The Pakistan Development Review
44 : 2 (Summer 2005) pp. 131–158

Reproductive Tract Infections among Women in Pakistan: An Urban Case Study

DURR-E-NAYAB

Reproductive tract infections (RTIs) among women—despite being common and having grave consequences—are not given much attention by policy-makers and health planners. The asymptomatic nature of most infections makes their detection and diagnosis difficult, making laboratory testing the most accurate method of bio-medical diagnosis. The present paper assesses the magnitude and nature of infections as diagnosed through laboratory testing and looks into the variation in magnitude and the nature of RTIs among women with different socio-economic and demographic characteristics. The aetiological rate of infection among women is found to be 24 percent, with the majority of these women testing positive for endogenous infections. Factors significantly increasing the likelihood of having an infection include intrauterine device use or getting a tubectomy, short inter-pregnancy intervals, and lower economic status of women.

The term reproductive tract infections (RTIs) refers to a variety of infections affecting the lower and upper reproductive tract of men and women. However, RTIs show, what Dixon-Mueller and Wasserheit (1991) call "gender asymmetry" and Hatcher, *et al.* (1989) refer to as "biological sexism". Uninfected women are more susceptible to acquire an infection from infected male partner than an uninfected male from an infected woman, and women are likely to suffer more serious and long-term consequences, like, pelvic inflammatory disease (PID), ectopic pregnancy, cervical cancer and infertility. These consequences could be particularly confounding in most developing countries where woman's status in the society, and even within the family, is usually dependent on her fertility. To make things worse, RTIs in many cases are

Durr-e-Nayab is Research Anthropologist at the Pakistan Institute of Development Economics, Islamabad.

Author's Note: This paper is part of a larger study done for my PhD dissertation at the Australian National University, Canberra, Australia. I am indebted to my supervisor, Professor Terence Hull, for his constant guidance, and to unknown referees of this journal who gave comments on an earlier version of this paper.

asymptomatic among women, making their detection and diagnosis difficult. Despite such grave consequences, policy-makers and health planners in developing countries have not given much attention to these infections. In part, it is due to the misconceptions that RTIs are not fatal, are expensive to treat, and that they affect only a particular segment of population, such as commercial sex workers. The risk for women getting RTIs is further exacerbated in the developing countries because of the existing socio-economic and cultural environment, especially that created by the taboos surrounding sexuality. These include financial constraints, gender roles in decision-making, constraints on mobility, health-seeking behaviour during illnesses, and norms related to menstruation, pregnancy and childbirth.

Considering the often asymptomatic nature of RTIs among women laboratory testing remains the most accurate method of bio-medical diagnosis of reproductive tract infections. Such tests, however, are generally expensive, complex and largely inaccessible to women in resource poor countries. Efforts to find more cost-effective, but still accurate, methods to diagnose RTIs in resource poor settings have suggested in devising means like risk assessment or syndromic management[1] of these infections, but there is a growing evidence proving them to be far from accurate [Sloan, *et al*. (2000); Klitsch (2000); Bhatia and Cleland (2000, 1995); Hawkes, *et al.* (1999); Teles, *et al.* (1997); Zurayk, *et al*. (1995)].

Evidence available in Pakistan on the subject, albeit scanty, is generally through certain small clinical based studies or some inferences that can be drawn from studies mainly focussed on family planning behaviour, through verbal inquiries.[2] Such studies are generally limited to a particular segment of population, like women in antenatal care centres or those attending gynaecology departments of tertiary care hospitals, and are not representative of the general population in any way. To have a more real representation of reality, the present study is based in the community and includes laboratory diagnosis to measure the actual magnitude of morbidity associated with RTIs among women in the sample. A medical diagnosis, along with measuring the magnitude of infection also helps throw light on the factors linked with the risks of having these infections.

[1]In an effort to counter the problem in resource-poor situations, the WHO designed the "Syndromic Approach" to diagnose RTIs, based on the symptoms reported by the patient and the signs observed by the clinician, referred to as the "syndromes" [WHO (2001)]. The recommended treatment takes into account all possible diseases that could cause the specific syndrome.

[2]UK Department for International Development (DFID) has funded the first of its kind nationwide study in the country, "National Study of Reproductive Tract Infections and Sexually Transmitted Infections in Pakistan". The study looks into the prevalence and determinants of RTIs, including STIs, in three groups, in three separate studies, which are, vulnerable or high risk group, the bridging population, and the general population. Individuals who spread the infection from concentrated high-risk groups to the general heterosexual population are termed the bridging group (like male urban migrants). It looks into different sets of infections for the three groups. For general population it takes into account only four infections, namely, chlamydia, syphilis, bacterial vaginosis and candidiasis [DFID (2002)]. The study findings were not available by the time of completion of this study.

OBJECTIVES

In the above stated scenario, following objectives are set forth for the present study:

(1) To assess the magnitude and nature of infections as found out through laboratory diagnosis.
(2) To probe the variation in magnitude and nature of RTIs across women with different socio-economic and demographic characteristics.

What are RTIs and Why Are They of Demographic Significance

RTIs refer to infections that affect the reproductive tract of males and females and could be contracted through three means [Population Council (2001); Germain, *et al.* (1992)]. These are:

- **Endogenous infections.** These are the most common RTIs, resulting from an overgrowth of organisms normally present in the vagina. These include bacterial vaginosis and candidiasis.
- **Iatrogenic infections.** These occur when the cause of infection is introduced into the reproductive tract through a medical procedure, such as insertion of IUD, during delivery or abortion, and menstrual regulation. Unsterilised and unhygienic medical instruments and conditions can infect women, and if the infection is already there in the lower reproductive tract (i.e., vagina, vulva and cervix) it can be pushed through the cervix to the upper reproductive tract (i.e., uterus, fallopian tube and ovaries) during a medical procedure.
- **Sexually transmitted infections (STIs).** These are transmitted through sexual activity with an infected partner. These include infections like, syphilis, herpes, human papillomavirus, gonorrhoea, trichomoniasis, chancroid and chlamydia.

RTIs are of demographic significance as they are intertwined with safe motherhood, family planning and child survival. These consequences range from less serious to fatal outcomes for the materno-foetal health, such as, premature delivery, low birth weight, still births, congenital syphilis, neo-natal conjunctivitis, neurological and cardiovascular diseases, PID, infertility, and ano-genital cancers, specifically cervical cancer [AVSC (2000); Reproductive Health Outlook (2001)].

The relation between RTIs and contraceptive technologies is also of great demographic implications. It is a two-way relation as the symptoms of infection may be attributed to the contraceptive method, affecting its usage, and the whole attitude towards contraception. Secondly, certain contraceptive methods may increase the risk for infection or aggravate the infection already present.

Dealing with RTIs becomes all the more important because of their relation with HIV infection. Men and women with some RTIs are at a greater risk of acquiring and transmitting HIV infection. RTIs that cause genital ulceration, such as chancroid, syphilis and herpes, can increase the risk of getting HIV infection by 3–9 times, while the inflammation causing RTIs, like gonorrhoea, chlamydia and trichomoniasis, increase it by 3–5 times. Ulcerative RTIs have a higher probability of transmission because of the direct contact of bodily fluids through the open ulcers that allow for a greater contact and access to the virus [Reproductive Health Outlook (2001)]. This is also a two-way relation as the presence of HIV makes the person more susceptible to RTIs and the infections are more difficult to cure [Population Council (2001)]. Presence of HIV makes even the not so dangerous candida infection hard to treat.

METHODOLOGY

The study was conducted in the major urban area of the country, the city of Rawalpindi, in November 2001 till April 2002, thus it is named as the Rawalpindi Reproductive Tract Infections Study 2001-2002 (RRTIs 2001-2002). As stated earlier, it was based in a community, instead of conducting it in places like family planning clinics, maternal care centres, or gynaecology departments of hospitals. The reasons for this were threefold:

(1) A selection bias creeps in the sample as women attending hospitals and clinics do not reflect the general population. In Pakistan, women's attendance at antenatal and post-natal care is not universal, so a sample in any such clinic would hardly represent the population.
(2) Women attending antenatal clinics being pregnant might be avoiding sexual interaction, which is a means of transmitting these infections, affecting the current incidence rate. The Quick Count Survey [NIPS (1999)] and the study done by Somji, *et al*. (1991) also show the currently pregnant women having a lower rate of RTI related symptoms.
(3) Women in ante and post-natal care clinics/hospitals might not be using contraceptives, which again are associated with some of the infections, affecting the prevalence rate.

Sample and Respondents

Using Federal Bureau of Statistics' primary sampling units (PSUs) of Rawalpindi, a representative sample of 500 households was drawn based on the economic status of the households. It was assumed that differences in economic background will bring with them differentials in factors like education level, health seeking behaviour, health perceptions, etc. Twenty-five PSUs were randomly selected, covering the economic composition of the city. From these sampling units,

20 households each were selected randomly to give a sample 500 households. A total of 508 women from these 500 households were part of the study. Of these 508 women in the sample, 311 gave their consent for the medical part of the study, the results of which are presented here.

The study sample comprised of currently married women aged 15–49 years, having their husbands living with them. The median age at first marriage in Pakistan among ever married women aged 15–49 years is still 18 years (PRHFPS 2000-2001), so inclusion of young females aged 15–19 years was a logical choice. Being currently married was of importance because if women were not in a current union they were unlikely to be sexually active or using contraceptives, which were factors of interest to this study. Similar reasons led to the decision to include only those women whose husbands were living with them.

Participation rates and the issue of representativeness usually dog community-based biomedical studies, more so if the study concerns sensitive subjects, like reproductive health in settings where such topics are not discussed openly. Participants often refuse to undergo medical examination and in some cases, the participation rate is so low that the data cannot even be analysed [Younis, *et al.* (1993)]. Participation rates in studies done in the South Asian region, having objectives similar to the present one, show wide differences. Participation rates vary from a high 90 percent or more [Wasserheit, *et al.* (1989) in Bangladesh; and Bhatia and Cleland (2000) in India] to a moderate ±60 percent [Hawkes, *et al.* (2002) and Goodburn, *et al.* (1995) in Bangladesh; and Bang, *et al.* (1989) and Koenig, *et al.* (1998) in India]. The participation rate in the medical part of the present study was 61.2 percent, nearer to the ones achieved by the latter group, that is the one with moderate participation rates. Both the quoted studies, having high participation rates were done over a long period of time and had an advantage of developing better rapport with their respondents. Another way to evaluate the sub-sample, comprising women who consented for the medical component of the study, is to compare its characteristics with those of the total sample. Table 1 presents this comparison between women included in the total sample and those taking part in the medical portion of the study.

As Table 1 shows, there is not much difference between the whole sample and the medical sub-sample for most characteristics. In many instances, there is no difference at all, while for others the difference generally remains in the range of 1–5 percent. The exceptions however are the differences in the proportions of the economic groups and the number of symptoms reported by women, where the differences are greater than other characteristics. The sub-sample has an almost 10 percent under-representation of women from the upper economic group. Likewise,

Table 1

Differences in Background Characteristics between Women in the Total Sample and the Sub-sample Consenting for Medical Examination

Background Characteristics	Medical Sub-sample		Total Sample	
	Percent	Cases	Percent	Cases
Total	100.0	311	100.0	508
Age of Woman				
<25	19.9	62	18.9	96
25–34	42.1	131	42.1	214
34<	37.9	118	39.0	198
Ever Been to School				
Yes	65.6	204	66.3	337
No	34.4	107	33.7	171
Level of Education				
11 Years or More	18.0	56	24.2	123
1–10 Years	47.6	148	42.1	214
No Education	34.4	107	33.7	171
Background Area				
Urban	75.6	235	76.8	390
Rural	24.4	76	23.2	118
Family Type				
Nuclear	71.7	223	71.5	363
Joint/Extended	28.3	88	28.5	145
Economic Group				
Upper	13.5	42	22.8	116
Middle	50.5	157	46.3	235
Lower	36.0	112	30.9	157
Inter-spousal Age Difference				
Wife Older	4.5	14	3.0	15
Same Age	5.8	18	5.9	30
Husband 1–10 Years Older	76.8	239	78.9	401
Husband >10 Years Older	12.9	40	12.2	62
Duration of Marriage				
≤ 1 Year	5.8	18	5.7	29
2–5 Years	20.3	63	20.7	105
6–15 Years	39.2	122	38.4	195
16 Years or More	34.7	108	35.2	179
Number of Pregnancies				
None	5.1	16	4.5	23
1–2	26.7	83	28.7	146
3–4	28.3	88	29.1	148
5 or More	39.9	124	37.6	191
Number of Children				
None	7.4	23	8.1	41
1–2	35.4	110	36.4	185
3–4	32.8	102	32.2	164
5 or More	24.4	76	23.2	118
Currently Pregnant				
Yes	10.9	34	9.4	48
No	89.1	277	90.6	460

Continued—

Table 1—(*Continued*)

Menstrual Hygiene				
Commercial Sanitary Pads	14.5	45	18.7	95
Cotton Wool/New Cloth	18.9	59	19.7	100
Old/Used Cloth	32.5	101	29.9	152
Not Menstruating	34.1	106	31.7	161
Frequency of Baths per Week				
1-2 Times	55.9	174	50.2	255
3-4 Times	37.3	116	39.0	198
5 or More	6.8	21	10.8	55
Current Contraceptive Use				
Not Using	50.8	158	51.2	260
Pills	4.2	13	4.1	21
IUD	7.7	24	7.5	38
Injections	2.9	9	3.0	15
Condom	14.1	44	14.4	73
Tubectomy	11.6	36	9.8	50
Rhythm	1.9	6	2.2	11
Withdrawal	6.8	21	7.9	40
Ever Wanted to Get Pregnant and Could Not				
Yes	10.9	34	11.4	58
No	89.1	277	88.6	450
Gap between the Last Two Pregnancies				
<12 Months	14.5	45	15.6	79
13–36 Months	52.7	164	45.7	232
>36 Months	16.7	52	22.1	112
None or Only One	16.1	50	16.8	85
Number of Symptoms Reported				
No Symptom	19.3	60	29.3	149
1-2 Symptoms	40.2	125	38.8	197
3-4 Symptoms	25.4	79	20.5	104
5 or More Symptoms	15.1	47	11.4	58
Decision-making Authority				
No Say at All	7.1	22	7.1	36
Moderate Say	20.6	64	18.5	94
Substantial Say	40.8	127	47.6	242
Major Say	31.5	98	26.8	136
Freedom from Threat				
Afraid and Beaten	19.3	60	17.1	87
Afraid but not Beaten	29.9	93	29.5	150
Not Afraid but Beaten	12.5	39	11.2	57
Neither Afraid nor Beaten	38.3	119	42.1	214
Freedom of Mobility				
NeedsPermission				
Always	65.3	203	61.8	314
Never	26.7	83	27.6	140
Depends	8.0	25	10.6	54
Control Over Household Income				
Has Control	71.7	223	71.7	364
Does not have Control	28.3	88	28.3	144

Source: RRTIS 2001-2002.

women with no reported symptoms are under-represented by 10 percent, having over representation of women reporting more symptoms (Table 1). These differences are understandable as women with more symptoms and fewer resources would be more likely to give consent for a free medical check up and treatment than those who perceive themselves to be well or have enough economic resources to obtain treatment easily.[3]

It is interesting to note the woman's autonomy indicators in this regard, as it concerns her decision-making authority and freedom of mobility to opt for the medical component of the study or otherwise. The differences found within these two indicators, with regard to participation in the medical part of the study (Table 1), can also be attributed to the number of symptoms reported by women in each category. Taking up the medical examination was a decision that was directly related to woman's mobility status, and it is of interest to see an over-representation of women who always needed permission to go out of home in the sub-sample. Women in this group did report more symptoms but being able to take the medical examination means that they obtained permission from their husbands to participate.

Tools for Data Collection

For a holistic approach to the problem under study three basic tools were used for the collection of data. These were: conducting a questionnaire; having a clinical exam which was based on the Syndromic Approach;[4] and finally to have a laboratory diagnosis to ascertain the presence or otherwise of any infection. The questionnaire included aspects of women's lives that were probable to have relation with having RTIs. These factors included: economic status, education, obstetric and gynaecological history, contraceptive history, hygiene practices, knowledge regarding RTIs and their experiences of RTI symptoms.

The laboratory procedures conducted for screening women for RTIs are presented in Table 2, while the clinical examination included:

- inspection of the genitals;
- abdominal and bimanual exam;
- pelvic exam;
- collection of samples for laboratory diagnosis.

[3]Due to ethical considerations, women consenting for the medical part of the study were given free treatment in case they tested positive for any of the infection included in the study.

[4]Results from the clinical examination would not be discussed in this paper, and it would focus on the laboratory diagnosis, which is considered a more efficient way of screening for infections.

Table 2

Laboratory Assays Used to Detect RTIs

Infection	Detection Assay	Nature of Sample
Candidiasis	Culture-Gram Stain	Vaginal smear
Bacterial Vaginosis	Culture-Gram Stain	Vaginal smear
Trichomoniasis	Culture	Posterior vaginal smear
Chlamydia	Direct Fluorescent Antibody (DFA)	Endo-cervical vaginal smear
Gonorrhoea	Culture	Endo-cervical vaginal smear
Syphilis	Rapid Plasma Reagin (RPR)	Serum
Genital Herpes	Culture	Cells from lesions
Chancroid	Culture	Smear from the base of the ulcer, pus removed
HPV	Cellular morphology	Endo/ecto-cervix cells
Other[1]	Culture	Vaginal/cervical smear

Note: [1]The other category includes infections like E-coli, staphylococcus aureaus, etc.

RESULTS

Magnitude and Nature of Prevailing RTIs

Laboratory diagnosis showed the presence of RTIs among 24 percent women. As Table 3 shows, infections are primarily endogenous in nature (17.4 percent). Laboratory diagnosis, taken to be the most accurate means of identifying infections, found 2.3 percent women having at least one STI, 1 percent with more than one STI and 3.2 percent having a combination of infections. Endogenous infections and STIs from all these categories put together had an infection rate of 20.6 percent and 4.5 percent, respectively. The most common infection is bacterial vaginosis (10.3 percent) followed by candidiasis (6.8 percent), as can be seen from Table 3. STIs, that have more serious sequelae than endogenous infections, are not common among women in the sample and only a few cases of gonorrhoea, chlamydia and syphilis are found. More prevalent among STIs are the less serious chancroid and trichomoniasis (Table 3).

Table 3

Prevalence of Reproductive Tract Infections[1]
Laboratory Diagnosis (%)

	Laboratory Diagnosis	Cases
Infections		
No Infection	76.2	237
Endogenous Infections		
Candidiasis	6.8	21
Bacterial Vaginosis	10.3	32
Candidiasis and Bacterial Vaginosis	0.3	1
Sexually Transmitted Infections/ Exogenous Infections		
Trichomoniasis	0.6	2
Gonorrhoea	0.3	1
Chlamydia	0.3	1
Syphilis	0.3	1
Chancroid	0.6	2
Trichomoniasis and Chancroid	0.6	2
Gonorrhoea and Chlamydia	0.3	1
Endogenous-Exogenous Co-infections		
Bacterial Vaginosis and Syphilis	0.3	1
Bacterial Vaginosis and Trichomoniasis	1.0	3
Bacterial Vaginosis and Staphylococcus Aureus	1.9	6
Total	100.0	311
Nature of Infection		
Endogenous—One or More	17.0	53
Sexually Transmitted—Any One	2.3	7
Sexually Transmitted—More Than One	1.0	3
Endogenous with Sexually Transmitted/Exogenous	3.5	11
Any Infection	23.8	74

Source: RRTIS 2001-2002.
Note: [1]Including 311 women who consented for the medical examination.

The rather low rates of STI prevalence are consistent with the findings of some of the existing studies in Pakistan that include medical diagnosis for estimating prevalence of RTIs in their study populations [NACP (2002); PAVNA (2001); Ghauri, *et al.* (1997); KRHP (1997)]. These studies show that endogenous infections, candidiasis more than bacterial vaginosis, are the most common RTIs prevalent among women in Pakistan, with mainly trichomoniasis contributing to the otherwise low STI prevalence rate. These findings are consistent to that of the current study, except that bacterial vaginosis was found to be more prevalent than candidiasis. This trend is found not only in Pakistan but studies in India and Bangladesh have also shown endogenous infections to be much more common than STIs [including, Hawkes, *et al.* (2002) and Ahmed, *et al.* (1999) in Bangladesh, and Brabin, *et al.* (1998); Garg, *et al.* (2001); Kumar, *et al.* (1997) and Mayank, *et al.* (2001) in India]. The slightly lower overall rate of infection in the present study, contrary to those found in some of the existing studies (going as high as 78 percent) could be because most of these studies were done in clinics, where the rate is likely to be higher than in the community as a whole.

The rather low prevalence of STIs among women in the study is a useful finding, as these RTIs could have graver consequences, but recent medical research shows that endogenous infections too are not as benign as they were considered in the past, especially bacterial vaginosis. There is growing evidence relating it to pelvic inflammatory disease and adverse pregnancy outcomes [USPSTF (2002); Berg (2001); Guise, *et al*. (2001); Steer (1999); Majeroni (1998); Hay, *et al.* (1994); Kuirki, *et al.* (1992)]. Bacterial vaginosis is now considered to be strongly associated with premature rupture of membranes, pre-term deliveries and spontaneous abortions. According to research done by Hay and colleagues, women with bacterial vaginosis have a fivefold increased risk of late miscarriage or pre-term delivery [Hay, *et al*. (1994)]. The association is further strengthened by evidence that metronidazole therapy, used to treat bacterial vaginosis, can reduce the incidence of pre-term labour and premature ruptures of membranes among infected women by 50 percent [Steer (1999)]. Pre-term delivery is the most important cause of perinatal mortality and morbidity. In view of these facts, the presence of bacterial vaginosis as the most common infection among women in the study is a source of concern, more so because a large proportion of deliveries take place at home, and are thus ill-placed to cope with emergency situations. There is also a growing concern about trichomoniasis, the most common STI in the current study. Some recent studies have linked it to adverse outcomes of pregnancy and an increased risk for HIV [Schwebke (2002); Klebanoff (2001) and Bowden (1999)]. The concern becomes even bigger in light of the fact that these two infections, that is, bacterial vaginosis and trichomoniasis, are among the most common RTIs.

Causes and sequelae of all infections diagnosed among women in Table 2 are frequently discussed in social science literature, with Staphylococcus aureus being

the only exception. In the context of this study, its presence is associated with puerperal infection or septic abortion. It is a sign that aseptic surgical techniques may have failed [Grudzinskas (1999) and Cheesbrough (1984)]. Presence of Staphylococcus aureus causes the same kind of signs as are linked to other RTIs, including offensive and profuse vaginal discharge and lower abdominal pain. In the present study, women testing positive for it included those who had gone through an induced abortion (1 woman), a spontaneous abortion (1 woman) or a delivery at home (2 women) within 6 months preceding the survey. The induced abortion and the deliveries at home were all carried out by *dais* (traditional birth attendants), and the spontaneous abortion took place at home without any subsequent referral to a doctor. In the case of induced abortion, it could be inferred that they were carried out in aseptic conditions leading to the infection. With regard to the infection in the woman with spontaneous abortion, it can be a case of incomplete abortion. There is medical evidence that such infection can occur with missed abortion[5] or incomplete abortion[6], especially in case of unprofessional handling or from inadequate surgical evacuation in the first five months of pregnancy [Grudzinskas (1999)].

Differentials in Aetiological Prevalence of RTIs

We would now see how the prevalence rate and the nature of infections vary with different characteristics of women. The characteristics taken into account are those that could possibly have a bearing on having RTIs. These characteristics mainly fall in four categories, that is, indicators of women's socio-economic background, her hygiene practices, her obstetric and contraceptive history, and her autonomy status. These are the factors that can directly or indirectly affect women's risk of getting an infection. Various studies have shown association of similar factors with having RTIs among women, including those done by, Bhatia and Cleland (1995); Hawkes, *et al.* (2002); Garg, *et al.* (2001); Grimes (2000); Mayank, *et al*. (2001) and Younis, *et al*. (1993) . As Table 4 shows, the economic status of women had a strong association with having RTIs. Women in the lower economic group have a rate of infection (36 percent) more than twice that of women in the upper economic group (14 percent). Lack of education is also positively associated with having an infection, as the most educated women have a rate almost one third to those who had never been to school (Table 4). Women who have higher rates of infection generally have higher disaggregated rates of prevalence for endogenous and sexually transmitted infections as well.

[5]Missed abortion is an abortion when the pregnancy ceases to develop but the conceptus is not expelled. Symptoms of pregnancy disappear. There is a brownish vaginal discharge but no free bleeding. Pain does not develop. [Mackay and Evans (1999), p. 622].

[6]Incomplete abortion is an abortion when some portion of the products of conception, usually placental, remains in the uterus. Only mild cramps are reported but spotting is persistent and often excessive. [Mackay and Evans (1999), p. 622].

Table 4

Differentials in Prevalence of Infections, Aetiologically, among Women by Selected Background Characteristics[1] *(%)*

Background Characteristics	Any Infection	Nature of Infection		
		Endogenous (One or More)	Sexually Transmitted (One or More)	Endogenous with STI/Other
Total	23.8	17.0	3.3	3.5
Age of Woman				
<25	17.7	12.9	1.6	3.2
25–34	27.5	20.6	3.8	3.1
34<	22.9	15.3	3.4	4.2
Ever been to School *				
Yes	20.1	15.2	2.0	2.9
No	30.8	20.6	5.6	4.7
Level of Education *				
11 Years or More	12.5	10.7	0.0	1.8
1–10 Years	23.0	16.9	2.7	3.4
No Education	30.8	20.6	5.6	4.7
Background Area				
Urban	23.0	16.6	3.4	3.0
Rural	26.3	18.4	2.6	5.3
Family Type				
Nuclear	26.5	18.4	3.6	4.5
Joint/Extended	17.0	13.6	2.3	1.1
Economic Group ***				
Upper	14.3	9.5	2.4	2.4
Middle	17.8	14.0	1.9	1.9
Lower	35.7	24.1	5.4	6.3
Inter-spousal Age Difference				
Wife Older	50.0	42.9	7.1	0.0
Same Age	22.2	16.7	0.0	5.6
Husband 1–10 Years Older	22.2	15.9	3.3	2.9
Husband >10 Years Older	25.0	15.0	2.5	7.5
Duration of Marriage				
≤ 1 Year	5.6	5.6	0.0	0.0
2–5 Years	20.6	15.9	3.2	1.6
6–15 Years	25.4	19.7	4.1	1.6
16 Years or More	26.9	16.7	2.8	7.4
Number of Pregnancies **				
None	0.0	0.0	0.0	0.0
1-2	15.7	13.3	2.4	0.0
3-4	28.4	22.7	3.4	2.3
5 or More	29.0	17.7	4.0	7.3
Number of Children *				
None	4.3	4.3	0.0	0.0
1-2	19.1	14.5	2.7	1.8
3-4	31.4	21.6	5.9	3.9
5 or More	26.3	18.4	1.3	6.6
Currently Pregnant				
Yes	14.7	8.8	5.9	0.0
No	24.9	18.1	2.9	4.0
Gap between the Last Two Pregnancies ***				
≤12 Months	46.7	37.8	6.7	2.2
13–36 Months	20.7	12.8	3.0	4.9
>36 Months	28.8	21.2	3.8	3.8
None or Only One	8.0	8.0	0.0	0.0

Continued—

Table 4—(*Continued*)

Ever Wanted to Get				
Pregnant and Could Not				
Yes	17.6	14.7	2.9	0.0
No	24.5	17.3	3.2	0.0
Pregnancy Resulting in Foetal				
Loss in Last 2 Years[2] **				
Yes	45.8	29.2	12.4	4.2
No	19.2	14.4	3.8	1.0
Current Contraceptive Use ***				
Not Using	22.8	15.8	3.8	3.2
Pills	23.1	15.4	7.7	0.0
IUD	54.1	45.8	4.2	4.2
Injections	11.1	0.0	11.1	0.0
Condom	9.1	9.1	0.0	0.0
Tubectomy	38.9	27.8	2.8	8.3
Rhythm	0.0	0.0	0.0	0.0
Withdrawal	14.3	4.8	0.0	9.5
Menstrual Hygiene ***				
Commercial Fanitary Pads	13.3	8.9	0.0	4.4
Cotton Wool/New Cloth	22.0	18.6	1.7	1.7
Old/used Cloth	35.6	24.8	4.0	6.9
Not Menstruating/Amenorrheic	17.9	12.3	4.7	0.9
Frequency of Baths per Week*				
1-2 Times	27.6	20.1	4.6	2.9
3-4 Times	21.6	14.7	1.7	5.2
5 or More	4.8	4.8	0.0	0.0
Decision-making Authority				
No Say at All	31.8	31.8	0.0	0.0
Moderate Say	26.6	20.3	1.6	4.7
Substantial Say	26.8	18.1	4.7	3.9
Major Say	16.3	10.2	3.1	3.1
Freedom from Threat				
Afraid and Beaten	23.3	16.7	5.0	1.7
Afraid but not Beaten	25.8	20.4	1.1	4.3
Not Afraid but Beaten	28.2	17.9	5.1	5.1
Neither Afraid nor Beaten	21.0	14.3	3.4	3.4
Freedom of Mobility				
Needs Permission				
Always	25.1	18.2	2.5	4.4
Never	22.9	16.9	4.8	1.2
Depends	16.0	8.0	4.0	4.0
Control Over Household Income*				
Has Control	21.1	15.2	1.8	4.0
Does not have Control	30.7	21.6	6.8	2.3

Source: RRTIS 2001-2002.

Note: [1]Including 311 women who consented for the medical examination, except where mentioned. For number of cases in each category see the medical sample in Table 1.

[2]Including 128 women who have pregnant in the last 2 years, including 70 women giving live births, 34 who were currently pregnant, 2, 7 and 15 who had still births, induced abortion and spontaneous abortions, respectively.

Chi-square/Fisher's Exact test significance levels: *** p<.001, **p<.01, and * p<.05, for having/not having any infection.

The autonomy indicators show weak association with having an infection. Except for the "control over household income" indicator, where women not having any control over household income had an infection rate 10 percentage points higher than those who had control, none of the indicators have significant relation with aetiological presence of infection. However, as Table 4 shows, women who had no say at all in household matters had a rate of infection (32 percent) double of those who had a major say (16 percent). Physical abuse could be associated with reproductive morbidity. Studies have found that women living with a physically abusive husband/partner report significantly more gynaecological problems than those living in violence-free relationships [Shaikh (2000); Fikree and Bhatti (1999); Walker, *et al*. (1992); Reiter, *et al.* (1991)]. These studies also demonstrate an association between physical abuse and chronic pelvic pain. In the present study, as Table 4 shows, women who are beaten, but not afraid, have the highest infection rate (28 percent).[7]

Woman's age, background area, family type or inter-spousal age difference do not have a significant association with having an infection (Table 4). Although, women in the 25–34 year age group, those living in nuclear households, and those who were older to their husbands have rates higher than their counterparts, as have those who had a rural background.

Personal hygiene can affect the vaginal environment, any alteration in which could lead to endogenous infections. In the present study the two indicators used for personal hygiene, that is menstrual protection and number of baths taken per week, are significantly associated with having an infection. Women having baths more frequently have an infection rate much lower to those who bathe just 1-2 times a week (Table 4). Likewise, women with better menstrual hygiene had lower infection rates. Women using old cloths for menstrual protection have an infection rate (36 percent) almost three times to those using sanitary pads (13 percent). The rate of infection for those using cotton wool or new cloth falls in the middle of these two categories, at 22 percent (Table 4). Other studies in the region, including those done by Hawkes, *et al.* (2002) and Wasserheit, *et al.* (1989) done in Bangladesh, and Brabin, *et al.* (1998) and Mulgaonkar, *et al*. (1996) in India, found a similar pattern of relations between these variables. In the present study, women using old cloths for menstrual protection usually used it 3 to 4 times on average before discarding it. Instead of drying the cloth in sun after washing, they almost invariably dried it in shady, hiding places, increasing the chances of it being infected even more. It is interesting to note that the rate of infection among amenorrheic[8] women is higher (18

[7]No statistically significant relation was found between women's socio-economic status and their husbands physically abusing them.

[8]Amenorrhoea here refers to absence of menstruation for any reason, including post-partum period, pregnancy, menopause, or any reason causing lack of menstruation in the three months preceding the survey.

percent) to those using sanitary pads (13 percent). These amenorrheic women mainly included those reaching menopause, ones who were pregnant at the time of the survey, or were going through post-partum amenorrhoea. There is evidence available that probability of having endogenous infections, especially bacterial vaginosis, increases among menopausal and pregnant women [Majeroni (1998); Wasserhiet, *et al.* (1989)].

With sexual relations primarily initiating after marriage in Pakistan, especially for females, duration of marriage reflects the time period spent with a possibility of sexual contact. It is normally only after marriage that women experience pregnancies and use contraceptives, all of which are associated with RTIs. As Table 4 shows, the rate of having a RTI increases with increasing number of years in marital union. The rate increases dramatically after one year of marriage. This is complemented by the significant relationship between number of pregnancies women have had and the rate of having any infection, with the rate increasing with the increasing number of pregnancies. Longer duration of marriage, more pregnancies and more the risk of having an infection seems to be the emerging pattern. Women with more pregnancies do not just have a higher rate of infection but also have more infections at the same time. Among infected women with five or more pregnancies, 7 percent have both endogenous and sexually transmitted infections, which is higher than those having fewer pregnancies (Table 4). The significant relationship between having an infection and the gap between women's last two pregnancies also gives credence to this association. Women having two pregnancies within a year have the highest rate of having an infection, which are mainly endogenous in nature. Apart from the endogenous factors that might be responsible for these infections, iatrogenic factors cannot be ruled out, given that a large proportion of deliveries are still taking place at home, not necessarily attended by trained practitioners. Thus, the obstetric methods used and the lack of aseptic conditions in which births are taking place could be contributing to the prevalence of infections.

Table 4 shows a strong association between foetal loss and having an infection. Women who experienced a loss of foetus in two years preceding the survey had a rate more than twice as high as those who had only live births or were still pregnant. Although induced abortion is legally restricted in Pakistan it is not uncommon [Rehan, *et al*. (2001) and Saleem and Fikree (2001)], as also confirmed by this study. However the laws restricting abortion mean that women opting for terminations have fewer options with regard to a safe abortion procedure and proper post-abortion care and treatment in case of complications. Women in Pakistan, especially those with fewer resources who get their abortions from *dais* or quacks, are exposed to lack of post-abortion care or proper treatment in case of complications, which take place often. The case of spontaneous abortion is no different, with many women failing to obtain any uterine evacuation after the event, increasing the risk of having infections.

The association between RTIs and infertility has long been established. There is enough evidence that infertility can result from untreated pelvic inflammatory disease (PID), a common sequela of RTIs [AVSC (2000); Reproductive Health Outlook (2001) and Path (1997)]. In the present study, however, this relationship could not be ascertained. In fact, the rate of infection is lower among women who report primary or secondary infertility,[9] than those who do not (Table 4). Interestingly, none of the women reporting primary infertility tested positive for any infection. This corroborates the view given by these women when they said that they have been to doctors too many times, and have been told that they have no problem, but their husbands do not agree to medical examination. This makes estimation of infertility by survey questions quite dubious. What is measured as infertility among women might well be because of infertility of their husbands. Another methodological issue is the social and personal connotation of infertility, especially in case of secondary infertility. For instance, women having an induced abortion and testing positive for an RTI might have a problem that leads to infertility, but the fact that they do not wish any more children leaves them out of the count for secondary infertility.

Contraceptives are often considered by its users to be the reason behind any health problem they are having, especially those related to the reproductive system, even in cases where the two could be totally unrelated. Table 4, however, shows that there does exist a strong association between contraceptive use and having infections. Women using IUDs have the highest rate of infection (54 percent) followed by those who were tubectomised (39 percent). Those using condoms (9 percent), injections (11 percent) or traditional methods of rhythm (zero percent) or withdrawal (14 percent) have a rate lower than that of non-users (23 percent). This trend is consistent with the findings of other studies in the region that found IUD users and sterilised women having higher rates of infection [Hawkes, *et al.* (2002); Wasserheit, *et al*. (1989) and Shrikhande, *et al.* (1998)].

Multivariate Analysis of the Determinants of RTIs

In order to examine the factors most likely to determine the presence of infection, data were analysed using logistic regression method. The analysis was confined to presence of only endogenous infections, as the number of cases for STIs was very low. As the modes of transmission for endogenous infections are likely to be different from those for STIs, it made sense to separate the two in the multivariate analysis.[10] Two models were created for the purpose, each taking aetiological

[9]Of the 311 women in the sub-sample, 34 women reported experiencing infertility. Of these 38 percent (13 women) complained of primary infertility and 62 percent (21 women) reported secondary infertility.

[10]An STI model was run with a very small set of independent variables and only the economic status of women was found to have a significant relation with her having an STI.

presence of at least one endogenous infection as the dependent variable. In Model 1, all factors that were believed to have a link to infections were included, while Model 2 was restricted to factors found significant in stepwise forward conditional logistic regression method, keeping the entry criterion for a variable at .05 and the removal criterion at 0.1. Table 5 presents the results of these two models, finding Model 2 to be more robust and having better statistical values.

Model 1 shows trends almost similar to the one found in the bivariate analysis for the likelihood of women, with different background characteristics, having endogenous infections. Though not a statistically significant relation, the likelihood of having an endogenous infection increases with age (Table 5). Likewise, there is an increased probability of having an endogenous infection with decreasing level of education.

The risk of having an endogenous infection is higher for women living in joint and extended households, as it is for those who have a rural background, as can be seen in Model 1. Relation of duration of marriage with the likelihood of having an endogenous infection shows an increasing probability of having an infection with increasing years of marriage. The likelihood of having an endogenous infection increases noticeably for women married for 16 years or more (by over 5 times) compared to those who have been married for a year or less (Model 1).

In Model 1, the likelihood of having an endogenous infection differs significantly with women's economic group, menstrual hygiene practices, gap between last two pregnancies, and current contraceptive use. Women from lower economic group have a 4.5 times higher probability of having an endogenous infection compared to those belonging to the upper economic group (Model 1). Women using old/used cloth for menstrual protection had a much higher probability of having an infection (5 times) compared to those who were not menstruating. Among the women who were menstruating, those using commercially produced sanitary pads had the lowest probability of having infection (Model 1). Having two pregnancies within a period of twelve months increased the probability of having an endogenous infection by 2.7 times, compared to those who had never been pregnant or were pregnant only once. Use of IUD or getting tubectomised also increases the likelihood of a woman getting an endogenous infection (Model 1). On the contrary, use of condom can reduce the likelihood of having an endogenous infection.

There is no significant interaction between other predictors and risk of having an infection. Women with lower autonomy status are more likely to have an infection, for all four autonomy indicators, but the association is not statistically significant in Model 1. Similarly, women who have fewer baths are more likely to have an infection by a factor of almost six to nine times, but again the association is not statistically significant.

Table 5

Logistic Regression Analysis of Aetiological Presence of At Least One Infection

Predictor Variable	Model 1 Odds Ratio	Model 2 Odds Ratio
Age of Women		
<25[a]		
25–34	1.08	–
34<	0.36	–
Level of Education		
11 or More Years[a]		
Never Been to School	1.01	–
1–10 Years	0.92	–
Family Structure		
Nuclear[a]		
Joint/Extended	0.42	–
Background Area		
Urban[a]		
Rural	1.16	–
Duration of Marriage		
1 Year or Less[a]		
2–5 Years	1.96	–
6–15 Years	1.78	–
16 Years or More	5.24	–
Economic Group		
Upper[a]		
Middle	1.68	1.62
Lower	4.53*	5.35**
Inter-spousal Age Difference		
Same Age[a]		
Wife Older	2.30	–
Husband 1–10 Years Older	0.57	–
Husband >10 Years Older	0.55	–
Number of Pregnancies		
1-2[a]		
None	0.00	–
3-4	4.27	–
5 or More	2.87	–
Gap Between the Last Two Pregnancies		
None or Only One[a]		
≤12 Months	2.69*	15.18***
13–36 Months	0.88	4.19**
>36 Months	1.11	7.27**
Frequency of Bath per Week		
5 or More[a]		
1-2 Times	5.78	–
3-4 Times	8.83	–

Continued—

Table 5—(*Continued*)

Menstrual Hygiene		
Not Menstruating[a]		
Commercial Sanitary Pads	3.47	2.26
Cotton Wool/New Cloth	4.14**	3.33*
Old/Used Cloth	5.18**	3.92**
Current Contraceptive Use		
Non-users[a]		
Pills	0.34	–0.34
IUD	4.26*	3.23*
Injections	–0.00	–0.00
Condom	–0.17**	–0.24**
Tubectomy	2.23	1.86**
Rhythm	–0.00	–0.00
Withdrawal	–0.67	–0.97
Decision-making Authority		
Major Say[a]		
No Say at All	2.52	–
Moderate Say	1.92	–
Substantial Say	1.13	–
Freedom from Threat		
Neither Afraid or Beaten[a]		
Afraid and Beaten	0.70	–
Afraid but not Beaten	0.87	–
Not Afraid but Beaten	1.20	–
Freedom of Mobility		
Needs Permission		
Never[a]		
Always	1.76	–
Depends	0.72	–
Control over Household Income		
Has Control[a]		
Does not have Control	0.59	–
Constant	–7.044***	–5.441***
Model Chi-square	102.516***	75.910***
Degrees of Freedom	41	15
R-square	44.0%	33.9%
Reporting Predicted Correctly	85.5%	82.6%
Hosmer-Lemeshow Test	.297	.750
Number of Cases	311	311

Source: RRTIS 2001-2002.

Note: [1]Chi-square/Fisher's Exact test significance levels: *** p<.001, **p<.01, and * p<.05, for having/not having any infection. [2]For the number of cases in each category, see the medical sample in Table 1.

Model 2, comprised of only those predictors in Model 1 that were found significant in stepwise forward conditional logistic regression method, shows that 82.6 percent of the variability in having an endogenous infection could be explained by a woman's economic status, gap between her last two pregnancies, her menstrual hygiene practices, contraceptive use and her say in household matters. Women from lower economic group are more than five times more likely to have an infection than women in upper economic group (Model 2). The relation between having an infection and inter-pregnancy gap is even stronger. Women with two pregnancies within 12 months were fifteen times more likely to have an infection than those with just one pregnancy or who have never been pregnant, in Model 2 (Table 5). Hormonal and iatrogenic factors, both, could be attributed to this high likelihood of having infections.[11]

The likelihood of having an endogenous infection aetiologically increases by approximately four times for those using old cloth for menstrual protection, a relation that was also shown in bivariate analysis (Model 2). Those using cotton wool do not lag far behind, as they are over three times as likely to have an infection, compared to those using who were not menstruating. Among women who were menstruating, those using commercially produced sanitary pads/napkins had the lowest probability of having an infection. The cotton wool rolls available in market are usually not sterilised and many of the packings even state that they are "not for surgical use", implying that asepsis is not guaranteed.

Association of IUD use with having an endogenous infection in Model 2 shows women using IUDs being 3.2 times more likely to have an infection than those using no contraceptive method (Model 2). The likelihood of having an infection also increases by having a tubectomy by 86 percent, while the use of condoms reduces the chance of having a RTI by 24 percent in Model 2. Regardless of statistical significance, it is worth noting that all methods, be they traditional or modern, with the exception of IUD and tubectomy, have a negative association with the likelihood of having an infection. Non-users, thus are more likely to have an endogenous infection except if they are using IUDs or are tubectomised.

IUD use has long been linked to infections [Guerreiro, *et al.* (1998); Grimes (2000); Farley, *et al.* (1992); Paavonen and Vesterinen (1980); Soderberg and Lindgren (1981)], and findings of the present study show that women using IUDs have an infection rate much higher than other method users or non-users. Along with the iatrogenic factors playing their role at the time of the insertion, a variety of reasons are attributed to this relation between infections and IUD use, including changes in the cervico-vaginal environment making it more susceptible to vaginitis and cervicitis [Amsel, *et al.* (1983) and Younis, *et al.* (1993)]. In the presence of

[11]Three women having more than one pregnancy within 12 months opted for an induced abortion, while two each had stillbirths and spontaneous abortion, factors that were associated with a high infection rate.

these infections, the tail of the IUD could facilitate the ascent of organisms. Being a foreign body, an IUD could also predispose the body's defence against pathogens.

Reasons similar to those mentioned for IUD use can be attributed to the presence of infections among tubectomised women. If we look further into the study data, of the fourteen tubectomised women who tested positive for any infection, eleven had bacterial vaginosis (79 percent). This association between bacterial vaginosis and tubectomy can be due to the changes in the hormonal milieu that follow tubal ligation. DeStefano, *et al.* (1985) suggest that tubectomy affects the blood supply to uterus and ovaries that results in decreasing the oestrogen production. This in turn, affects the overall hormonal homeostasis of the body, specifically that of the cervico-vaginal environment. However, the two hormonal methods, pills and injections, do not appear to increase the infection rate. In fact users of both methods have a lower probability than non-users (Model 2). This result however should be interpreted cautiously because of the small number of women using pills and injections in the study sample. The same applies to women using rhythm as the method of contraception. On the contrary, the number of women using tubectomy as their choice of contraception is large enough to give credence to the inferred relation between hormonal imbalance and endogenous infections.

CONCLUSIONS AND POLICY IMPLICATIONS

The aetiological rate of infection among women was at a moderate level of 24 percent, with 71 percent of these women testing positive for endogenous infections. Bacterial vaginosis was found to be the most prevalent endogenous infection and trichomoniasis the most common STI. Factors significantly increasing the likelihood of having an infection include IUD use or getting a tubectomy, very short inter-pregnancy intervals (that is $\leq$ 12 months), use of old cloth for menstrual hygiene and the lower economic status of women. Use of condom as the preferred contraceptive proves to be helpful in protecting against RTIs, specifically STIs, while better hygiene preventing women from endogenous infections.

These findings have certain policy implications for improving the reproductive health, specifically that of women, in the country. There is a need for an improved use of mass media, advocacy, and public awareness campaigns emphasising prevention of RTIs, alerting women of the risk factors and the medical meanings and consequences of various bodily signs and symptoms, and it should be done in a clear and focussed manner. Campaigns carrying messages in vague and implicit manner can often be without use, more so in the absence of any basic information among women to interpret any hidden messages. Women need to be more aware of their bodies and its functions, something found to be greatly lacking in the present study. The public awareness campaigns should thus stem from the needs of the people, and fill information gaps, remove misinformation and provide quality information in a way that is linked to the realities of women's lives.

Simple information, at times, can have drastic impact. In the present study, most RTIs were not sexually transmitted, and were found to have a negative association with women's hygiene practices, especially during menstruation. Women using rags/old cloth for menstrual protection had a much higher rate of infections than those using commercially produced sanitary pads. An increased infection rate was also found among women using IUDs. These trends could be reversed, at least to some degree, by educating women on better menstrual hygiene and proper use of IUDs. Due to economic constraints, if women cannot use commercially made sanitary pads during menstruation, they can at least boil the cloth before re-use, sterilising it that way, and dry it in sun instead of shady, hidden places. Likewise, women lacked the understanding about the duration an IUD should be used and when it should be removed or even if it should be removed at all, leading many women not getting their IUDs removed at the appropriate time.

Where health messages fail to reach their audience through mass media, non-governmental organisations (NGOs) can play a useful role in disseminating such knowledge, but sadly, unlike in India or Bangladesh, the NGO activities in Pakistan lack any substantial contribution. There are NGOs working in reproductive health field, but none has a wide coverage and many still focus on family planning, with HIV/AIDS being a recent addition. The more commonly present and more easily preventable RTIs still elude their attention to the agenda. With enough funding available for reproductive health issues, it is about time NGOs in Pakistan played their role in educating people about RTIs.

Integration, improvement and reorientation of health services is the need of the hour. The concept of reproductive and sexual health, as envisaged by ICPD and ICPD +5, proposes to deal these health issues holistically. What Wellings and Cleland (2001) describe as "one stop shopping in an integrated setting", it makes sense to control infection and unwanted conception in one clinical setting, by integrating RTI management services and the services provided by family planning clinics and MCH centres. It is an idea supported by many, including Guest (2003), Budiharsana (2002), Pachauri (1998), Piet-Pelon and Rob (1996), Mulgaonkar (1996), Costello (1998), Wilkinson (1997), and WHO (1999). A more efficient delivery system can go a long way in improving the health status of the population, especially the women folk in the present context.

REFERENCES

Ahmed, M. U., T. Mirza, P. A. Khanum, M. A. Khan, S. Ahmed, and M. H. Khan (1999) Management of Reproductive Tract Infections in Rural Bangladesh. *International Journal of STD & AIDS* 10 (April), 263.

Amsel, R., P. A Totten, C. A. Spiegel, K. C. Chen, D. Eschenbach, and K. K. Holmes (1983) Non-Specific Vaginitis: Diagnostic Criteria and Microbial and Epidemiological Associations. *American Journal of Medicine* 74, 14–22.

AVSC-International (2000) *National Guideline for the Management of Reproductive Tract Infections.*

Bang, R., A. Bang, M. B. Y Chaudhry, S. Sarmukaddam, and O. Tale (1989) High Prevalence of Gynaecological Diseases in Rural Indian Women. *The Lancet* 14, 58–88.

Berg, A. O. (2001) Screening for Bacterial Vaginosis in Pregnancy: Reccomendations and Rationale. *American Journal of Preventive Medicine* 20:3, 59–61.

Bhatia, J. C., and J. Cleland (1995) Self-Reported Symptoms of Gynecological Morbidity and Their Treatment in South India. *Studies in Family Planning* 26:4, 203–216.

Bhatia, J., and J. Cleland (2000) Methodological Issues in Community-Based Studies of Gynecological Morbidity. *Studies in Family Planning* 31:4, 267–273.

Bowden, F. J. (1999). Why Is Trichomonas Vaginalis Ignored? *Sexually Transmitted Infections* 75(December), 372.

Brabin, L., A. Gogate, S. Gogate, A. Karande, R. Khanna, N. Dollimore, K. de-Koning, S. Nicholas and C. A. Hart (1998) Reproductive Tract Infections, Gynaecological Morbidity and Hiv Seroprevalence among Women in Mumbai, India. *Bulletin of World Health Organisation* 76:3, 277–287.

Budiharasana, M. P. (2002) Integrating Reproductive Tract Infections Services into Family Planning Settings in Indonesia. *International Family Planning Perspectives* 28:2.

Cheesbrough, M. (1984) *Medical Laboratory Manual for Tropical Countries*. Oxford: Butterworth-Heinemann Ltd.

Costello, M. P. (1998) *Integrating RTI Services in the Public Sector Health Clinics in the Philippines.* Paper presented at the Improving Reproductive Health: International Shared Experiences, West Java, Indonesia.

DeStefano, F., J. A. Perlman, H. B. Peterson, and E. L Diamond. (1985) Long-Term Risk of Menstrual Disturbances after Tubal Sterilisation. *American Journal of Obstetrics and Gynecology* 152, 835–841.

DFID (2002) *National Study of Reproductive Tract Infections and Sexually Transmitted Infections*. Retrieved, from the World Wide Web: www.dfid.gov.uk/Pubs/files/repo_tract_study_pak1_repo9.pdf

Dixon-Mueller, R., and J. Wasserheit (1991*).* The Culture of Silence. Reproductive Tract Infections among Women in Third World. New York. (Unpublished Manuscript).

Farley, T. M., M. J. Rosenberg, P. J. Rowe, J. H. Chen, and O. Meirik (1992) Intrauterine Devices and Pelvic Inflammatory Disease: An International Perspectives. *Lancet* 339, 785–788.

Fikree, F. F., and L. I. Bhatti (1999) Domestic Violence and Health of Pakistani Women. *International Journal of Gynecology & Obstetrics* 65:2, 195–201.

Garg, S., P. Bhalla, N. Sharma, R. Sahay, A. P. R. Saha, P. Sodhani, N. Murthy, and M. Mehra (2001) Comparison of Self-Reported Symptoms of Gynecological Morbidity with Clinical and Laboratory Diagnosis in a New Delhi Slum. *Asia-Pacific Population Journal* 16:2, 75–92.

Germain, A., K. K. Holmes, O. P. Piot, and J. N. Wasserheit (1992) *Reproductive Tract Infections: Global Impact and Priorities for Women's Reproductive Health*. New York: Plenum Press.

Ghauri, K., and S. A. Shah (1997) Patterns of STD Syndromes in Sindh. *Infectious Diseases Journal of Pakistan.* (April-June).

Goodburn, E. A., R. Gazi, and M. Chowdhury (1995) *An Investigation into Nature and Determinants of Maternal Morbidity Related to Delivery and the Puerperium in Rural Bangladesh*. Dhaka: Bangladesh Rural Advancement Committee.

Grimes, D. A. (2000) Intrauterine Device and Upper-Genital-Tract Infection. *The Lancet* 356(September 16), 1013.

Grudzinkas, J. G. (1999) Miscarriage, Ectopic Pregnancy and Trophoblastic Disease. In D. K. Edmonds (ed.) *Dewhurst's Textbook of Obstetrics and Gynaecology*. London: Blackwell Science Limited.

Guerreiro, D., M. A. M. Gigante, and L. C. Teles (1998) Sexually Transmitted Diseases and Reproductive Tract Infections among Contraceptive Users. *International Journal of Gynaecology and Obstetrics* 63:1, S167–S173.

Guest, P. (2003) Reproductive Health Including Family Planning. *Asia-Pacific Population Journal* 18:2, 55–79.

Guise, J. M., S. M. Mahon, M. Aickin, M. Helfand, J. F. Peipert, and C. Westoff (2001) Screening for Bacterial Vaginosis in Pregnancy. *American Journal of Preventive Medicine* 20:3, 62–72.

Hatcher, R. A., D. Kowal, F. Guest, J. Trussel, F. Stewart, G. K. Stewart, S. Bowen, and W. Cates (1989) *Contraception Technology. Special Edition on AIDS*. Atlanta, Georgia.

Hawkes, S., L. Morison, J. Chakraborty, K. Gausia, F. Ahmed, S. S. Islam, N. Alam, D. Brown, and D. Mabey (2002) Reproductive Tract Infections: Prevalence and Risk Factors in Rural Bangladesh. *Bulletin of the World Health Organisation* 80:3, 180–188.

Hawkes, S., L. Morison, S. Foster, K. Gausia, J. Chakraborty, R. W. Peeling, and D. Mabey (1999) Reproductive-Tract Infections in Women in Low-Income, Low-Prevalence Situations: Assessment of Syndromic Management in Matlab, Bangladesh. *Lancet* 354:9192, 1776–1781.

Hay, P. E., R. F. Lamont, D. Taylor-Robinson, D. J. Morgan, C. Ison, and J. Pearson (1994) Abnormal Bacterial Colonisation of the Genital Tract and Subsequent Preterm Delivery and Late Miscarriage. *British Medical Journal* 308, 295–298.

Klebanoff, M. A., J. C. Carey, J. C. Hauth, S. L. Hillier, R. P. Nugent, E. A. Thom, J.

M. Ernest, R. P. Heine, R. J, Wapner, W. Trout, A. Moawad, K. J. Leveno, M. Miodovnik, B. M. Sibai, J. P. Van Dorsten, M. P. Dombrowski, M. J. O'Sullivan, M. Varner, O. Langer, D. McNellis, and J. M. Roberts (2001) Failure of Metronidazole to Prevent Preterm Delivery among Pregnant Women with Asymptomatic Trichomonas Vaginalis Infection. *New England Journal of Medicine* 345:7, 487–493.

Klitsch (2000) Two Approaches to Managing Vaginal Discharge Lead to Overtreatment, Missed Infections and Wasted Funds. *International Family Planning Perspective* 26:2, 89–90.

Koenig, M., S. Jejeebhoy, S. Singh, and S. Sridhar (1998) Investigating Women's Gynaecological Morbidity in India: Not Just Another KAP Survey. *Reproductive Health Matters* 6:11, 84–97.

KRHP (Karachi Reproductive Health Project) (1997) Prevalence of Sexually Transmitted Diseases Amongst Women in Low-Income Communities of Karachi. *Infectious Diseases Journal of Pakistan* 4:2.

Kuirki, T., A. Sivonen, and O. V. Rankonen (1992) Bacterial Vaginosis in Early Pregnancy and Pregnancy Outcomes. *Obstetrics and Gynecolog* 80:2, 173–177.

Kumar, R., M. Kaur, A. Aggarwal, and L. Mahandiratta (1997) Reproductive Tract Infections and Associated Difficulties. *World Health Forum* 18:1, 80–82.

Mackay, H. T., and A. T. Evans (1999) Gynecology and Obstetrics. In L. M. Tierney, S. J. McPhee, and M. A. Papadakis (ed.) *Current Medical Diagnosis and Treatment* (33rd ed.). Connecticut: Appleton and Lange.

Majeroni, B. A. (1998) Bacterial Vaginosis: An Update. American Academy of Family Physician. *Newsletter* April, pp. 1–4.

Mayank, S., R. Bahl, and N. Bhandari (2001) Reproductive Tract Infections in Pregnant Women in Delhi, India. *International Journal of Gynecology & Obstetrics* 75:1, 81–82.

Mulgaonkar, V. B. (1996) Reproductive Health of Women in Urban Slums of Bombay. *Social Change* 26:3 & 4, 137–156.

NACP (National AIDS Control Programme) (2002) *STI Prevalence Study in Pakistan*. Islamabad: National AIDS Control Programme.

NIPS (1999) *The Quick Count Survey 1999*. Islamabad: National Institute of Population Studies.

Paavonen, J., and E. Vesterinen (1980) Intrauterine Device Use in Patients with Acute Salpingitis. *Contraceptio* 22, 107–114.

Pachauri, S. (1998) Defining a Reproductive Health Package for India: A Proposed Framework. In M. Khrishnaraj, R. M. Sudarshan, and A. Shariff (eds.) *Gender, Population and Development*. Oxford University Press.

PATH. (1997) Infertility in Developing Countries. *Outlook* 15:3, 1–5.

PAVNA (2001) *Sexual Health: An Exploration of Trends*. Karachi: PAVNA.

Piet-Pelon, N., and U. Rob (1996) Integration of RTI Care into Existing Family

Planning Services in Bangladesh: The Possible and the Practical. *Social Change* 26:3 & 4, 186–195.

Population Council (2001) *Reproductive Health and Family Planning: An Overview*. New York: Population Council.

PRHFPS (2001) *Pakistan Reproductive Health and Family Planning Survey 2000-01*. Islamabad: National Institute of Population Studies.

Rehan, N., A. Inayatullah, and I. Chaudhary (2001) Induced Abortion: Magnitude and Perceptions. Paper presented at the Population Association of Pakistan, 2nd Annual General Meeting, Karachi, Pakistan.

Reiter, R. C., L. R. Shakerin, J. C. Gambone, and A. K Milburn (1991) Correlation between Sexual Abuse and Somatisation in Women with Somatic and Nonsomatic Chronic Pelvic Pain. *American Journal of Obstetrics and Gynecolog* 165:1, 104–109.

Reproductive Health Outlook (2001) Reproductive Tract Infections. Website: www.rho.org.

Saleem, S., and F. F. Fikree (2001) Induced Abortions in Low Socio-Economic Settlements of Karachi, Pakistan: Rates and Women's Perspectives. *Journal of Pakistan Medical Association* 51:8, 275–279.

Schwebke, J. R. (2002) Update of Trichomoniasis. *Sexually Transmitted Diseases* 78:5, 378–379.

Shaikh, M. A. (2000) Domestic Violence against Women—Perspective from Pakistan. *Journal of Pakistan Medical Association* 50:9.

Shrikhande, S. N., S. P. Zodpey, and H. R. Kulkarni (1998) Risk Factors and Protective Factors of Pelvic Inflammatory Disease: A Case-Control Study. *Indian Journal of Public Health* 42:2, 42–47.

Sloan, N. L., B. Winikoff, N. Haberland, C. Coggins, and C. Elias (2000) Screening and Syndromic Approaches to Identify Gonorrhea and Chlamydial Infection among Women. *Studies in Family Planning* 31:1, 55–68.

Soderberg, G., and S. Lindgren (1981) Influence of an Intrauterine Device on the Course of an Acute Salphingitis. *Contraception* 24, 137–143.

Somji, S., S. U. Kazmi, and A. Sultana (1991) Prevalence of Chlamydia Trachomatis Infections in Karachi, Pakistan. *Japanese Journal of Medical Science and Biology* 44:5-6, 239–243.

Steer (1999) Preterm Labour. In D. K. Edmonds (ed.) *Dewhurst's Textbook of Obstetrics and Gynaecology*. London: Blackwell Science Limited.

Teles, E., E. Hardy, U. Oliveira, C. Elias, and A. Faundas (1997) Reassessing Risk Assessment: Limits to Predicting Reproductive Tract Infection in New Contraception Users. *International Family Planning Perspectives* 23:4, 179–182.

USPSTF (US Preventive Services Task Force) (2002) Screening for Bacterial Vaginosis in Pregnancy: Recommendations and Rationale. *American Family Physician* 65:6.

Walker, B., Jr., N. J. Goodwin, and R. C. Warren (1992) Violence: A Challenge to the Public Health Community. *Journal of National Medical Association* 84:6, 490–496.

Wasserheit, J. N., J. R. Harris, J. Chakraborty, B. A. Kay, and K. J. Mason (1989) Reproductive Tract Infections in a Family Planning Population in Rural Bangladesh. *Studies in Family Planning* 20:2, 69–80.

Wellings, K., and J. Cleland (2001) Survey on Sexual Health: Recent Development and Future Directions. *Sexually Transmitted Infections* 77:4, 238–241.

WHO (1999) *Integrating STI Management into Family Planning Services: What Are the Benefits*. WHO/RHR/99.10: World Health Organisation.

WHO (2001) *Report of an Expert Consultation on Improving the Management of Sexually Transmitted Infections*. Geneva: World Health Organisation.

Wilkinson, D. (1997) Family Planning Services in Developing Countries: An Opportunity to Treat Asymptomatic and Unrecognised Genital Tract Infections? *Genitourinary Medicine* 73(December), 558.

Younis, N., H. Khattab, H. Zurayk, M. el-Mouelhy, M. F. Amin, and A. M. Farag (1993) A Community Study of Gynecological and Related Morbidities in Rural Egypt. *Studies in Family Planning* 24:3, 175–186.

Zurayk, H., H. Khattab, N. Younis, O. Kamal, and M. el-Helw (1995) Comparing Women's Reports with Medical Diagnoses of Reproductive Morbidity Conditions in Rural Egypt. *Studies in Family Planning* 26:1, 14–21.