Reproductive Tract Infections among Women in Pakistan: An urban case study

by

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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 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. 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 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[1]. 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

[1] UK Department for International Development (DFID) has funded the first of its kind nation-wide 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. 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 completion of this study.

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 both laboratory and clinical diagnosis to measure the actual magnitude of morbidity associated with RTIs among women in the sample. A medical diagnosis helps throw light on the factors linked with the risks of having these infections while inclusion of both clinical and laboratory diagnoses also helps to assess the efficiency of syndromic approach[2] to screen women for RTIs.

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 diagnosed through medical examination, including both laboratory and clinical diagnoses.
2. To evaluate the efficiency and effectiveness of clinical diagnosis of RTIs as an alternative for the more expensive and resource demanding laboratory diagnosis.
3. 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 three different types of infections that affect the reproductive tract (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**: they 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

[2] In an effort to counter the problem in resource poor situations, WHO designed the "Syndromic Approach" to diagnose RTIs, based on symptoms reported by the patient and 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.

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. 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 total of 500 households.

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.

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; 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 1, while the clinical examination included:

- Inspection of the genitals
- Abdominal and bimanual exam
- Pelvic exam
- Collection of samples for laboratory diagnosis

Table 1: 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, staphlococus aureaus, etc.,

Out of 508 women in the sample, 311 gave their consent for the medical part of the study, the results of which are presented here.

Results

Magnitude and nature of prevailing RTIs

Laboratory diagnosis showed the presence of RTIs among 24 per cent women, while for the clinical diagnosis the rate was 40 per cent. As Table 2 shows, infections are primarily endogenous in nature, in both laboratory (17.4 per cent) and clinical (37 per cent) diagnoses. Laboratory diagnosis, taken to be the most accurate means of identifying infections, found 2.3 per cent women having at least one STI, 1 per cent with more than one STI and 3.2 per cent having a combination of infections. Endogenous infections and STIs from all these categories put together had an infection rate of 20.6 per cent and 4.5 per cent, respectively. Although clinical diagnosis found 3.2 per cent women with sexually transmitted infections, it completely missed the co-existing infections, be it more than one STI or endogenous infections together with exogenous infections/STIs. The most common infection remained bacterial vaginosis for both kinds of diagnosis but the clinical examination over-diagnosed it by over 10 per cent. It was a similar case with candidiasis, the second most common infection among women in the sample, where clinical examination over-diagnosed the infection by over 5 per cent (Table 2). On the contrary, clinical examination failed to identify presence of STIs like gonorrhoea, chlamydia and syphilis altogether. These are the infections that have more serious sequelae and can very often be asymptomatic. Chancroid, that generally has a visible presence, and trichomoniasis were the two infections that had almost a similar prevalence rates in laboratory and clinical diagnoses.

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 also 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, as compared to those found in some of the existing studies (going as high as 78 per cent) 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.

Table 2: Prevalence of reproductive tract infections[1]: Laboratory and Clinical diagnoses (%)

	Laboratory diagnosis	Clinical diagnosis
Infections		
No infection	76.2	59.8
Endogenous Infections		
Candidiasis	6.8	11.9
Bacterial vaginosis	10.3	25.1
Candidiasis and bacterial vaginosis	0.3	0.0
Sexually Transmitted Infections/Exogenous Infections		
Trichomoniasis	0.6	2.3
Gonorrhoea	0.3	0.0
Chlamydia	0.3	0.0
Syphilis	0.3	0.0
Chancroid	0.6	1.0
Trichomoniasis and chancroid	0.6	0.0
Gonorrhoea and chlamydia	0.3	0.0
Endogenous-Exogenous Co-infections		
Bacterial vaginosis and syphilis	0.3	0.0
Bacterial vaginosis and staphylococcus aureus	1.9	0.0
Total	100.0	100.0
Nature of infection		
Endogenous- one or more	17.3	37.0
Sexually transmitted- any one	2.3	3.2
Sexually transmitted-more than one	1.0	0.0
Endogenous with sexually transmitted/exogenous	3.2	0.0
Any infection	23.8	40.2

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

The results of the medical examination in the present study add to the ever-increasing evidence that laboratory testing is imperative for an accurate diagnosis of RTIs, and that the correspondence between the laboratory findings and results of the syndromic approach could be poor. The diagnosis done through clinical examination in this study, which followed the syndromic management approach, over-estimated the prevalence of some of the RTIs while missing completely on others.

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; McGregor et al., 1995; 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 per cent (Penn and 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; 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; 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*, 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[3] or incomplete abortion[4], 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

Taking laboratory diagnosis as the true indicator of the presence or otherwise of infections, we would 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. As Table 3 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 per cent) more than twice that of women in the upper economic group (14 per cent). Lack of education is also positively associated with having an infection, as the most

[3] Missed abortion: The pregnancy cease 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).

[4] Incomplete abortion: 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).

educated women have a rate almost one third to those who had never been to school (Table 3). Women who have higher rates of infection generally have higher disaggregated rates of prevalence for endogenous and sexually transmitted infections as well.

Table 3: 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 yrs older	22.2	*15.9*	*3.3*	*2.9*
Husband >10 yrs 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*

Background Characteristics	Any Infection	Nature of infection: Endogenous (one or more)	Nature of infection: Sexually transmitted (one or more)	Nature of infection: Endogenous with STI/Other
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*
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 sanitary 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 sat 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 *(Battered)*	23.3	*16.7*	*5.0*	*1.7*
Afraid but not beaten *(Anxious)*	25.8	*20.4*	*1.1*	*4.3*
Not afraid but beaten *(Defiant)*	28.2	*17.9*	*5.1*	*5.1*
Neither afraid nor beaten *(Contented)*	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. 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 3 shows, women who had no say at all in household matters had a rate of infection (32 per cent) double of those who had a major say (16 per cent). 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 3 shows, women who are beaten, but not afraid, have the highest infection rate (28 per cent). Although it would be a crude relation but if we look into data for pregnancies that took place in 24 months preceding the survey, their outcomes and the presence of an infection, we find the infection rates to be slightly higher among physically abused women who had an adverse pregnancy outcome. There were two women who had stillbirths in the 24-month period, both were physically abused by their husbands and both tested positive for having an infection. Likewise, rate of infection among physically abused women who had spontaneous abortions was 40 per cent, compared to 30 per cent among those who had a spontaneous abortions but were not abused. The number of cases is too small to draw any conclusive causal relationship but some degree of association could be inferred. The abuse may not directly be the cause of having an infection but it can trigger a problem leading to an infection resulting in an adverse pregnancy outcome, or even vice versa.

Woman's age, background area, family type or inter-spousal age difference do not have a significant association with having an infection (Table 3). 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 3). Likewise, women with better menstrual hygiene had lower infection rates. Women using old cloths for menstrual protection have an infection rate (36 per cent) almost three times to those using sanitary pads (13 per cent). The rate of infection for those using cotton wool or new cloth falls in the middle of these two categories, at 22 per cent (Table 3). 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., 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[5] women is higher (18 per cent) to those using sanitary pads (13 per cent). Analysis of data shows, twenty one per cent of these amenorrheic women were reaching menopause, while 26 per cent were pregnant at the time of the survey, with the remaining proportion going through post-partum amenorrhoea or stating no specific reason for it. Among women approaching menopause and those pregnant, 75 per cent and 60 per cent had endogenous infections, respectively. Both these conditions can result in alterations in the hormonal balance, which is a possible source of endogenous infections. These findings should be treated with caution because of the small number of observations, but 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 3 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 per cent have both endogenous and sexually transmitted infections, which is higher than those having fewer pregnancies (Table 3). 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 3 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; 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. According to WHO (1995) there is a need for complete medical assessment after abortion, comprising identification of intra-uterine and abdominal injury, vaginal bleeding, infection, sepsis and pain. In contrast, women in Pakistan, especially those with fewer resources who get their abortions from *dais* or

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

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; Path 1997b). PID can scar the fallopian tubes, either blocking them completely or damaging them to an extent where they cannot function properly. Ascent of gonococcal and chlamydial cervical infections to the upper reproductive tract can lead to PID, as can post-partum and post-abortion infections, which characterise deliveries taking place in unhygienic conditions and unsafe abortions. It is believed that the risk of infertility due to tubal reasons doubles with successive episodes of PID (PATH 1997b). 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[6], than those who do not (Table 3). 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 3, 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 per cent) followed by those who were tubectomised (39 per cent). Those using condoms (9 per cent), injections (11 per cent) or traditional methods of rhythm (zero per cent) or withdrawal (14 per cent) have a rate lower than that of non-users (23 per cent). 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; Shrikhande, et al., 1998).

IUD use has long been linked to infections (Guerreiro, et al., 1998; Grimes, 1987; 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.,

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

1983; Younis, et al., 1993). In the presence of 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. Presence of primarily endogenous infections (Table 3), gives weight to the changes in the cervico-vaginal environment as a cause of the infections among IUD users.

Reasons similar to those mentioned for IUD use can be attributed to the presence of infections among tubectomised women. The nature of infections is largely endogenous in nature (Table 3), and if we look further into study data, of the fourteen tubectomised women who tested positive for any infection, eleven had bacterial vaginosis (79 per cent). 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 injection users have a lower rate than non-users (Table 3). 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. Barrier methods, if used properly and consistently, are considered the best protection against STIs. In the present study also, none of the women using condoms tested positive for any STI, along with having the lowest infection rate among contracepting women, after rhythm users.

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. Two models were created, each taking aetiological presence of at least one 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 to be significant in Model 1. Stepwise forward conditional logistic regression method was applied in Model 2, keeping the entry criterion for a variable at .05 and the removal criterion at 0.1. This procedure gave a model similar to the one created by including only the significant predictors in Model 1. Table 4 presents the results of these two models, finding Model 2 to be more robust and having better statistical values.

The risk of having an infection differs significantly with women's economic group, the menstrual hygiene practices, gap between two pregnancies, and current contraceptive use. 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 significant. Similarly, there is an increasing likelihood of having an infection with decreasing educational levels but that association is also not significant. Women who have fewer baths are more likely to have an infection by a factor of six to eight times, but again the association is not statistically significant.

Table 4: Logistic regression analysis of aetiological presence of at least one infection

Predictor Variable	Model 1		Model 2	
	Co-efficient	Odds ratio	Co-efficient	Odds ratio
Age of women				
>25[a]				
25-34	.409	1.50	-	-
34<	-.118	0.89	-	-
Level of education				
11 or more years[a]				
Never been to school	.522	1.69	-	-
1-10 years	.281	1.32	-	-
Family Structure				
Nuclear[a]				
Joint/extended	-.763	0.47	-	-
Background area				
Urban[a]				
Rural	.076	0.93	-	-
Duration of Marriage				
16 years or more[a]				
1 year or less	.445	1.56	-	-
2-5 years	.327	1.39	-	-
6-15 years	.655	1.92	-	-
Economic group				
Upper[a]				
Middle	.353	1.42	-.452	1.57
Lower	1.407	4.09*	1.599	4.95**
Inter-spousal age difference				
Same age[a]				
Wife older	1.161	3.19	-	-
Husband 1-10 yrs older	.005	1.01	-	-
Husband >10 yrs older	-.041	0.99	-	-
Number of pregnancies				
1-2[a]				
None	-6.393	0.00	-	-
3-4	1.113	3.04	-	-
5 or more	.867	2.38	-	-
Gap between the last two pregnancies				
None or only one[a]				
≤12 months		3.98*		
13-36 months	1.380	1.15	2.835	12.03***
>36 months	.136	1.77	1.453	4.27**
	.569		1.871	6.50**
Frequency of bath per week				
5 or more[a]				
1-2 times	1.794	6.02	-	-
3-4 times	2.122	8.35	-	-
Menstrual hygiene				
Not menstruating[a]				
Commercial sanitary pads	.831	2.30	.645	1.91
Cotton wool/new cloth	1.167	3.21*	.921	2.51**
Old/used cloth	1.066	2.90*	1.133	3.11**
Predictor Variable	**Model 1**		**Model 2**	

	Co-efficient	Odds ratio	Co-efficient	Odds ratio
Current contraceptive use				
Non-users[a]				
Pills	-1.042	0.35	-.957	0.38
IUD	1.473	4.36*	1.248	3.49*
Injections	-1.973	0.14	-1.940	0.14
Condom	-2.018	0.13**	-1.845	0.16**
Tubectomy	.503	1.65	.198	1.22*
Rhythm	-6.533	0.00	-6.311	0.00
Withdrawal	-.508	0.60	-.257	0.77
Decision-making authority				
Major say[a]				
No say at all	1.619	5.05	-	-
Moderate say	1.052	2.86	-	-
Substantial say	1.025	2.79*	-	-
Freedom from threat				
Neither afraid or beaten *(Contented)*[a]				
Afraid and beaten *(Battered)*	-.324	0.72	-	-
Afraid but not beaten *(Anxious)*	-.368	0.69	-	-
Not afraid but beaten *(Defaint)*	.083	1.09	-	-
Freedom of mobility				
Needs permission:				
Never[a]				
Always	.338	1.40	-	-
Depends	-.320	0.72	-	-
Control over household income				
Has control[a]				
Does not have control	.404	1.50	-	-
Constant	-7.197***		-4.176***	
Model Chi square	101.896***		72.535***	
Degrees of freedom	41		15	
R-square	41.9%		31.2%	
Reporting predicted correctly	83.0%		81.7%	
Hosmer- Lemeshow Test	.305		.690	
Number of cases	311		311	

Source: RRTIS 2001-2002.

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

Women's economic status becomes even more significant when we exclude the insignificant factors in Model 2. Women from lower economic group are 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 twelve times more likely to have an infection than those with just one pregnancy or who have never been pregnant, in Model 2 (Table 4). Hormonal and iatrogenic factors, both, could be attributed to this high likelihood of having infections[7].

[7] 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 high infection rate.

The likelihood of having an infection aetiologically increases by three times for those using old cloth for menstrual protection, a relation that was also shown in bivariate analysis. Those using cotton wool do not lag far behind, as they are over twice as likely to have an infection, compared to those using commercially produced sanitary pads/napkins. 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 gauranteed. Using old cloth was primarily due to economic reasons but use of cotton wool could only be attributed to the lack of knowledge about the possible repercussions that the use of such materials can have, because there was not much price difference between some of the locally produced sanitary pads and cotton wool packs. The link between the protection used and the economic status of women is strengthened by the fact that in the upper economic group the use of old cloth was a mere 6 per cent, increasing to 40 per cent in the middle and 85 per cent in the lower economic group. There is also a similar linear trend in the use of sanitary napkins, though in the reverse direction.

Association of IUD use with RTIs proves to be significant in the multivariate analysis as well, with women using IUDs 3.5 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 22 per cent, while the use of condoms reduces the chance of having a RTI by 16 per cent 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 a RTI except if they are using IUDs or are tubectomised.

Conclusions and Policy Implications

The aetiological rate of infection among women was at a moderate level of 24 per cent, with 71 per cent 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. Clinical examinations, using the syndromic approach, tended to over estimate the presence of infections in total, but missed diagnosing some of the asymptomatic STIs and co-existing infections. Factors significantly increasing the likelihood of having an infection include IUD use or getting a tubectomy, shorter inter-pregnancy intervals, 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).

Any improvement in health services would be of no avail without appropriate training and education of all professionals involved. Findings of this study showed that doctors, whom women were consulting, not always gave medically sound advice. This finding is supported by the study done by Khandwalla et al. (2000) about knowledge, attitudes and practices regarding STIs among general practitioners and medical specialists in Karachi, Pakistan. They found doctors, especially GPs, lacking in skills and knowledge to manage and counsel STI patients. Among specialists, they found urologists and dermatologists to be better equipped to manage STIs than gynaecologists, a finding having serious repercussions for the health of women. Most women, if consulting a specialist, would generally go to a gynaecologist, and not a urologist or dermatologist, and it is also gynaecologists who are present in FP/MCH centres. Another study in the country, done on the quality of care provided by private

practitioners, showed poor prescribing practices among the health providers (Thaver et al 1998). Proper training of health professionals and 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.

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