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STI
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ANTENATAL CLINIC STI SURVEY

PORT VILA, VANUATU

MINISTRY OF HEALTH, VANUATU

WORLD HEALTH ORGANIZATION – WESTERN PACIFIC REGIONAL OFFICE

AUGUST 2000

ANTENATAL CLINIC STI SURVEY PORT VILA VANUATU

Directorate of Public Health,

Ministry of Health, Samoa

with support from the

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EXECUTIVE SUMMARY

The Antenatal Clinic STI survey was a laboratory-confirmed sexually transmitted infection (STI) prevalence survey. The aim of the survey was to determine the prevalence rates of gonorrhoea, chlamydiosis, trichomoniasis, treponemal seroreactivity and human immunodeficiency virus (HIV) among women attending the First-visit Antenatal Clinic at the Vila Central Hospital. The HIV testing was the first formal seroprevalence surveying of HIV in Vanuatu.

The cross-sectional survey was conducted by the Directorate of Public Health, Ministry of Health, Vanuatu, in conjunction with an Australian technical team from the University of New South Wales and the Royal Women's Hospital, Melbourne. During the period from October 12, 1999 to February 29, 2000, 547 pregnant women aged 15-46 years were consecutively recruited from the First-visit Antenatal Clinic at Vila Central Hospital, Port Vila. Of the women sampled, 54% were aged 25 years or younger. A tampon swab and a blood sample were collected from each of the participating women. The tampon swabs were tested by polymerase chain reaction (PCR) for chlamydial infection, gonorrhoea, *Trichomonas vaginalis* and betaglobin. HIV was assayed with a commercially available enzyme-linked immuno-sorbent assay (ELISA) and a repeat ELISA for confirmation. Syphilis serology was performed using the rapid plasma reagin (RPR) as the screening test with a *Treponema pallidum* haemagglutination assay (TPHA) as a confirmatory test. All specimens underwent laboratory testing at the Royal Women's Hospital.

The survey was voluntary, incorporating individual informed consent. All components of the survey, including the antenatal examination, laboratory testing and treatment, were free to study participants. Testing for gonorrhoea, chlamydial infection, *Trichomonas vaginalis* and syphilis was confidential and linked. Testing for HIV was unlinked anonymous testing. Treatment was provided to study participants who were diagnosed either syndromically and/or by laboratory testing, as well as to their contacts

The University of New South Wales carried out the data analysis in conjunction with the Directorate of Public Health, Ministry of Health, Vanuatu. There were 214 women with one or more STI. The most prevalent laboratory-confirmed STI was trichomoniasis, with 27.4% (150) of the women having a trichomonal infection, followed by chlamydiosis (21.4%; n=117) and gonorrhoea (5.9%; n=32). There were 15 women with positive RPR results, of whom 13 (2.4%) had positive treponemal antibody tests. There were no positive HIV test results in the HIV seroprevalence survey of the 547 women.

The prevalence of STIs in a moderate- to low-risk population of pregnant women in Port Vila is high. The prevalence rates of trichomonal and chlamydial infections are of concern, particularly in association with known poor pregnancy outcomes. At the national level, current policies and programmes for STIs and HIV need to be reviewed, especially the capacity for laboratory testing of STIs, prevention strategies for HIV and STIs, and implementation of syndromic case management of STIs. Further characterization and surveillance of STI prevalence is needed. Programmes for STI detection and management need to be supported

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INTRODUCTION

Sexually transmitted infections (STIs) are a major public health problem in the developing world. In Asia and the Western Pacific, STIs are an important problem because of their impact on maternal and child health. There is little information available about the epidemiology of STIs in developing countries in the Pacific area. However, STIs, excluding human immunodeficiency virus (HIV) infection, rank among the most important causes of healthy productive life-years lost in developing countries.[1] In addition, the risk of heterosexual HIV acquisition and transmission may be greatly increased in the presence of curable STIs, and symptomatic infections appear to carry greater risks than asymptomatic infections.[1] The association between STIs and HIV is strongest for those infections that cause genital ulceration[2-4] but has also been demonstrated for infections such as gonorrhoea, chlamydiosis and trichomoniasis.[5,6] Sexually transmitted diseases that cause genital inflammation have been shown to increase the efficiency of HIV transmission by as much as fivefold. The literature has shown that interrupting STI transmission at these initial points of spread, such as with male patients with chlamydial urethritis, and treating them, reduces the proportion of cases in which HIV is detected and the amount of HIV in the ejaculate. Treatment of STIs and health education, including correct condom use, is the most efficient and cost-effective way to contain the HIV epidemic.

In order to make their STI and HIV policies and programmes more efficient, the Government of Vanuatu, in collaboration with the World Health Organization , decided to conduct a study to determine the epidemiology of STIs and provide an estimate of the prevalence of various etiologic agents responsible for STIs within their country.

The Republic of Vanuatu has an estimated population of 160 700 (1994), spread across more than 83 islands. The majority of the population live in settlements of <200 people. Vanuatu, like other Pacific nations, has a high annual population growth rate (2.8%; 1989 Census). Internal migration is high, with approximately one in three persons living in a different region from where they were born (1989 Census). There has been a history of rural drift, particularly of young adults aged 20-39 years, to the two major cities of Port Vila and Luganville.

Vanuatu has a high fertility rate of 5.3 (1989 Census), a low contraception use rate of 15% (1991) and a crude birth rate of 38/1000 population. Almost all (93%) pregnant women receive some formal antenatal care, with an average of four visits per woman. It is estimated that approximately 50% of the population are aged less than 18 years. The adult literacy rate was 30% in a 1991 World Bank report, with only a 12% secondary school gross enrolment rate among those aged 12-18 years.

There is a marked gender division of roles and expectations in Vanuatu. The practice of bride price, in which the wife is bound economically, socially and religiously to her husband and his family, is still followed in most of the country. The use of contraception, or barrier methods such as condoms, continues to be largely predetermined by males. Males also determine when sexual activity occurs in and outside marriage, and are not culturally restricted from having casual partners, as women are. Condom availability is still erratic, particularly for unmarried women. A 1992 KABP survey reported that 96% believed premarital and extramarital sex was occurring. This is compounded by the fragmentation of village community life, rising teen pregnancy incidence (4.5% in 1991) and the high general fertility rate. There appears to be no recognized, established, commercial sex industry in Vanuatu and there are no full-time brothels in Port Vila. It is speculated that casual freelance commercial sex occurs when cruise or navy ships come to Port Vila or Santo.

The 1998 Mitchell report on young people aged 13-18 years revealed that 43% of those interviewed sometimes smoked and 46% sometimes drank alcohol.[7] The study findings also suggested that many young people were sexually active, but the level of information on contraception, condom use and safe sex practices was extremely variable. Low use of condoms (11.3%) and the pill (23.9%) was reported by females, while 53.4% of males reported using condoms. The use of condoms was problematic, with female respondents reporting that there was considerable male resistance to them, and females being accused of being promiscuous if they suggested condom use. The study concluded that a large proportion of the young population was at risk of pregnancy and/or STIs.

The epidemiology of STIs in Vanuatu is poorly defined. STI surveillance is inefficient, only consisting of hospitals and community health centres reporting general outpatient statistics of suspected or confirmed cases (depending on the laboratory support) to the Department of Health. The number of confirmed cases of gonorrhoea in 1994 and 1995 at Vila Central Hospital ranged from <10-120 (300:1993). There is no passive reporting of STIs by private medical practitioners. There have been no reported cases of AIDS or HIV infection since national reporting was established by the National AIDS/ STD programme in 1988. One strategy to improve STI surveillance would be to conduct periodic baseline prevalence studies of selected STIs.

Screening, diagnosis and treatment costs for many STIs are expensive and are likely to exceed the country's per capita health budget. One possible cost-effective public health strategy would be the adoption of country-customized STI syndromic case management. However, in order to best apply syndromic case management, it is important to know the epidemiology of STIs in the community. In 1998, the World Health Organization funded the development of a generic protocol to conduct ad hoc laboratory-confirmed STI prevalence surveys in the Western Pacific Region. The Republic of Vanuatu was one of four countries funded by WHO in 1999 to conduct an STI prevalence survey.

This document details the findings of the first STI prevalence survey in Vanuatu. The survey was of pregnant women attending the First-visit Antenatal Clinic at the Vila Central Hospital. It is important to consider that surveys of this type are limited in that they do not represent all major population groups and so will not be a true prevalence study of STI pathogens in the whole community. However, if used within these limitations, they provide valuable data on the prevalence of selected STIs in the studied population. Such information can be used to refine STI policy and planning and revise disease prevalence estimates in population subgroups. This is the report of the findings of the survey, which was conducted during 1999–2000 in Port Vila, Vanuatu.

STUDY INVESTIGATORS

The study was coordinated by the Ministry of Health, Directorate of Public Health. The Principal Investigator was Mrs Miriam Abel, Director of Public Health. The study team was based in Vanuatu with a technical support team in Australia (Table 1).

Table 1 Vanuatu Antenatal Clinic Health Study Team and Technical Support Group

Name	Affiliation	Role
Miriam Abel	Public Health , Ministry of Health	Principal Investigator
Katimal Kaun	National AIDS/STD Prevention Programme	Study Manager
Dr Alan Grice	Antenatal clinic Vila Central Hospital	Senior Obstetrician
Helen Wambi Taleo	Principal Laboratory Officer	Laboratory
Marie Jean Baptiste Willy	Vila Central Hospital	Antenatal clinic
Stephen Thomas	Vila Central Hospital	Pharmacy, supplies
Dr Elizabeth Sullivan	University of NSW	Study coordinator/epidemiologist
Dr Sepehr Tabrizi	Royal Women's Hospital	Referral Laboratory
Professor Sue Garland	Royal Women's Hospital	Referral Laboratory

OBJECTIVES OF THE PREVALENCE STUDY

(1) To determine the prevalence rates of gonorrhoea, chlamydiosis, trichomoniasis and HIV among women attending the First-visit Antenatal Clinic at the Vila Central Hospital, Port Vila;

(2) to determine the prevalence rates of treponemal seroreactivity in women attending the First-visit Antenatal Clinic at the Vila Central Hospital, Port Vila;

(3) to provide baseline data to monitor trends in the prevalence of gonorrhoea, chlamydial and trichomonal infections; and treponemal seroreactivity and HIV among antenatal mothers in Port Vila; and

(4) to strengthen the capacity for epidemiological assessment and surveillance of STIs in Vanuatu.

For the purpose of the survey the prevalence rate is a measure of frequency of the specific STIs during the 20-week survey period (from October 12, 1999 to February 29, 2000) of pregnant women attending the Vila Central Hospital, Port Vila, Vanuatu.

SEXUALLY TRANSMITTED INFECTIONS INCLUDED IN THE SURVEY

(1) *Neisseria gonorrhoea* (gonorrhoea), *Chlamydia trachomatis* (chlamydiosis) *Trichomonas vaginalis* (trichomoniasis);

(2) Syphilis: prevalence of treponemal seroreactivity;

(3) HIV.

The four STIs, gonorrhoea, chlamydiosis, trichomoniasis and syphilis, were included in the prevalence survey because the infections are curable, are spread primarily by sexual transmission and are often asymptomatic in women. In the case of chlamydial infection, there had been no laboratory testing capacity in Vanuatu prior to the survey.

In the case of treponemal seroreactivity, the prevalence survey only determined the prevalence in the study population of antenatal women. This provides a measure of "lifetime exposure". An unknown proportion of the women identified as treponemal-seroreactive would have received treatment at some stage in the past (prescribed, coincidental or self-prescribed). This is therefore not a measure of the prevalence of syphilis (active infection) and, if misinterpreted as such, will overestimate the burden of infection in the population. Accurate diagnosis of infectious syphilis and latent syphilis requires the recording of serial rapid plasma reagin (RPR) titres and treatment details. A significant proportion of high-level titres supports a high background prevalence of active infection.

METHODS

POPULATION

A cross-sectional study was conducted to determine by laboratory confirmation the prevalence of *Neisseria gonorrhoea, Chlamydia trachomatis, Trichomonas vaginalis, Treponema pallidum,* and HIV among 547 pregnant women attending the Vila Central Hospital First-visit Antenatal Clinic over a five-month period from October 1999 to February 2000. During this period, all women presenting for their first antenatal visit were recruited. The hospital clinic is situated in Port Vila, the largest city in the Republic of Vanuatu and serves the peri-urban area.

Ethics approval for the study was granted by the Ministry of Health, Republic of Vanuatu, and the Committee on Experimental Procedures involving Human Subjects, at the University of New South Wales, Australia.

Pregnant women attending the clinic were invited to participate in the study. Well-informed consent was obtained before inclusion in the study. Participation in the study was voluntary and written consent was obtained from all participants prior to data and sample collection.

A questionnaire was confidentially administered by one of the senior female registered nurses working in the Antenatal Clinic to obtain limited demographic information on: last menstrual period, gestational age, maternal age, gravidity, parity, marital status, date of specimen collection, place of residence and island of birth.

SPECIMEN COLLECTION, TRANSPORTATION AND PREPARATION IN VILA

Prior to the routine antenatal speculum examination, a tampon was inserted and immediately withdrawn by one of the three doctors who participated in the study and placed in 15 ml of transport medium (0.14 M NaCl, 3 mM KCl, 10 mM Na_2HPO_4, 2 mM KH_2PO_4).[8]

After the routine antenatal examination, the women went to the Vila Central Hospital Laboratory (on-site) to have a blood sample collected. A 5 ml blood sample from each patient was obtained in a serum separation gel tube (Sarstedt, Adelaide, Australia). Serum was separated by centrifugation at 3000 rpm for 10 minutes. The tampon and separated serum samples were stored at 4°C in the Vila Central Hospital Laboratory until transportation to the Molecular Microbiology Laboratory of the Royal Women's Hospital, Melbourne, Australia. All specimen collection, preparation, storage and shipping was supervised by the Principal Laboratory Officer at the Vila Central Hospital Laboratory. All specimens were packed according to IATA regulations. Ice packs were included in all shipments. Specimens were shipped by air from Port Vila, Vanuatu, to Melbourne, Australia. Shipment times varied from one to four weeks, depending on specimen numbers.

SPECIMEN PREPARATION AND TESTING, AUSTRALIA

Upon tampon specimen arrival at the Molecular Microbiology Laboratory, Royal Women's Hospital, Melbourne, cells were dislodged from tampons by manual ringing and squeezing and were pelleted by centrifugation. The DNA was extracted from a 20 µl aliquot of tampon cell pellet[9] using a QIAamp DNA Purification Kit (Qiagen Inc., Valencia, CA, United States of America) as per the manufacturer's instructions.

POLYMERASE CHAIN REACTION (PCR):

Overall, three amplification reactions were performed on DNA extracted from each tampon specimen: (1) combined amplification of *C. trachomatis* and *N. gonorrhoeae* sequences using Roche COBAS Amplicor (Roche Diagnostics, Branchburg, NJ, United States of America); (2) amplification of *T. vaginalis* sequences; and (3) amplification of ß-globin gene sequences as positive internal control.

PCR reaction for detection of *C. trachomatis* and *N. gonorrhoeae* by COBAS included mixing of 25 µl of extracted tampon DNA and 25 µl of specimen diluent (Roche Diagnostics), followed by a 10-minute room temperature incubation prior to amplification and detection of *C. trachomatis* and *N. gonorrhoeae*.[10] All positive *C. trachomatis* results were confirmed by repeat testing and *N. gonorrhoeae* positive specimens were confirmed using Roche 16S confirmatory assay (Roche Diagnostics).

PCR detection of *T. vaginalis* and ß-globin gene sequences were performed using a rapid real-time PCR (LightCycler, Roche Molecular Biochemicals). Amplifications were performed in capillaries with a volume of 10 µl, consisting of 2 µl aliquot of extracted DNA and 1x Hot Start Reaction Mix (Roche Diagnostics) containing 2.5 mM $MgCl_2$ final concentration. Amplification reaction for *T. vaginalis* DNA sequences consisted of 0.5 µM of each primer TVA5 - TVA6 directed at amplifying a 102 bp fragment of genomic DNA[11,12] and 0.2 µM of hybridization probes TV-F1AS 5'ttacactctgagttctttcttcta 3' (3'fluorescein labelled) and acceptor fluorophore TV-F2AS 5' agtctttttagattttgaaaca 3' (5'LC640 Red labelled and 3' phosphorylated to block polymerase extension during PCR). Both probes were purified by HPLC post synthesis (Genset, Singapore). The samples were heated at 95 °C for 10 minutes and cycled 45 times using parameters of 95 °C for 0 seconds, 50°C for 10 seconds and 72°C for 10 seconds. Fluorescence was acquired once each cycle at the end of the annealing segment. A cycle for fluorescence acquisition of a melting curve was appended to the end of the amplification cycle. This cycle included a programmed rate of 20°C/second to 95 °C, cooling at 20°C/second to 40°C, a 10-second hold at 40°C, and heating at 0.2°C/second to 80°C. During heating from 40 to 80°C, the fluorescence from fluorescein was measured each second. Fluorescein data for each sample were plotted as derivatives of LC640/fluoresecin fluorescence Vs temperature. The presence of peak at a melting temperature of 51°C confirmed the presence of *T. vaginalis* sequences. All positive specimens were repeat-tested to confirm positivity.

The amplification reagent for ß-globin gene sequences consisted of 0.5 µM of each primer GH20-PC04,[12] 1x LightCylcer-Fast Start Master Syber Green 1 (Roche Molecular Biochemicals) 2.5 mM $MgCl_2$. The samples were heated at 95 °C for 10 minutes and cycled 45 times using parameters of 95 °C for 0 seconds, 55°C for 10 seconds and 72°C for 10 seconds. Fluorescence was acquired once each cycle at the end of the extension segment. A cycle for fluorescence acquisition of a melting curve was appended to the end of the amplification cycle. This cycle included a programmed rate of 20°C/second to 95 °C, cooling at 20°C/second to 40°C, a 10-second hold at 45°C, and heating at 0.2°C/second to 95°C. During heating from 45 to 95°C, fluorescence was measured continuously. Fluorescein data for each sample were plotted as derivatives of fluorescence vs temperature. The presence of peak at a melting temperature of 88°C confirmed the presence of ß-globin gene sequences, indicating the presence of adequate amplifiable DNA in the sample.

Positive clinical specimens by culture for *T. vaginalis* were used as positive and negative controls. Strict procedures were followed to avoid specimen contamination and carry-over.

ANTIBODY TESTING OF SERUM

Each serum sample was separated into two aliquots upon receipt at the Melbourne Laboratory. One aliquot of the serum sample was tested by RPR (Panbio, Baltimore, MD, United States of America) according to the manufacturer's instructions. All positive RPR sera were re-tested using *Treponema pallidum* haemagglutination assay (TPHA, Omega Diagnostic, Scotland, United Kingdom) for confirmation of positives.

HIV tests were done on a delinked aliquot of serum using IMX HIV 1 and 2 III Plus (Abbott Diagnostics, Abbott Park, IL United States of America) according to the manufacturer's instructions. Positive serum samples were re-tested by the IMX assay and, if positive, were then tested by a reference laboratory using Western blot.

PARTNER NOTIFICATION AND TREATMENT

During their antenatal visits, the women received counselling on antenatal care and STI and HIV prevention. Based on clinical findings, all women were treated at the time of examination, following the standard treatment used in Vanuatu. Untreated infections subsequently detected by laboratory tests were treated at follow-up visits. Gonorrhoeal infections were treated with a single intramuscular injection of 4.8 mega units (16mls) of procaine penicillin and a single 1 g oral dose of probenecid. Chlamydial infections were treated with a daily oral dose of 2 g of erythromycin (500 mg 6 hourly) for a period of seven days. Syphilis was treated with three intramuscular injections of benzathine penicillin, 2.4 million units over a three-week period. Trichomonal infections were treated with a single oral dose of 2 g of metronidazole. Metronidazole was not prescribed in the first trimester.

Dependant upon the time required to test the samples, women were informed of the results at their next routine antenatal visit or recalled for laboratory results and management at an earlier date. Adequate treatment was given according to the Vanuatu-modified WHO recommendations for syndromic case management. The women were asked to bring in their partners for treatment and counselling. There was no cost for treatment.

NOTIFICATION OF RESULTS

The results were notified to the Director of Public Health as they became available. This varied from weekly to monthly. The results were faxed care of the WHO office in Vanuatu to maximize confidentiality. The results for HIV were delinked and were reported on a population basis. The Director of Public Health then notified the antenatal clinic and the laboratory of the results.

DATA ANALYSIS

The results of the study were analysed as follows:

(1) number and proportion of persons with positive test results for each STI and HIV;
(2) prevalence of each STI and HIV stratified by the study population and, where applicable, by five-year age group;
(3) proportion of treponemal reactive sera by five-year age group;
(4) to assess the association of variables of interest with a particular STI, odds ratios were calculated with 95% confidence intervals and/or chi-square tests.

An estimated prevalence rate ratio and a 95% confidence interval, based on the estimated coefficients from the regression model, were calculated for all variables. Associations were assessed by odds ratios (ORs) with exact 95% confidence intervals (CIs). Differences between proportions, by sociodemographic and other characteristics, were tested using the Pearson chi-square test. Correlation of factors was tested using Pearson's correlation test. Non-normally distributed data and continuous data were tested using Kruskal-Wallis and Mann-Whitney non-parametric tests. Factors significantly associated ($P<0.05$) to a statistical association with STIs in the univariate analysis were entered into a logistic regression model with infection as the outcome variable. Multivariate logistic regression models were developed using a backward elimination method. The data were compiled and analysed using the statistical software SPSS (Chicago, IL, United States of America) version 10.5

RESPONSE RATE

A total of 547 pregnant women were consecutively recruited into the study during the period from October 1999 to February 2000. There were no non-responders. From the 547 study participants, 546 (99.8%) tampons samples, 537 (98.2%) sera samples, and 546 (99.8%) patient study forms were received.

RESULTS

CHARACTERISTICS OF THE STUDY POPULATION

All eligible women agreed to participate in the study. A total of 547 pregnant women were recruited, 77.1% from Vila and 22.1% from other villages on the island of Efate (Table 2).. Participants' ages ranged from 15 to 46 years (mean 25.7 years, standard deviation 5.8 years), with nearly half (269; 49.2%) under 25 years of age. Among the 547 pregnant women, 185 (34.1%) were primigravidas, and most (308; 56.8%) were married. Gestational age ranged from 6-41 weeks, with a mean gestational age of 21 weeks at presentation. Twenty percent (109) of the pregnant women presented to the clinic in their first trimester, 57.5% (310) presented in the second trimester and 22.2% (120) in the third trimester. The women came from 33 different islands, 91 (16.6%) from Tanna, 70 (12.8%) from Efate, 56 (10.2%) from Ambrym and 51 (9.3%) from Malekula. Island of birth was not significantly associated with current infection.

Table 2 Demographic characteristics of 547 pregnant women attending the Vila Central Hospital First-visit Antenatal Clinic, Port Vila, Vanuatu, from October 1999 to February 2000.

Characteristic	Number	Percentage
Age group (years) (n=547)		
15-19	66	12.1
20-24	203	37.1
25-29	142	25.9
30-34	89	16.3
35-39	40	7.3
>40	7	1.3
Median age years (range)	25	15-46
Marital status (n=542)		
Single	234	43.2
Married	308	56.8
Parity (n=538)		
Primiparous	194	36.1
Multiparous	344	63.9
Gravida (n=545)		
Primigravida	186	34.1
Multigravida	359	65.9
Residence (n=525)		
Vila	405	77.1
Villages Efate	116	22.1
Other Islands	4	0.8
Gestational age (n=541)		
Range (weeks)	6-41	
Median (weeks)	20	

Table 2b shows that increasing age (by age group) was associated with an increasing number of pregnancies (χ^2=211, 4 degrees of freedom, p=0.001).

Table 2b Gravidity by five-year age group of 545 pregnant women attending the Vila Central Hospital First-visit Antenatal Clinic, Port Vila, Vanuatu, from October 1999 to February 2000.

Age group (years) n=545	Pregnancy			
	First		Two or more	
15-19	61	93.8%	4	6.2%
20-24	101	50.2%	101	49.8%
25-29	16	11.3%	125	88.7%
30-34	5	5.6%	84	94.4%
³35	2	4.3%	45	95.7%
Total	186	34.1%	359	65.9%

Table 2c shows that increasing age (by age group) was associated with marriage (χ^2=120, 4 degrees of freedom p=0.001).

Table 2c Marital status by five-year age group of 542 pregnant women attending the Vila Central Hospital First-visit Antenatal Clinic, Port Vila, Vanuatu, from October 1999 to February 2000.

Age group (years) n=542	Marital Status			
	Single		Married	
15-19	54	81.8%	12	18.2%
20-24	119	58.9%	83	41.1%
25-29	42	30.2%	97	69.8%
30-34	18	20.5%	70	79.5%
³35	1	2.1%	46	97.9%
Total	234	43.2%	308	56.8%

PREVALENCE OF SEXUALLY TRANSMITTED INFECTIONS AND SEROPREVALENCE OF TREPONEMAL ANTIBODIES AND HIV

Prevalence was zero for HIV infection, 2.4% for treponemal antibodies, 5.9% for gonorrhoea, 21.5% for chlamydial infection, and 27.5% for trichomonal infection (Table 3). The prevalence of women with either chlamydial and/ or gonorrhoeal infection was 22.4%.

Table 3 Baseline prevalence of sexually transmitted infections and seroprevalence of treponemal antibodies and HIV among 545 pregnant women attending the Vila Central Hospital First-visit Antenatal Clinic, Port Vila, Vanuatu, from October 1999 to February 2000.

Sexually transmitted infection	Baseline prevalence			
	Number tested	Number of women with infection	Prevalence %	95% confidence interval
Trichomonas vaginalis	545	150	27.5	23.8, 31.3
Chlamydia trachomatis and / or Neisseria gonorrhoea	545	122	22.4	18.9, 25.9
Chlamydia trachomatis	545	117	21.5	18.0, 24.9
Neisseria gonorrhoea	545	32	5.9	3.9, 7.9
Treponemal antibody seroreactivity	537	13	2.4	1.1, 3.7
HIV	537	0	0	-

CURRENT INFECTION IN STUDY POPULATION WITH BOTH TAMPON AND SERUM SAMPLES

In all, 535 pregnant women (97.8%) had microbiological results available for all 4 bacterial STIs; missing results were due to 11 (Blood 10; 1.8% and tampon 1; 0.2%) samples not being collected and 1 tampon sample being unusable. Of these 535 women, 138 (25.8%) had at least one infection, 46 (8.6%) had two concurrent infections, 23 (4.3%) had three concurrent infections and 2 (0.4%) women had all four infections.

Decreasing maternal age was highly correlated with the presence of infection (Pearsons corrrelation –0.22, p=0.0001) (Table 3b). The younger women (<25 years) were more likely to have a current infection than the older women (OR=2.5, 95% CIs 1.7, 3.6). Almost three in five (58.1%) teenage women had an infection, compared to one in two women aged 20-24 years. Women with current STIs were significantly younger than women without STIs (median 24.2 years versus median 26.7 years; Mann Whitney test Z=-5.1, p<0.001). Women with current STIs were significantly more likely to be single than women without an infection (OR 3.1, 95% CI 2.2, 4.5; model χ^2=39.2, 1 degree freedom, p<0.001). There was no difference in the gestation of women with infection when compared with women without infection (median 20 weeks, [mean 21.3 weeks] versus median 20 weeks, [mean 20.6 weeks]; Mann Whitney test Z=-0.74, p=0.5)

Table 3b Number of current infections by five- year age group of 535 pregnant women attending the Vila Central Hospital First-visit Antenatal Clinic, Port Vila, Vanuatu, from October 1999 to February 2000.

Age group (years) n=535		Infection					
		No		Current			
				One		Two to four	
15-19	**62**	26	41.9%	22	35.5%	14	22.6%
20-24	**200**	105	52.5%	66	33.0%	29	14.5%
25-29	**139**	93	66.9%	24	17.3%	22	15.8%
30-34	**88**	66	75.0%	19	21.6%	3	3.4%
≥35	**46**	36	78.3%	7	15.2%	3	6.5%
Total	**535**	326	60.9%	138	25.8%	71	13.3%

Table 3c Univariate associations between demographic data and any sexually transmitted infection among 535 pregnant women attending the Vila Central Hospital First-visit Antenatal Clinic, Port Vila, Vanuatu, from October 1999 to February 2000.

Variable	Presence of one or more sexually transmitted infection			
	Pearson chi-square	P-value	Adjusted odds ratio	95% CI
Age				
<25 years	25.8	<0.0001	2.5	1.7, 3.6
≥25 yr			1.0	
Marital status				
Single	39.2	<0.001	3.1	2.2, 4.5
Married			1.0	
Single aged <25 years	0.5	<0.001	2.6	1.8, 3.8
Gravida				
Primigravida	12.1	0.001	1.9	1.3, 2.8
Multigravida			1.0	
Parity				
Nulli/primiparous	18.7	<0.001	2.2	1.5, 3.2
Multiparous			1.0	
Residence				
Urban	0.05	0.82	1.0	0.7, 1.6
Villages			1.0	

There were significant independent associations between current STI and being young, single or having your first pregnancy (Table 3c). Variables identified as significantly associated with a current STI were placed in a regression model.

Table 3d Multivariate models using significant demographic factors and any sexually transmitted infection among 535 pregnant women attending the Vila Central Hospital First-visit Antenatal Clinic, Port Vila, Vanuatu, from October 1999 to February 2000.

Model	Factors	Model Wald chi-square	Model P-value	Adjusted odds ratio	95% CI
1	<25 years	51.2	<0.001	2.5	1.5, 4.3
	Single			4.1	2.2, 7.5
	Single & <25 years			0.4	0.2, 0.96
2	<25 years	46.9	<0.001	1.7	1.2, 2.6
	Single			2.5	1.7, 3.7

Marital status was correlated with age (<25 years versus >25 years) (Pearsons correlation 0.48, p<0.01). Gravidity was significantly correlated with parity (Pearsons correlation 938, p=0.01). Both parity and gravidity were used separately in the initial modelling, with only gravidity being used in the final logistic regression models. Marital status, age, gravidity and a composite variable of young and single were placed in a backward stepwise logistic regression model. Two final multivariate models were considered for predicting current infection after gravidity was removed (Table 3d). The final multivariate model (Model 2) for infection contained two variables: age less than 25 years (OR=1.7, 95% CIs 1.2, 2.6) and being single (OR=2.5, 95% CIs 1.7, 3.7); both were independently associated with infection (model χ^2=46.9, 2 degrees freedom, p<0.001).

PREVALENCE OF TRICHOMONAS VAGINALIS

Of the survey sample, 27.5% were diagnosed with trichomonal infection. Of those, 43.5% (n=64, 12.0% of the overall study sample) were diagnosed with another STI in addition to trichomoniasis. The prevalence of trichomonal infection by five-year age group is detailed in Table 4. Nearly half of the pregnant women aged 15-19 years had a current trichomonal infection. The ages of women with current trichomonal infections were significantly lower than women without trichomonal infections (24.0 years versus 26.4 years; $p<0.001$). Of the women with a trichomonal infection, 34 (22.8%) were in their first trimester (gestational age 13 weeks or less). There was no difference in the gestation of women with infection when compared with women without infection (median 19 weeks versus 20 weeks; Z=-0.098, $p=0.3$).

Table 4 Prevalence of *Trichomonas vaginalis* by five-year age group among 545 pregnant women attending the Vila Central Hospital First-visit Antenatal Clinic, Port Vila, Vanuatu, from October 1999 to February 2000.

Age group years	Study population by age group	Number positive trichomoniasis test results	Percentage of total age group population
15-19	66	30	45.5
20-24	202	62	30.7
25-29	141	36	25.5
30-34	89	15	16.9
≥35	47	7	14.9
Total	545	150	27.5

Note: Denominator =545 because 1 tampon specimen was not collected and 1 was unavailable for analysis.

Of the women with trichomonal infection, 58.4% (n=87) were single ($p<0.001$); 49.0% (n=72) were primiparous ($p<0.001$); and 61.0% (n=91) were aged less than 25 years ($p<0.001$).

Trichomonal infection was associated with gravidity, marital status and age. Being a young (OR 2.0; 95% CIs 1.3, 2.9), single (OR 1.8; 95% CIs 1.4, 2.5) or primigravida (OR 2.0; 95% CIs 1.3, 2.9) pregnant woman was independently associated with current trichomonal infection. (Table 4b).

Table 4b Univariate associations between demographic data and *Trichomonas vaginalis* among 545 pregnant women attending the Vila Central Hospital First-visit Antenatal Clinic, Port Vila, Vanuatu, from October 1999 to February 2000.

Variable	Pearson chi-square	P-value	Adjusted odds ratio	95% CI
Age **<25 years**	12.2	0.001	2.0	1.3, 2.9
Marital status **single**	20.0	<0.0001	2.4	1.6, 3.5
Gravida **Primigravida**	12.2	<0.001	2.0	1.3, 2.9
Residence **Urban**	0.2	0.7	0.9	0.6, 1.4

Gravidity, marital status and age were significantly associated with current trichomonal infection and were placed in a logistic regression model. The final logistic regression model for trichomonal infection contained only one variable: marital status. Women with trichomonal infections were significantly more likely to be single; this was reported by 87 (58.4%) of the 149 women with infection (OR 2.4, 95% CI 1.6, 3.5; model χ^2=19.9, 1 degrees freedom, p<0.001).

PREVALENCE OF CHLAMYDIA TRACHOMATIS

Of the survey sample, 21.5% were diagnosed with chlamydial infection. Of those, 58.3% (n=67, 12.5% of the overall study sample) were diagnosed with another STI in addition to chlamydiosis. The prevalence of chlamydial infection by five-year age group is detailed in Table 5. One third of the pregnant women aged 15-19 years had a current chlamydial infection. The average ages of women with current chlamydial infections were significantly lower than of women without chlamydial infections (24.2 years versus 26.2 years; p<0.001). There was no difference in the gestation of women with infection when compared with women without infection (median 20 weeks versus 20 weeks; Z=-0.32, p=0.7).

Table 5 Prevalence of *Chlamydia trachomatis* by five-year age group among 545 pregnant women attending the Vila Central Hospital First-visit Antenatal Clinic, Port Vila, Vanuatu, from October 1999 to February 2000

Age group years	Study population by age group	Number of positive chlamydiosis test results	Percentage of total age group population
15-19	66	22	33.3
20-24	202	51	25.2
25-29	141	29	20.6
30-34	89	9	10.1
≥35	47	6	12.8
Total	545	117	21.5

Note: Denominator =545 because 1 tampon specimen was not collected and 1 was unavailable for analysis.

Of the women with a chlamydial infection, 67.0% (n=77) were single (p<0.001); 46.1% (n=53) were primiparous (p=0.008); and 63.5% (n=73) were aged less than 25 years (p<0.001). Chlamydial infection was associated with gravidity, marital status and age. Being a young (OR 2.0; 95% CIs 1.3, 3.0), primigravida (OR 1.6; 95% CIs 1.0, 2.4) or single (OR 2.7; 95% CIs 1.9, 3.8) pregnant woman was independently associated with current chlamydial infection. (Table 5b).

Table 5b Univariate associations between demographic data and chlamydial infection among 545 pregnant women attending the Vila Central Hospital First-visit Antenatal Clinic, Port Vila, Vanuatu, from October 1999 to February 2000.

Variable	Pearson chi-square	P-value	Adjusted odds ratio	95% CI
Age **<25 years**	10.4	0.001	2.0	1.3, 3.0
Marital status **single**	34.3	<0.001	3.5	2.3, 5.5
Gravida **primigravida**	4.4	0.036	1.6	1.0, 2.4
Parity **primiparous**	7.4	0.006	1.8	1.2, 2.7
Residence **urban**	0.02	0.9	1.0	0.6, 1.6

Gravidity, marital status and age were significantly associated with current chlamydial infection and were placed in a logistic regression model. The final logistic regression model for chlamydial infection contained only one predictor: marital status. Of the 115 women with a chlamydial infection, 77 (67%) were single. Women with a chlamydial infection were significantly more likely to be single, (OR=3.5, 95% CIs 2.3, 5.4); marital status was independently associated with chlamydial infection (model χ^2=34.3, 1 degrees freedom, p<0.0001).

CONCURRENT CHLAMYDIAL AND GONORRHOEAL INFECTIONS

Of the pregnant women, 122 had concurrent chlamydial and gonorrheal infections. Being a single (OR 3.7; 95% CIs 2.4, 5.7), or young (OR 1.9; 95% CIs 1.3, 3.0) pregnant woman was independently associated with concurrent chlamydial and gonorrheal infection. Women who were young and single were 2.4 times more likely to have concurrent chlamydial and gonorrheal infections (OR 2.4; 95% CIs 1.6, 3.6). Women who were primiparous were 1.9 times more likely to have concurrent chlamydial and gonorrheal infections (OR 1.9; 95% CIs 1.2, 2.8) than multiparous women.

GONORRHOEAL INFECTION

Of the survey sample, 5.9% were diagnosed with gonorrhoea. Of those, 87.5% (n=28, 5.2% of the overall study sample) were diagnosed with another STI in addition to gonorrhoea. The prevalence of gonorrhoeal infection by five-year age group is detailed in Table 6. Approximately one in six of the pregnant women aged 15-19 years had a current gonorrhoeal infection. The average ages of women with current gonorrhoeal infections were significantly lower than of women without gonorrhoeal infections (22.4 years versus 26.0 years; p=0.001). There was no difference in the gestation of women with gonorrhoeal infections when compared with women without gonorrhoeals infection (median 19 weeks versus 20 weeks; Z=-0.57, p=0.6).

Table 6 Prevalence of *Neisseria gonorrhoea* by five-year age group among 545 pregnant women attending the Vila Central Hospital First-visit Antenatal Clinic, Port Vila, Vanuatu, from October 1999 to February 2000.

Age group years	Study population by age group	Number of positive gonorrhoea test results	Percentage of total age group population
15-19	66	11	16.7
20-24	202	12	5.9
25-29	141	7	5.0
30-34	89	2	2.2
[3]35	47	0	0
Total	545	32	5.9

Note: Denominator =545 because 1 tampon specimen was not collected and 1 was unavailable for analysis.

Of the women with a gonorrhoeal infection, 75% (n=24) were single (p<0.05) and 72% (n=23) were aged less than 25 years (p<0.05). Being a young (OR 2.8; 95% CIs 1.3, 6.2), single (OR 4.0; 95% CIs 1.8, 8.7) or primigravida (OR 2.6; 95% CIs 1.3, 5.4) pregnant woman was independently associated with current gonorrhoeal infection (Table 6b).

Table 6b Univariate associations between demographic data and gonorrhoeal infection among 545 pregnant women attending the Vila Central Hospital First-visit Antenatal Clinic, Port Vila, Vanuatu, from October 1999 to February 2000.

Variable	Pearson chi-square	P-value	Adjusted odds ratio	95% CI
Age **<25 years**	7.0	0.008	2.8	1.3, 6.2
Marital status **single**	14.2	<0.001	4.3	1.9, 9.8
Gravida **primigravida**	7.5	0.006	2.6	1.3, 5.4
Residence **urban**	0.9	0.352	1.6	0.6, 4.2

Gravidity, marital status and age were significantly associated with current gonorrhoeal infection and were placed in a regression model. The final logistic regression model for gonorrhoeal infection contained only one variable: marital status. Women with gonorrhoeal infections were significantly more likely to be single, which was reported by 24 of the 32 women with infections (OR 4.3, 95% CI 1.9, 9.8; model χ^2=14.4, 1 degree freedom, p<0.001).

TREPONEMAL ANTIBODIES

Fifteen pregnant women had a positive rapid plasma reagin (RPR), with another three equivocal results. Treponemal antibodies were positive in 13 of the 18 samples, all three equivocal RPR were negative on TPHA testing. The STS proportions reflect not only the incident syphilis but also the reactive serostatus of patients who did not have newly diagnosed syphilis. The prevalence of positive tests for treponemal antibodies by five-year age group is detailed in Table 7. None of the demographic variables (including age and marital status) were associated with an increased risk of a positive treponemal antibody test.

Table 7 Prevalence of treponemal antibodies by five-year age group among 537 pregnant women attending the Vila Central Hospital First-visit Antenatal Clinic, Port Vila, Vanuatu, from October 1999 to February 2000.

Age group years	Study population by age group	Number positive treponemal antibody test results	Percentage of total age group population
15-19	62	2	3.2
20-24	201	5	2.5
25-29	140	3	2.1
30-34	88	2	2.3
≥35	46	1	2.6
Total	537	13	2.4

Note: Denominator =537 because 10 sera samples were not collected.

Of the survey sample, 2.4% were diagnosed positive for treponemal antibodies. Of those, 76.9% (n=10, 1.9% of the overall study sample) were diagnosed with another STI in addition to having treponemal antibodies.

DISCUSSION

The importance of having reliable STI prevalence estimates in the Asia and Pacific region is seen in the results of this STI prevalence survey in Vanuatu. The unexpectedly high burden of disease among a traditionally low-risk population of antenatal women argues for policy and community-level interventions in addition to the more traditional approaches of individually focused behaviour-change intervention. The high prevalence rate of bacterial STIs is of major concern, with more than one in four women having either a trichomonal and/or a chlamydial infection. Chlamydial infection has long been associated with pelvic inflammatory disease (PID) and infertility, while trichomonal infection has been implicated in at least one study with atypical PID in infertile women.[14] The prevalence rates found in Vanuatu are of a similar magnitude to those found in countries in Africa and Asia that having been experiencing HIV epidemics in the 1990s. Despite the survey finding an HIV seroprevalence of zero, the STI picture remains alarming and suggests a community at great risk for the introduction and rapid spread of HIV infection.

The survey was designed according to the WHO requirement to measure the prevalence of STIs, and not to procure associated risk or behavioural information. Even though the survey was of a specific subpopulation of pregnant women in Vila, the study investigators believe that this sample gives a reasonable representation of women of reproductive age in Vanuatu as a whole. It is important that interpretation of the findings takes into account the limitations of the data due to the lack of information on: whether the women were symptomatic or asymptomatic; whether the women had ulcerative or non-ulcerative genital infections; a post-treatment test of cure; risk and behavioural factors. If this information had been available it may have influenced recommendations arising from the findings of the survey.

The lack of the survey's information on the presence of symptoms restricts the usefulness of the data in developing and evaluating algorithms for a syndromic approach in the management of STIs. Research on reproductive tract infections has shown that, in any given population, the majority of women with gonoccocal or chlamydial cervical infection will be asymptomatic, and that a significant number will also be asymptomatic for trichomonal infection.[15] Case-finding of often asymptomatic, non-ulcerative female genital infections is difficult unless resources are available to establish and maintain laboratory testing facilities. In other countries with a high prevalence of STIs but inadequate resources to support widespread laboratory testing, a syndromic approach has been used for symptomatic individuals. The syndromic approach is most effective when it has been customized for the population and has been based on local epidemiological prevalence data and public health strategies. Despite the limitations in case-finding of subclinical and asymptomatic STIs, and the often poor treatment-seeking behaviour demonstrated by certain populations with STI symptoms, syndrome management has been found to be a cost-effective strategy in treating STIs.

Another suggested control strategy approach in high-prevalence populations, such as the antenatal population in Vila, is the use of mass treatment, usually followed by syndrome management.[16] This can be implemented as either epidemiologic mass treatment of the whole community (defined as those sexually active) or can be targeted at high-risk groups within the community, commonly known as core groups. The advantage of mass treatment over syndromic case management is that both asymptomatic and symptomatic individuals are treated, and that it captures the whole population, including those with low health-seeking behaviour. The presumptive treatment with antibiotics in high-prevalence populations is thought to have both a treatment and, in some STIs, a prophylactic effect. The aim of mass treatment is a rapid and significant decrease in the disease reservoir. However, in isolation the strategy is ineffective. It must be

The application of this strategy to Vanuatu should be considered because of the high rates of trichomonal and chlamydial infections in women, noting that the rates in men are unknown. There has been limited use of mass treatment internationally, but it has been effective in two studies in Africa. Wawer's study showed significant reductions in the prevalence of syphilis and trichomonal infections in the general population, while Steen's showed significant reductions in the prevalence of chlamydial and gonorrhoeal infections and genital ulcers in targeted high-risk women in a mining community.[18, 19] Vanuatu, with its small population and discrete island geography, may be suited to mass treatment. However, it would be useful to know the prevalence in males prior to implementation of a mass or targeted treatment strategy. It may be an effective strategy for use on Efate and Santo among adults of reproductive age, 15-49 for women and 15-59 years for men. As noted earlier, this type of strategy could only be considered if there were both the resources and the capacity to not only implement the STI strategy but also sustain STI control measures that include primary prevention and improved case management, as well as access to and availability of STI health services.

The prevalence rate for chlamydial infection among women attending their first antenatal clinic was 21.5%. This is a high rate of infection in a traditionally low-risk population of women. The rates were highest for women aged less that 20 years. There was no laboratory capacity to test for chlamydial infection in Vanuatu prior to this survey. The test does not indicate when the infection occurred. Therefore, some of the infections may have been old and may not have related to current partners. The results of an ad hoc survey can be inflated by picking up old (prevalent) as well as new (incident) infections, and do not necessarily reflect the community rate of new infection. Nevertheless, the one-in-five infection rate among pregnant women has a significant implication for the community as a whole as chlamydial infection is not only implicated in pelvic inflammatory disease and preterm labour, but is also a major cause of infertility.

The high rate of bacterial STIs among the antenatal population suggests the need to review current antenatal screening so that curable STIs are treated early in pregnancy. This would involve following up the partners of the women with infections, as well as testing the treatment algorithm to make sure the antibiotics being prescribed are effective. The evaluations of syndromic case management in two studies[19,20] of women attending antenatal clinics have shown variable results in using risk-assessment algorithms to detect chlamydial and/or gonococcal cervical infections.

However, the use of risk assessment in conjunction with the application of specific clinical criteria in those with a positive risk assessment increased the positive predictive value of the algorithms. In Mwanza, Tanzania, in a population of 660 antenatal women with a cervical infection prevalence of 7.4%, it was found that the use of an algorithm of locally derived sociodemographic risk factors in conjunction with a speculum and pelvic examination in the clinic setting had a PPV of 36% for cervical infections.[20] In Libreville, Gabon, in a population of 646 antenatal women with a cervical infection prevalence of 11.3%, it was found that the use of age and marital status and simple clinical signs within the clinic setting had a PPV of 17%.[16]

The rate of infection detected in the survey was not equal across all age groups, with younger mothers having a significantly greater risk of infection than older mothers. Nearly 60% of the pregnant teenagers in the survey had at least one STI and, of those, two in five had two to four infections. Single status was also independently associated with a higher risk of infection. The group at highest risk for infection was teenage, single mothers. This is not surprising when the findings of Mitchell's study of low contraception and condom use in 13-18 year old women are considered.[7] This may reflect a combination of factors, such as cultural expectations of a woman's role in sexual relationships; access to and affordability of family planning/sexual health services, contraception and condoms; or inadequate or inappropriately targeted pregnancy and STI harm minimization strategies.

The availability of antenatal assessment and care in Vanuatu is good. However, this needs to be broadened, or a similar model adopted for sexual health and family planning care, so that there is access to prevention information, screening and medical care where necessary. The use of mobile clinics should be encouraged as they have been for other health services. It is apparent from the high rates of STIs among adolescent single women that harm minimzation messages of safer sex are not successful. Prevention is important, but the availability of confidential, affordable clinical services is also essential in containing the transmission of STIs.

Confidentiality is another issue of major concern and needs to be addressed. Even although there were no confirmed HIV-positive test results in this seroprevalence survey, the high STI rates suggest the inevitability of there being HIV-positive results. It is critical that strategies be put in place to maintain the confidentiality of patients when HIV-positive results occur and to offer them the best medical care that can be supported

The limited surveillance of STIs in Vanuatu needs to be reviewed. Reliable surveillance data are important for the following reasons: they inform policy development; assist in prioritization of health issues; quantify the enormity of the disease burden and potential risks; and can be used to evaluate STI programmes. STI programmes can include health promotion harm-minimization programmes that promote the use of condoms and a safer sex message, or health information programmes to raise community awareness of STIs and HIV. Surveillance data can also be used to evaluate the implementation of syndromic case management programmes and the introduction of antenatal screening or testing capacity for specific STIs. The type of surveillance that is most suitable for Vanuatu needs to be determined. This may be sentinel surveillance, which could be clinic-based at the two major antenatal clinics in Vila and Santo; periodic ad hoc STI surveys of specific populations; laboratory-based surveillance; or passive reporting by medical officers and health workers.

The survey findings pose a number of significant questions as to how and where to proceed in a climate of limited resources. Vanuatu has a finite health budget that has a number of legitimate competing concerns, a small professional workforce and limited access to technology and new or expensive medication. Therefore, it is critical when recommendations are developed at the dissemination forum that there be due consideration of the sustainability of the measures adopted, including any local capacity-building. The following need to be considered at the dissemination forum, where their merit can be assessed and a strategic plan developed to address the high prevalence of STIs in Vanuatu.

ITEMS FOR CONSIDERATION

(1) Review of policy and strategies for STIs and HIV in the Ministry of Health Second National Health Development Plan 1997-2001, including surveillance, clinical services, laboratory services, health promotion, role of syndrome management and staff training and development;
(2) review of conditions included in routine antenatal screening (eg. chlamydiosis and trichomoniasis);
(3) review of access to confidential clinical services for sexual health and family planning, including the feasibility of free treatment;
(4) review of general and specialist clinical services for the detection and management of STIs, including numbers and level of training of staff;
(5) customization of syndrome management for Vanuatu, taking

(7) consideration of the strategy of targeted mass treatment of chlamydial and trichomonal infections;
(8) review of the national drug list to include, where possible, single dose drug therapy for STIs (eg. chlamydial infection with possibly azithromycin), and to include antiretrovirals for HIV infection;
(9) evaluation of current STI and HIV prevention strategies in health education and promotion for young people;
(10) review of public education to promote awareness of STI symptoms and to improve treatment-seeking behaviour;
(11) review of access to condoms to prevent STI transmission, including their availability and affordability;
(12) consideration of a community-based strategy to promote condom use in all casual and commercial sex;
(13) review of policies and access to treatment for symptomatic individuals, screening for asymptomatic infections and presumptive treatment of contacts of index cases;
(14) review of access to contraception to prevent unplanned pregnancy, including availability and affordability;
(15) review of strategies related to teenage pregnancy;
(16) development of a surveillance strategy for STIs and HIV;
(17) development of strategy to address public health and clinical management of HIV infection; and
(18) ad hoc surveys (surveillance) of STIs. A behavioural and risk factor STI prevalence survey of high-risk males would better determine community prevalence rates and predictors of infection and also assist in looking at the cure rate of proposed drugs to be used in treatment of STIs.

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