelihood of HIV or STIs spreading through the general population of East Timor and being seen at rural health centres is thus small. Yet this is where health workers are being trained in STI management. Meanwhile, those most likely to be infected—sex workers and MSM—had virtually no access to screening or treatment services for STIs, or to other basic HIV prevention services.

East Timor is a country facing many health and development challenges. According to UNICEF, fewer than one in 10 women of childbearing age is using contraception, and fewer than a quarter had a trained attendant at last childbirth. Some 850 women out of 10 000 die in childbirth. Two thirds of children in East Timor are not immunised for the common communicable diseases of childhood, and 126 out of 1000 die before their fifth birthday.¹⁰ In addition, a quarter of children of primary age are not in school and 49% of households live in poverty.¹¹ It is critical, then, that East Timor and its partners use scarce financial and human resources wisely.

The evidence of this study shows that parallels drawn with Cambodia in the absence of any data do not hold true—unless sexual or drug injecting behaviour changes dramatically, East Timor is not threatened with a generalised HIV epidemic. To prevent such a threat arising in the future, East Timor and its development partners should reduce the emphasis on HIV prevention efforts aimed at the general

Key messages

- Sexual and injecting risk behaviour, STI prevalence, and HIV prevalence are all relatively limited in Dili, East Timor, even within subpopulations most likely to be exposed. Sexual networking between higher risk populations and the wider population is also limited
- With current patterns of risk, STIs and HIV are unlikely to spread widely into the general population. HIV programmes should be refocused from general population approaches towards providing quality prevention services for the small populations with higher risk behaviour
- In the context of East Timor, carefully targeted HIV prevention services are likely to achieve greater impact at limited cost, freeing up human and financial resources to meet the nation's other extremely pressing health and development needs. Funding decisions based on local evidence rather than global assumptions or development fashion will lead to better welfare outcomes for the nation as a whole

population, and focus instead on providing access to condoms, lubricant, and STI screening and treatment for all those who sell and buy sex, as well as for sexually active MSM. Since these populations are small, this can be done relatively cheaply, allowing the country to concentrate time and effort on other pressing health issues such as immunisation coverage, reproductive health services, and safe motherhood.

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CONTRIBUTORS

EP wrote the survey protocol, oversaw interviewer training and fieldwork, did the data analysis, and was principal writer of this paper; HP contributed to survey design and was field manager during data collection; AS trained specimen takers and laboratory staff and was responsible for quality assurance for biological markers; AA coordinated government participation in the survey and was operational head of the survey steering committee; MZ was responsible for field logistics, contributed to survey staff training, and oversaw treatment for participants; CT contributed to survey design and chaired the survey steering committee; HB managed survey preparation, contracting, logistics, and dissemination; GN contributed to the survey design and the writing of this paper, and provided technical supervision on testing and treatment issues.

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CORRECTION

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In the December issue of the journal there was a mistake in the paper by H Z Qian *et al* (Risk of HIV/AIDS in China: subpopulations of special importance. *Sex Transm Infect* 2005;**81**:442–7). The name of the first author was misspelled. The correct spelling is as above.