

## IN PRACTICE

# Antimicrobial self medication for reproductive tract infections in two provinces in Lao People's Democratic Republic

A Sihavong, C S Lundborg, L Syhakhang, K Akkhavong, G Tomson, R Wahlström

*Sex Transm Infect* 2006;**82**:182–186. doi: 10.1136/sti.2005.016352

See end of article for authors' affiliations

Correspondence to: Amphoy Sihavong, c/o Rolf Wahlström, IHCAR, Karolinska Institutet, SE-171 76 Stockholm, Sweden; amphoy.sihavong@phs.ki.se; rolf.wahlstrom@phs.ki.se

Accepted for publication 12 September 2005

**Objectives:** To describe antimicrobial self medication for reproductive tract infections (RTI) including sexually transmitted infections (STI), and to explore the understanding and use of health information among the adult population self medicating with antimicrobials for RTI/STI in two provinces of Laos. This could contribute to quality improvement of RTI/STI management.

**Methods:** Cross sectional community based study. Structured interviews (household survey) were conducted among 500 subjects aged 18 or more, who had used antimicrobials as self medication for RTI/STI during the past year. They were recruited among 3056 family members in Vientiane capital and Champasak province, divided equally between the two study sites, and between urban and rural areas.

**Results:** Among the 500 respondents reporting self medication for RTI/STI, 91% had bought the antimicrobials from local private pharmacies without a physician's prescription. 58% of those were advised to buy the drugs from drug sellers. Ampicillin (not recommended as syndromic treatment for RTI/STI) was used in 83% of all cases, in 28% combined with tetracycline. 79% of respondents used antimicrobials for a non-recommended duration of time. Most respondents had access to health messages for RTI/STI, largely from radio/television and drug sellers. However, only 17% of all respondents reported that they had ever used a condom.

**Conclusions:** More than three quarters of respondents, self medicating for RTI/STI with antimicrobials, used inappropriate drugs bought from private pharmacies. There is a need to improve RTI/STI management, including health promotion, through interventions at community level, and to health providers, including private drug sellers.

Reproductive tract infections (RTI), including sexually transmitted infections (STI), impose a burden of mortality and morbidity through their impact on reproductive and child health,<sup>1</sup> resulting in serious economic, social, and psychological consequences.<sup>2</sup> Appropriate management of RTI/STI in combination with health education, is of major public health importance. Intercurrent STI facilitates HIV transmission.<sup>3</sup> Improved treatment services for STI can reduce the incidence of HIV infection in populations with a high prevalence of curable STI and high risk sexual behaviour, particularly in the early phases of an HIV epidemic.<sup>4–6</sup>

Lao People's Democratic Republic, with a population of about 5.5 million,<sup>7</sup> is one of the world's least developed countries, low on health indicators.<sup>8</sup> Fifty eight per cent of health spending in the country comes from households, of which two thirds are spent on private services, mostly at private pharmacies,<sup>9</sup> of which less than 10% are run by a qualified pharmacist or an assistant pharmacist.<sup>10</sup> Self medication with antimicrobials is commonly found in developing countries, and misuse of antibiotics has been reported.<sup>11</sup> A high percentage of irrational antibiotic use may worsen the increasing antibiotic resistance, resulting in treatment failure and increasing mortality and morbidity.<sup>11</sup> Private pharmacies are usually the first point of contact with health delivery services.<sup>12–13</sup> In one study in Laos, 60% of drugs were obtained without a prescription, drug sellers were untrained and dispensed drugs irrationally, and little or no information was given to patients.<sup>14</sup>

Few data on RTI/STI are available from Laos. In 2000, HIV prevalence in Laos was estimated to be 0.05% of the 15–49 year old population.<sup>15</sup> However, a sentinel surveillance in

2001 showed that the HIV prevalence rate was 0.9% among high risk groups (such as service women—any woman who worked in a small drink shop, nightclub, or guesthouse and had direct contact with customers<sup>16</sup>—and long distance truck drivers), and that infection rates of certain STI among service women were high, 32% for chlamydia and 14% for gonorrhoea.<sup>16</sup> Community based surveys showed that 38% of those reporting more than three sexual partners had never used condoms.<sup>17</sup> The possible introduction of HIV in such an environment could lead to a fast evolving epidemic, emphasising prevention and treatment of RTI/STI as a priority component of HIV/AIDS control.<sup>18</sup> As yet, no study on self medication with antimicrobials for RTI/STI has been done in Laos, but is highly relevant to the nation, as it is a response to the continuing increase in antimicrobial resistance, and to the high levels of STI/HIV in neighbouring countries.<sup>19–20</sup>

The aim of the study was to describe antimicrobial self medication for RTI/STI and to explore the understanding and use of health information among the adult population self medicating with antimicrobials for RTI/STI in two provinces of Laos in order to provide essential information for future interventions to contribute to quality improvement of RTI/STI management.

## METHODS

### Study site and population

This cross sectional community based study was conducted in Vientiane capital (VTC) and Champasak province (CPS) with

**Abbreviations:** CPS, Champasak province; RTI, reproductive tract infections; STI, sexually transmitted infections; VTC, Vientiane capital

500 subjects, divided equally between the two study sites. Inclusion criteria were women and men aged 18 or more who reported use of an antimicrobial as self medication for RTI/STI during the past 12 months, and who were willing to participate. The two provinces were chosen as their neighbouring countries have experienced high levels of HIV/AIDS. VTC had a total population of 531 800 in 2002, and consists of nine districts, 591 villages, and 102 043 households. CPS had a population of 503 300 and consists of 10 districts, 914 villages, and 95 685 households. The average size of the study villages was 1300 people per village in VTC and 1050 people per village in CPS. In both provinces, the average size of urban and rural villages was similar. The socioeconomic situation was somewhat better in VTC regarding, for example, household economy and education.<sup>7</sup>

### Sampling procedure

Using ordinary sample size calculations (estimated prevalence 50%, precision 5%, confidence interval 95%), the total number of participants was estimated to be 500. Within two districts (one urban, one rural) purposely selected in each province, 10 villages were randomly selected for the household survey. From each village, 25 people should be included, and thus the total number of households was divided by 25. The first household selected was the household number on the list corresponding to the quotient. Thereafter, the households were selected in relation to the same interval as the quotient. All household members aged 18 or more were screened by interviewers using a check list to determine if the individual met the criteria for inclusion or not. If the number of participants was still less than 25, new households were visited, starting with the one next in line related to the already selected households, until 25 study participants were recruited from each village.

The 500 study participants (250 in VTC and 250 in CPS), including 466 women and 34 men, were recruited from 3056 family members aged 18 years or more (1690 women and 1366 men) in 827 households in the two study sites, including 1331 family members in 363 households in VTC (714 women and 617 men), and 1725 family members in 464 households in CPS province (976 women and 749 men). Of all family members screened, 16% (500/3056) reported use of an antimicrobial as self medication for RTI during the preceding 12 months. More women than men were recruited, because more women were present during the survey, and

full information could therefore not be obtained for all men in the household.

### Definitions

In this study, self medication<sup>21</sup> with antimicrobials was defined as antimicrobial use without prescription or recommendation by a physician for the specific episode.

Syndromic case management means that diagnosis and management are based on the identification of syndromes, which are combinations of symptoms and signs, and the recommended treatment for these syndromes.

The reported symptoms of RTI/STI included abnormal vaginal discharge and low abdominal pain in women, urethral discharge and scrotal swelling in men, and genital ulcer/wart, inguinal bulbo, genital itching, and pain during passing urine or urine with pus in both women and men.

### Management of RTI/STI

Based on WHO<sup>22</sup> and national guidelines on syndromic RTI/STI case management in Laos, the recommended drugs for the treatment of vaginal discharge and lower abdominal pain syndromes in women and urethral discharge in men include metronidazole orally in single dose or daily for 7 days for bacterial vaginosis or trichomoniasis, clotrimazole cream or vaginal suppository for candidiasis, ceftriaxone or cefixime or spectinomycin in single dose for gonorrhoea, and doxycycline or tetracycline or erythromycin for 7 days for chlamydia. All treatment options should be given together with the "4 Cs"—counselling/education, correct condom use, contact tracing, and compliance with the treatment regime prescribed.<sup>18</sup>

### Data collection and analysis

The data were collected in March 2002. A pretested structured interview form (available in English or Lao from the corresponding author) contained both closed and open ended questions on demographic information, self reported symptoms of RTI/STI, details of antimicrobial self medication, and the understanding and use of health information. All 10 enumerators, who were selected by the health department of each province, were trained in order to standardise the procedures of data collection.

Data were entered into a computer and analysed using Epi-Info (version 6.04) and SPSS (version 10). The 95% confidence intervals and the  $\chi^2$  test were used to compare

**Table 1** Distribution of sociodemographic characteristics of 500 respondents using antimicrobials as self medication for RTI/STI, classified by areas

Sociodemographic characteristics	Vientiane capital	Champasak province	Total	
	(n = 250)	(n = 250)	(n = 500)	%
<b>Sex</b>				
Female	227	239	466	93.2
Male	23	11	34	6.8
<b>Age group (years)</b>				
18–24	30	44	74	14.8
25–34	98	83	181	36.2
35–44	93	74	167	33.4
45–54	25	39	64	12.8
55+	4	10	14	2.8
<b>Marital status</b>				
Married	218	209	427	85.4
Divorced/ separated/widowed	14	14	26	5.6
Single	18	27	45	9.0
<b>Education</b>				
None	17	24	41	8.2
Primary school (5 years in school)	100	139	239	47.8
Secondary school (6–11 years in school)	123	85	208	41.6
University or higher	10	2	12	2.4

**Table 2** Advisers for using antimicrobials and kinds of drugs used as self medication for RTI/STI, classified by areas. More than one alternative may be given

Advisers and kinds of drugs	Vientiane capital	Champasak province	Total	
	(n = 250)	(n = 250)	(n = 500)	%
<b>Advisers</b>				
Knowing by myself (without consulting anyone else)	27	4	31	6.2
Following previous treatment	50	39	89	17.8
Nurse	7	0	7	1.4
Drug seller	88	76	164	32.8
Friend	19	6	25	5.0
Parents/relative	21	7	28	5.6
Mixed answers:	38	118	156	31.2
Drug sellers + following previous treatment	16	45	61	12.2
Drug sellers + nurse/friends	8	55	63	12.6
Friend + relative	6	2	8	1.6
Other mixed answers	8	16	24	4.8
<b>Kinds of drugs</b>				
Ampicillin	100	65	165	33.0
Tetracycline	15	10	25	5.0
Penicillin	1	6	7	1.4
Metronidazole	1	0	1	0.2
Clotrimazole	3	0	3	0.6
Ceftriaxone	1	0	1	0.2
Mixed antibiotics :	99	150	249	49.8
Ampicillin + tetracycline	56	85	141	28.2
Ampicillin + penicillin	15	46	61	12.2
Ampicillin + kanamycin	7	6	13	2.6
Other mixed antibiotics	21	13	34	6.8
Other mixed drugs:	24	16	40	8.0
Ampicillin + clotrimazole	19	5	24	4.8
Ampicillin + traditional medicine	2	7	9	1.8
Traditional medicine + penicillin/tetracycline	3	4	7	1.4
Don't know the name of drugs	6	3	9	1.8

differences between age groups, between urban and rural areas, and between provinces.

### Ethical approval

The project was approved by the Ministry of Health of Lao People's Democratic Republic and by the Karolinska Institute, Sweden. Information was presented to local authorities before implementing the study, and all interviewees were informed about the purpose of the study. A verbal consent was taken from the interviewees after explaining that all collected information should remain confidential and anonymous.

### RESULTS

The mean age of the 500 participants was 34.8 (SD 9.5). Background information is shown in table 1. No significant

differences in the age groups were found between urban and rural areas, nor between the two study sites.

The most frequently reported symptoms among the 466 female respondents was a combination of vaginal discharge and lower abdominal pain (78%), while 29 out of 34 male respondents reported symptoms of urethral discharge. The symptoms reported by men are likely to be signs of STI, while the symptoms reported by women may be caused by other RTI.

### Details of antimicrobial self medication for RTI/STI

Most respondents (73%) reported that they had kept at least one antimicrobial at home in the past year. Almost all respondents (91%) had obtained the antimicrobials for the reported treatment episode from local private pharmacies without prescription by a physician. The others obtained

**Table 3** Reasons for self medication for RTI/STI, classified by areas

Reasons	Vientiane capital	Champasak province	Total	
	(n = 250)	(n = 250)	(n = 500)	%
Following drug advertisement	1	3	4	0.8
Following advice of other	20	35	55	11.0
Habit (following previous self treatment with similar symptoms)	47	57	104	20.8
Low cost/not enough money	8	11	19	3.8
No time to see physician	56	21	77	15.4
Too far from physician	9	7	16	3.2
No serious disease	21	14	35	7.0
Mixed answers:	78	112	190	38.0
Habit + no time to see physician/too far	22	29	51	10.2
Habit + advertisement/advice of other	12	20	32	6.4
Habit + no serious disease/not enough money	10	16	26	5.2
Advertisement + advice of other/no serious disease	17	18	35	7.0
No time to see physician + long waiting time/shy/too far	7	13	20	4.0
No serious disease + not enough money/no time	7	11	18	3.6
Other mixed answers	3	5	8	1.6

drugs from friends or relatives. Fifty eight per cent obtained the advice to buy the drugs from drug sellers, either as the only source, or together with other sources (table 2). Thirty per cent followed previous treatment, either directly or combined with advice from drug sellers.

One third of the antimicrobials used were ampicillin as a single drug, while half were mixed antibiotics, with almost all combinations containing ampicillin (table 2). In total, ampicillin was used in 83% of all cases. Only 9% knew the dosage of antibiotics used. Twenty one per cent reported use of antimicrobials for the recommended duration of 5 days or more, 66% used antibiotics for 3–4 days, and 13% for 2 days or less. There was no relation between educational level and duration of antimicrobial use.

Forty three per cent said that they treated themselves for RTI/STI out of habit, either as the only reason or one of several reasons (table 3). Of the 496 respondents who had ever gone to hospital, 59% replied that the services of medical staff were polite/good, while 37% said that the services were fair. Of 122 women who mentioned that they had problems with the genital examination, 94% replied that they were shy, and 6% were specifically afraid of pain in connection with the genital examination.

### Health information

Almost all respondents (91%) had heard some information on RTI/STI; the remaining 9% did not pay attention, or had no time to watch television/listen to the radio, or meet people. Among those who had received RTI/STI information, 58% got the information from radio or TV, 34% from drug sellers, 16% from friends, and 3% from medical staff or village health volunteers.

Of the 453 respondents receiving health information, 176 reported that they changed behaviour, including 133 who would not self medicate any more, and 43 who would use a prevention method such as a condom or having only one partner. However, only 17% of all respondents reported that they had ever used a condom (25% in Vientiane *v* 9% in Champasak,  $p < 0.01$ ).

### DISCUSSION

The major finding is that more than 80% of respondents reporting symptoms of RTI/STI and self medicating with antimicrobials bought the drugs from private pharmacies, and used non-recommended drugs, mostly not for the recommended time. Most men probably had symptoms of STI and would, consequently, need treatment with antimicrobials; however, they should be the recommended drugs. The much larger number of women should have been further investigated, following the syndromic management procedure, to determine a more precise diagnosis in order to specify the treatment.

More than three quarters of the respondents reported using antibiotics for an inappropriate duration of time, and few of them knew the dosage of drugs used. Ampicillin was the most common drug taken, probably because of low costs, easy access at every drugstore without a prescription, and familiarity with “ampi.” However, following the WHO’s recommendations,<sup>23</sup> ampicillin should not be used according to the national guidelines for syndromic STI case management,<sup>18</sup> as a high level of resistance has been detected in some Asian countries,<sup>23</sup> including Laos. As antimicrobial resistance compromises effective treatment of RTI/STI, it is important to educate people about the benefits of appropriate treatment with effective drugs in order to prevent treatment failure that may cause complications, relapse, and further transmission of infection.

Almost all respondents had bought the antimicrobials from private pharmacies and more than half had the advice to buy

the drugs from the drug sellers themselves. In Laos, all kinds of drugs, including antibiotics, are easy to access everywhere without a physician’s prescription and a correct diagnosis. In addition, stigma and shame associated with RTI/STI might be important barriers to appropriate diagnosis and treatment services,<sup>24</sup> as many women respondents reporting RTI/STI symptoms said that they were shy of the genital examination and opted for self medication. Similarly, studies in private pharmacies in Vietnam and Brazil found that none provided correct treatment for STI.<sup>25–26</sup>

As private pharmacies in Laos are a common place for people to obtain advice for RTI/STI treatment, the critical question is how the quality of care can be improved. Evidence suggests that STI services provided by pharmacy staff, especially pharmacists, can be significantly improved through short term training, although the improvements have been shown to be time limited, indicating the need for continued training and supervision.<sup>27–29</sup> Recognising the importance of prompt and correct treatment with effective drugs for RTI/STI in combination with health education to the public, continuous training of drug sellers on syndromic STI case management should be initiated to improve their awareness and competence. In addition, strict control should be put on the prescription and sale of these antimicrobials. However, this can be done only if there is enough access to trained doctors or other personnel, as well as diagnostic equipment being available throughout the country.

The most common reasons for self medication with antimicrobials for RTI/STI were habit or following previous self treatment of similar symptoms. Such behaviour in association with inappropriate antimicrobial use may contribute to the development of antimicrobial resistance.<sup>30</sup> In order to encourage appropriate and prompt care seeking behaviour for RTI/STI, there is a need to improve health education messages, focusing on behaviour change communication for RTI/STI, such as a change in knowledge about RTI/STI, causation, transmission, prevention, or treatment. However, it has been well substantiated that real, long lasting behavioural change is not the result of simply telling people what to do.<sup>31</sup> To address a sensitive issue like RTI/STI and to promote changes in health seeking behaviour requires an understanding of people’s needs, concerns, and perceptions. As an example, the low rate of self reported use of condoms raises concerns that promotion of condoms should be one priority in the health education activities for protection against HIV and RTI/STI.<sup>32</sup>

The limitations of this study include: (1) its reliance on self reported information on symptoms of RTI/STI, and the fact that it was not possible to validate symptoms by laboratory tests for practical reasons; (2) an interval of up to 12 months between antimicrobial self treatment of RTI symptoms and interview may affect accurate recall, resulting in under-reporting as well as over-reporting; and (3) the possibility of response bias because of the sensitive character of RTI/STI could not be excluded.

In conclusion, this study shows that more than three quarters of respondents who were self medicating for RTI/STI with antimicrobials used inappropriate drugs, bought from private pharmacies. There is a need to improve RTI/STI management, including health promotion, through interventions at community level and health providers, including drug sellers at private pharmacies.

### ACKNOWLEDGEMENTS

This study was one of the five Health System Research projects in implementation of the National Drug Policy Programme in Laos, supported by the Swedish International Development Cooperation Agency (Sida). We thank Professor Boungnong Boupha for her supervision of the project, and all directors of provincial health departments for their cooperation in this study. Our thanks also go to

## Key messages

- More than 80% of respondents reporting symptoms of RTI/STI and self medicating with antimicrobials bought from private pharmacies, used non-recommended drugs, mostly not for the recommended time
- 58% of respondents self medicating for RTI/STI obtained advice to buy the drugs from drug sellers at private pharmacies
- The most common reasons for antimicrobial self medication for RTI/STI were habit or following previous self treatment with similar symptoms
- The rate of self reported use of condoms was low (17%)

Dr Somphao Gneunphonsavath, Dr Khamphou Chanthavong, Mr Sangkhane Choumklamphanh, Ms Aphone Visatthep, and Dr Syda Xayyavong for their commitment to the implementation of the project. We also thank Dr Keonakhone Houamboun, Dr Sengchanh Koumnavong, Dr Rattiphone Oula, Dr Solveig Freudenthal, and Professor Bo Eriksson for their valuable comments, and all interviewers and interviewees for their friendly participation in the research work.

## CONTRIBUTORS

AS contributed to the planning, design, implementation, analysis, and writing of the paper; LS contributed to supervision of the implementation of the study in the field, analysis and writing of the paper; KA contributed to supervision of the planning, design, and analysis of the study; CSL, GT, and RW contributed to supervision of the planning, design, analysis, and writing of the paper.

## Authors' affiliations

**A Sihavong**, Vientiane Capital Health Department, Ministry of Health, Lao People's Democratic Republic

**A Sihavong, C S Lundborg, G Tomson, R Wahlström**, Division of International Health (IHCAR), Department of Public Health Sciences, Karolinska Institutet, Stockholm, Sweden

**L Syhakhang**, Food and Drug Department, Ministry of Health, Lao People's Democratic Republic

**K Akkhavong**, National Institute of Public Health, Ministry of Health, Lao People's Democratic Republic

**G Tomson**, Medical Management Centre, Karolinska Institutet, Stockholm, Sweden

**C S Lundborg**, Nordic School of Public Health and Apoteket AB, Goteborg, Sweden

Conflict of interest: none.

## REFERENCES

- 1 **Mayaud P**, Hawkes S, Mabey D. Advances in control of sexually transmitted diseases in developing countries. *Lancet* 1998;**351**(Suppl 3):29–31.
- 2 **Chandeying V**. Pelvic inflammatory disease and perihepatitis. In: Aria OP, Hart CA, eds. *Sexually transmitted infections and AIDS in the Tropics*. New York: CABI Publishing, 1998:326–35.
- 3 **Ghys PD**, Fransen K, Diallo MO, et al. The association between cervical-vaginal HIV shedding STDs and immunosuppression in female sex workers in Abidjan, Cote d'Ivoire. *AIDS* 1997;**11**:85–93.
- 4 **Mayaud P**, Mosha F, Todd J, et al. Improved treatment services significantly reduce the prevalence of STDs in rural Tanzania: results of a randomised controlled trial. *AIDS* 1997;**11**:1873–80.
- 5 **White RG**, Orroth KK, Korenromp EL, et al. Can population differences explain the contrasting results of the Mwanza, Rakai, and Masaka HIV/STD intervention trials? : a modeling study. *AIDS* 2004;**37**:1500–13.
- 6 **Korenromp EL**, White RG, Orroth KK, et al. Determinants of the impact of sexually transmitted infection treatment on prevention of HIV infection: A synthesis of evidence from the Mwanza, Rakai, and Masaka intervention trials. *J Infect Dis* 2005;**191**(Suppl 1):S168–75.
- 7 **National Statistics Centre**. *Basic statistics 2002*, Lao People's Democratic Republic, 2003.
- 8 **Ministry of Health, National Institute of Public Health**. *Health status of the people in Lao PDR*, National Health Survey, 2001.
- 9 **World Health Organization**. *World health report*, Lao People's Democratic Republic, 2004. ([www.who.int/whr](http://www.who.int/whr)).
- 10 **Ministry of Health, Food and Drug Department**. *National drug policy programme 1993–2003*, Ministry of Health, Food and Drug Department, Lao People's Democratic Republic, 2003.
- 11 **Hart CA**, Kariuki S. Antimicrobial resistance in developing countries: review. *BMJ* 1998;**317**:647–50.
- 12 **Tomson G**, Sterky S. Self-prescribing by way of pharmacies in three Asian developing countries. *Lancet* 1986;**13**:620–2.
- 13 **Adu-Sarcodie YA**. Antimicrobial self-medication in patients attending a STD clinic. *Int J STD AIDS* 1997;**8**:456–8.
- 14 **Stenson B**, Syhakhang L, Eriksson B, et al. Real world pharmacy: assessing the quality of private pharmacy practice in the Lao People's Democratic Republic. *Soc Sci Med* 2001;**52**:393–404.
- 15 **UNAIDS/WHO**. *Report on the global HIV/AIDS epidemic*, June, 2000.
- 16 **National Committee for the control of AIDS Bureau**. *National action plan on HIV/AIDS/STD 2002–2005*, Ministry of Health, Lao People's Democratic Republic, 2002.
- 17 **World Health Organization**. *HIV/AIDS in Asia and the Pacific region* 2001.
- 18 **Ministry of Health**. *National Policy and Strategy for the prevention and care of STD of Lao PDR*, National Programme for Prevention and Care of STD, Vientiane, Ministry of Health, 1998.
- 19 **Limpakarnjanarat K**, Mastro TD, Saisorn S, et al. HIV-1 and other sexually transmitted infections in a cohort of female sex workers in Chiang Rai, Thailand. *Sex Transm Infect* 1999;**75**:30–5.
- 20 **Ohshige K**, Morio S, Mizushima S, et al. Cross-sectional study on risk factors of HIV among female commercial sex workers in Cambodia. *Epidemiol Infect* 2000;**124**:143–52.
- 21 **World Health Organization**. *The role of pharmacist in self-care and self-medication*. Geneva: WHO, 1998.
- 22 **World Health Organization**. *STD case management*. Geneva: WHO, WHO/GPA/TCO/PMT/95.18/H, 1995.
- 23 **Tapsall J**. Antimicrobial resistance in Neisseria gonorrhoeae. Geneva: World Health Organization, WHO/CDS/CSR/DRS/2001.3.
- 24 **Cunningham SD**, Tschann J, Gurvey JE, et al. Attitudes about sexual disclosure and perceptions of stigma and shame. *Sex Transm Infect* 2002;**78**:334–8.
- 25 **Chalker J**, Chuc NTK, Falkenberg T, et al. STD management by private pharmacies in Hanoi: practice and knowledge of drug sellers. *Sex Transm Infect* 2000;**76**:299–302.
- 26 **Ramos MC**, da Silva RD, Gobbato RO, et al. Pharmacy clerks' prescribing practices for STD patients in Porto Alegre, Brazil: missed opportunities for improving STD control. *Int J STD AIDS* 2004;**15**:333–6.
- 27 **Chuc NTK**, Larsson M, Do NT, et al. Improving private pharmacy practice: A multi-intervention experiment in Hanoi, Vietnam. *J Clin Epidemiol* 2002;**55**:1148–55.
- 28 **Garcia P**, Hughes J, Carcamo C, et al. Training pharmacy workers in recognition, management, and prevention of STDs: district-randomized controlled trial. *Bull World Health Organ* 2003;**81**:806–14.
- 29 **Tuladha SM**, Mills S, Acharya S, et al. The role of pharmacists in HIV/STD prevention: evaluation of an STD syndromic management intervention in Nepal. *AIDS* 1998;**12**(Suppl 2):S81–7.
- 30 **World Health Organization**. *Report on infectious diseases 2000. Overcoming antimicrobial-resistance*, [www.who.int/infectious-diseasereport/2000/index.html](http://www.who.int/infectious-diseasereport/2000/index.html).
- 31 **UNFPA and Population Council**. *Reproductive tract infections: a guide for programme managers*. New Delhi: UNFPA and Population, 2001.
- 32 **NIAID/NIH**. *Workshop summary: scientific evidence on condom effectiveness for sexually transmitted diseases prevention*. Washington: NIH, 2001.