

## High prevalence of trichomonal vaginitis and chlamydial cervicitis among a rural population in the highlands of Papua New Guinea

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### SUMMARY

We conducted a community-based study of the prevalence of sexually transmitted diseases in rural and periurban communities in Eastern Highlands Province. We interviewed a stratified random sample of women and men, examined the women for evidence of sexually transmitted diseases (STDs) and collected specimens for diagnosis of syphilis, by serology and dark-field microscopy, gonorrhoea, by Gram stain and culture, chlamydial infection, by polymerase chain reaction (PCR) and direct immunofluorescence (DIF), trichomoniasis, by wet mount, and bacterial vaginosis, by wet mount and Gram stain. The men were tested for chlamydial infection only (first void urine tested by PCR and DIF). 201 women and 169 men were tested. Additionally, adults in the same communities who had not been randomly selected were offered the same services. An extra 243 women and 85 men were tested in this way. The laboratory results confirmed the clinical impression of an extremely high prevalence of STDs in this population. Among those randomly selected, 46% of the women had trichomonal vaginal infections and 26% had *Chlamydia trachomatis* infections detected by PCR, while 25% of the men had chlamydial infections. Other infections were much less common. 58% had one or more STDs. The prevalence of infection in self-selected adults was similar to that found in those randomly selected.

### Introduction

Following years of virtually universal neglect of, and disregard for, sexually transmitted diseases (STDs) as a public health problem, in both industrialized and developing countries, the emergence of the global pandemic of acquired immune deficiency syndrome (AIDS) has resulted in increasing interest in STDs and their control as a means to combat the spread of AIDS. However, STDs are a concern not just because they increase the transmission of human immunodeficiency virus (HIV) (1) but also because they cause considerable morbidity and mortality in their own right, both in terms of immediate illness and long-term sequelae. The long-term sequelae can cause physical and psychological suffering and even death, and include infertility, ectopic pregnancy, chronic pelvic pain and cervical cancer. In order to adequately develop programs for the control and management of STDs, including development

of appropriate treatment regimens, services, surveillance and health promotion, it is necessary to obtain information on their prevalence and aetiology.

Available evidence suggested that sexually transmitted diseases were common in Papua New Guinea (PNG) and probably increasing (2-4). However, no community-level information on the prevalence of STDs was available as all data were from health facilities. Data based on health facility usage are likely to suffer from a number of limitations, including underreporting, inconsistent reporting and probable misdiagnosis, as well as gross underutilization of these facilities. STDs are highly stigmatized and utilization of services, particularly by women, is low. Further, changes in utilization, diagnosis or reporting can result in apparent changes in incidence where no such change has occurred. Studies purposely designed to determine the correct aetiology of disease, with adequate laboratory

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backup, overcome some of these problems, and have demonstrated that chlamydial infections are common among patients attending STD clinics in PNG (4). A study at Port Moresby General Hospital also found that 17% of women presenting for antenatal care were infected with *Chlamydia trachomatis* (5). Thus the available data suggested that STDs were a public health problem among those in urban communities who used health facilities, but no data were available which indicated the extent of the problem in rural areas.

In order to address this deficit, we conducted a cross-sectional community-based study of the prevalence and aetiology of STDs and other reproductive tract infections (RTIs) among women of reproductive age in a rural and periurban area of the Eastern Highlands Province of PNG, and the prevalence of chlamydial infection among men in the same population. We also collected data on postulated risk factors for infection, utilization of services, reported symptoms and clinical findings. The study was conducted from April to August 1995. Ethical clearance for the study was obtained from the Medical Research Advisory Committee of PNG. Only the laboratory results will be reported here.

## Methods

### Selection, recruitment and data collection

The study was conducted in a rural and periurban population of 19 208 people in the Asaro Valley, Eastern Highlands Province, which had been previously censused by the PNG Institute of Medical Research (PNG IMR). A stratified random cluster sample of 16 clusters each containing 18 women aged 15 to 45 years and 18 men over the age of 15 years was selected, giving a total of 288 women and 288 men. Unfortunately, clan warfare involving three of the selected clusters prevented their participation in the study and necessitated reselection of clusters. Only two clusters were selected to replace these as the fighting covered most of the villages in that census division which had been censused. Thus, only 15 clusters were finally included in the study, giving a total of 270 women and 270 men selected. As some of the selected participants were not present in the village at the time the study team visited, second (and, if

necessary, third) persons identified from the data base to replace those absent were then asked to participate. In small villages, this was not always possible. A total of 261 women and 185 men were both randomly selected and present.

Inclusion criteria for all subjects were: normally and currently resident in that area; provision of informed consent; randomly selected; women aged 15 to 45 years; men aged 15 years or more. In addition, any nonselected men or women present in the selected village at the time were allowed to participate if they desired, but their results were analyzed separately.

As the level of biomedical knowledge about reproductive health is very low in these communities, an educational program was conducted in each village in order to increase people's knowledge and to explain the purpose and design of the study, and to increase compliance with and interest in it (6). Following this program, the selected participants were given a full explanation and their consent sought. Additionally, others present but not selected were included if they requested it.

Participants were interviewed by same-sex interviewers, with collection of the following data: demographic, obstetric history in women, sexual history (including numbers of partners, history of STDs and partner's STDs), and current or recent symptoms. For men, first-void urine specimens were collected the following day for detection of *C. trachomatis*. Women were brought to the clinic for examination and specimen collection. Examination of the women included a brief general examination and abdominal, speculum and bimanual examination, and was performed by a female doctor.

### Specimen collection and laboratory procedures

Specimens collected from women were: blood for syphilis serology; a cotton-tipped high vaginal swab for Gram stain for detection of bacterial vaginosis; two dacron endocervical swabs for detection of *C. trachomatis*; one cotton-tipped endocervical swab for Gram stain and culture of *Neisseria gonorrhoeae*; and

amine test, pH and wet mount preparation of vaginal secretions from the speculum, for detection of bacterial vaginosis and *Trichomonas vaginalis*. Syphilis serology: rapid plasma reagin (RPR) and *Treponema pallidum* haemagglutination (TPHA) were performed using the Murex system, following the manufacturer's instructions. A cut-off of 1:4 was used for the RPR which was then confirmed by TPHA. Gram stain: smears were stained using standard techniques (7). The vaginal swab was used for detection of bacterial vaginosis (see criteria below) and the endocervical swab for detection of gram-negative intracellular diplococci. Detection of *C. trachomatis* using the MicroTrak direct fluorescence test was performed with the Syva kit according to the manufacturer's instructions. The slides were read by two observers and pronounced positive when at least 5 elementary bodies were independently seen by both observers. Detection of *C. trachomatis* using polymerase chain reaction (PCR) was performed using primers which amplify the four nonvariable segments of the major outer membrane protein (MOMP) gene, which is unique to *C. trachomatis*. For further details of both methods for detection of chlamydial infection see Mgone et al. (8).

Culture for *N. gonorrhoeae*: endocervical swabs were smeared on to GC medium containing vancomycin inhibitor and on to chocolate agar, then transported in candle jars to the laboratory, where they were placed in a CO<sub>2</sub> incubator at 37°C and read after 24 and 48 hours. Colonies were Gram-stained and identified further using standard techniques (7). A wet mount of vaginal secretions was immediately prepared from the speculum using normal saline, after determination of pH using standard test strips and performance of the amine test with potassium hydroxide (9). The wet mount was used to detect *T. vaginalis*, the presence of which was considered diagnostic for trichomonal vaginitis, and for the laboratory confirmation of bacterial vaginosis, which was considered positive if 3 of the following 4 criteria were present: clue cells on wet mount or Gram stain, pH > 4.5, positive amine test, and the absence of normal flora on a Gram stain of the vaginal fluid.

All data were double-entered on to computer using Foxpro 2.5 and analyzed using EpiInfo 5.01. Results for the randomly selected and self-selected participants were compared using the Wilcoxon rank sum test and calculating chi squared statistics, as appropriate.

**TABLE 1**

NUMBERS OF PARTICIPANTS AND AGES BY SEX AND SELECTION PROCESS

	Female Participants		
	Random	Self	Total
Total interviewed	225	264	489
Total examined	201	243	444
Age range	14 – 55	14 – 70	14 – 70
Mean age	30.3	29.3	29.7
	Male Participants		
	Random	Self	Total
Total interviewed	177	87	264
Total tested	169	85	254
Age range	14 – 70	16 – 70	14 – 70
Mean age	32.9	31.2	32.4

## Results

A total of 225 randomly selected women and 177 randomly selected men were interviewed, of whom 201 women were examined and 169 men provided first-void urine specimens. In addition, 264 self-selected women and 87 self-selected men were interviewed, of whom 243 women were examined and 85 men provided urine specimens. The age range and mean for each group are shown in Table 1. There were no significant differences between the two groups for either sex.

A very high level of both chlamydial infection and trichomonal infection was detected. The results in Table 2 show the detection rate for each disease for the randomly selected and self-selected participants separately. The chlamydial results are for PCR detection, which was found to be slightly more sensitive than immunofluorescence (8). The results for gonococcal infection are those detected by culture. There were no significant differences in the prevalence between those randomly selected and those self-selected.

## Conclusions

The main infections detected were *T. vaginalis* and *C. trachomatis*, with the level of chlamydial infection being similar for men and women. Bacterial vaginosis was also common. These are among the highest levels of infection by these organisms reported, and are particularly worrying as this is a relatively low-risk population. Trichomonal infections, while often mild, may cause physical discomfort as well as psychological distress for the woman, and are associated with adverse neonatal outcomes (1,10). Chlamydial infections are often asymptomatic, but have severe sequelae, including chronic or recurrent pelvic inflammatory disease, ectopic pregnancy, infertility and neonatal infections, and may also be associated with increased risk of postpartum infections (1,11). The high prevalence of chlamydial infection detected may be the cause of the unusually high levels of tubal infertility found in this population (12,13). Both these organisms have been shown to increase transmission of HIV (1).

**TABLE 2**

LABORATORY RESULTS BY SEX AND SELECTION PROCESS

	Random		Self		Total	
	+/n	%	+/n	%	+/n	%
<b>Women</b>						
Trichomonas	92/198	46.5	106/240	44.2	198/438	45.2
Bacterial vaginosis	18/197	9.1	35/238	14.7	53/435	12.2
Chlamydia (PCR)	53/201	26.4	57/241	23.7	110/442	24.9
Gonorrhoea	3/201	1.5	2/243	0.8	5/444	1.1
Syphilis (serology)	8/204	3.9	13/243	5.3	21/447	4.7
Any infection	124/201	61.7	155/243	63.8	279/444	62.8
Any STD	117/201	58.2	138/243	56.8	255/444	57.4
<b>Men</b>						
Chlamydia (PCR)	42/169	24.9	20/85	23.5	62/254	24.4

The level of infection was extremely high, with no significant differences between those randomly selected and those self-selected. However, in this preliminary analysis we have not performed an in-depth assessment of confounding factors, and subsequent analyses may reveal differences between the two groups.

It is clear that reproductive tract infections are a major problem in this community. Despite the preliminary nature of this report, in view of the high prevalence of infection, the problems with infertility in this population, and the ever-encroaching AIDS epidemic, we believe that urgent action is required to combat this problem. This should include revisions to standard management procedures; modifications and improvements to the health services, particularly in their capacity to screen for and treat STDs in women; community-level awareness raising; and widespread distribution of condoms.

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