

The Contraceptive Potential of Lactation for Bangladeshi Women

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Lactational amenorrhoea deserves careful consideration within the family planning programme.

The relationship between breastfeeding and the possibility of conception has been noted for over a century and has been a topic of investigation for at least the past 40 years (see for example Henripin, 1954; Jain, 1969). Data from numerous settings have demonstrated the correlation between breastfeeding duration and birth interval duration (Jain and Bongaarts, 1981), as well as the duration of postpartum amenorrhoea (Jain and Sun, 1972; Bongaarts and Potter, 1983). An impressive body of clinical evidence also suggests that breastfeeding has an important contraceptive effect (McNeilly, 1979 and 1987; Glasier, McNeilly and Howie, 1984; and Thapa and Williamson, 1990).

In Bangladesh, long durations of intensive breastfeeding have traditionally resulted in extended durations of postpartum amenorrhoea and long intervals between births even in the absence of contraception (Hobcraft and McDonald, 1984). The national Bangladesh Fertility Survey (BFS) of 1975 reported a median duration of postpartum amenorrhoea of 14.6 months (Singh and Ferry, 1984) and analyses of data from the 1989 BFS suggest that lactational amenorrhoea continues to have an important contraceptive effect, reducing fertility overall by 35 per cent (Cleland and others, 1994) (see also Islam, Mamun and Bairagi, 1998).

However, the contraceptive effect of breastfeeding is not absolute and, since ovulation may occur in the first menstrual cycle following the birth of a child, a woman may conceive even without any visible menses. Recent studies have attempted to evaluate the contraceptive potential of breastfeeding more precisely and to develop guidelines for use by individual women.

Drawing on results from eight countries, the Bellagio Consensus Statement concluded that, for women who breastfeed "fully or nearly fully" and remain amenorrhoeic, the cumulative risk of conception over the first six months postpartum is less than 2 per cent, that is, similar to or lower than the risks attached to the use of modern methods of contraception (Kennedy, Rivera and McNeilly, 1989). Subsequent studies have further investigated the relationship between breastfeeding patterns and conception, and have addressed two important questions: does breastfeeding have to be full or nearly full for a contraceptive effect to exist and can contraceptive protection be achieved beyond six months postpartum?

Recent studies suggest that a high degree of contraceptive protection can be achieved even among women who are not breastfeeding fully (Kennedy, Labbok and VanLook, 1996). Gray and others (1990) concluded that a certain level of protection may be achieved by different patterns of breastfeeding, for example either long, infrequent feeds or shorter, frequent feeds, but that a certain degree of nipple stimulation must be maintained to suppress ovarian activity. Other researchers have concluded that amenorrhoea alone can be taken as the indicator of low pregnancy risk among breastfeeders, regardless of whether or not supplements have been introduced to the baby's diet (Short and others, 1991; Kennedy and Visness, 1992).

Most studies have confirmed the findings of the Bellagio Consensus Statement, namely that lactation can provide a high degree of protection up to six months postpartum. There is less agreement, however, as to whether this protection can be relied upon beyond six months. Some researchers have concluded that six months is the point at which the risk of pregnancy increases to an unacceptably high level (Gray and others, 1990), whereas others suggest that protection extends beyond this time, particularly in populations where there is intensive and prolonged breastfeeding. Recent findings suggest that lactational amenorrhoea may be relied upon for protection against pregnancy up to nine or even twelve months in certain situations (FHI, 1996). It has been suggested that protection may be relied upon up to the resumption of menses, regardless of the time since birth (Short and others, 1991).

Thus, despite the Bellagio "consensus", research in this area continues to produce varying results and recommendations. Partial explanation for divergent results lies in inconsistent study designs and analyses. Many studies have employed small samples, often consisting of individuals who are unrepresentative of the population at large, have failed to use life table methodology (or are not explicit about the way life tables were constructed), or have failed to control for potentially confounding factors. Different researchers have used different outcome measures, some looking at ovulation (using a range of biochemical assays), others considering hypothetical pregnancy rates, and still others considering observed pregnancies. Leaving methodological issues aside, however, there appears to be significant real variation in the natural protection against pregnancy afforded by lactation, both between and within populations. Though this variation is probably largely explained by differing breastfeeding patterns, recent research also suggests that the effect of lactation on ovarian activity may be mediated by other physiological factors such as maternal nutrition (Panter-Brick, 1991; Rosetta, 1992). This finding highlights the need for population-based analyses and suggests that generalizations across settings may be dangerous.

Bangladesh is a particularly appropriate setting for an investigation into postpartum infecundability since durations of breastfeeding and lactational amenorrhoea have traditionally been among the longest in the world. At the same time, recent years have seen a steady rise in use of modern contraception, largely as a result of a very active family planning programme (Cleland and others, 1994). To date, little research has addressed the issue of natural protection against pregnancy in Bangladesh. Weis (1993) analysed data from the 1989 BFS and concluded that breastfeeding affords good protection against pregnancy among amenorrhoeic Bangladeshi women for the first 12 months after birth. The present article uses longitudinal surveillance data in order to explore in more detail the issue of lactational protection against pregnancy among Bangladeshi women.

#### Study sites, data and methods

The data used in this article come from surveillance systems maintained in two research sites of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B): the Record Keeping System of the Matlab MCH-FP project treatment area and the Urban Surveillance System of the Dhaka slum study area of the Urban Health Extension Project.

#### Record Keeping System

Matlab is a large rural thana (administrative area) situated about 55 km to the south-east of Dhaka. In 1977, the Matlab Family Planning and Health Services Project, now called the Maternal and Child Health/Family Planning Project (MCH-FP Project), was launched in order to test whether an intensive family planning programme could succeed in the absence of extensive socio-economic development. Half the villages in the study area, with a population of 89,000, were designated as the treatment area and received intensive services, while the rest comprised the comparison area, receiving only government services (Koenig and others, 1987).

Throughout the treatment area of the MCH-FP Project, the community health workers use field registers to record information regarding married women of reproductive age (15-44 years) and their children aged under five years, as they make their routine service visits. This information is kept in a computerized database known as the Record Keeping System (RKS). When a woman enters the treatment population for the first time, baseline information is recorded. Thereafter, a longitudinal record of each woman's monthly reproductive, contraceptive and lactational status is available, together with other health-related information and background data. A number of in-depth surveys and censuses have also been carried out there over the past 20 years.

#### Urban Surveillance System

The Urban Health Extension Project of ICDDR,B, a health and family planning research project, worked in the slum communities of five of the fourteen thana of the Dhaka metropolitan area. The Urban Surveillance System (USS) is a demographic, health and family planning surveillance of a probability sample of slum settlements in the five study thana. Following household registration and a baseline survey, demographic surveillance was maintained from January 1992 to June 1994 in approximately 8,000 households. Demographic, family planning and health-related information was collected routinely on a three-monthly cycle. In addition, special surveys, addressing particular issues of importance, were fielded from time to time. A more detailed description of the system can be found in Baqui and others (1994).

#### Data sets and data limitations

Despite some methodological complexities, the longitudinal data from the RKS and USS provided an excellent opportunity to explore the risks of pregnancy following birth in two relatively large samples drawn from natural populations of Bangladeshi women.

In order to explore the risks of pregnancy in the postpartum period, a population totally not practising contraception ideally should be taken, since the adoption of contraception obviously affects the risk of pregnancy, and is also likely to be positively associated with fecundity. Since contraceptive use in the postpartum period has risen sharply in Matlab in recent years (Salway and Nurani, 1998), an examination of pregnancy risks during postpartum amenorrhoea would be severely biased for recent cohorts of women. Therefore, data from the early years of the MCH-FP Project were chosen (1978/79) when the practice of contraception during amenorrhoea was relatively uncommon. The use of data from 1978/79 implies caution in extrapolating the results to the present time. However, as discussed further below, the prevailing patterns of breastfeeding and postpartum amenorrhoea do not appear to differ substantially between the rural Matlab population of 1978/79 and the national rural population of the 1990s. Furthermore, since information was available for a large cohort of women, differentials in pregnancy risk between sub-groups of women could be explored and the findings produced are of relevance to present-day policy decisions.

As well as the rural data set, more recent data on pregnancy risks during amenorrhoea could be analysed from the Dhaka slum population, from 1992/93. In both the study cohorts, contraceptive use in the early postpartum period was relatively low and unlikely to affect seriously the estimates produced.<sup>2</sup>

The RKS data analysed in the present study were gathered through the existing data collection system described above. The data consisted of the two-year cohort of women who had a live birth in the Matlab treatment area in the period 1978/79. For each live birth, the woman's monthly reproductive and contraceptive records for the 36 months following the birth were extracted from the RKS database, together with background variables describing the woman's education, religion and socio-economic status. In creating the data file for analysis, 229 cases had to be dropped owing to missing data or inconsistencies and the final sample size was 5,558.

The data analysed from the USS related to women who had a live birth between April 1992 and June 1993 in the sample clusters of the USS. A special add-on questionnaire was administered to each woman at each three-monthly visit following the birth, and careful probing was used to ascertain the timing of resumption of menses, uptake of contraception and any subsequent pregnancy. Each woman was followed up until any one of three possible end-points: resumption of menstruation and initiation of contraception, conception, or loss to follow-up (owing to out-migration from the cluster, or absence from the household for two consecutive visits). A total of 1,201 women were reported to have had a live birth in the period, of whom 1,151 were successfully followed up and received the special questionnaire at least once. The remaining 50 women were lost to follow-up before the questionnaire could be administered. In the absence of out-migration, the maximum period of follow-up was 27 months and the minimum was 12 months.

Women's reports of resumption of menses postpartum are obviously prone to a number of potential sources of error. The urban data, in particular, are less accurate, because they involved a greater period of recall (on average six weeks versus two weeks for Matlab). However, our own detailed qualitative fieldwork suggests that the resumption of menses postpartum is a key event for Bangladeshi women and an important trigger for the start of contraception. The duration of postpartum amenorrhoea and the return of menses was commonly discussed among women, and pregnancy during amenorrhoea was given a special term (*mura*). Earlier research also suggests that women can recall menstrual events quite accurately (WHO, 1981) and that women's descriptions of bleeding episodes correspond closely to hormonal profiles (Campbell and Gray, 1993) suggesting that women do take notice of their postpartum bleeding experiences. Furthermore, an examination of the distribution of the reported timing of resumption of menses postpartum for the urban sample did not show any serious irregularities when compared with that for Matlab. During data collection in both areas, special care was taken to avoid confusion between postpartum lochial bleeding and resumption of menses.

A limitation of the study was that breastfeeding information was not available for the urban cohort. This meant that analyses of pregnancy risk could not be explored for different breastfeeding patterns in the urban population. Nevertheless, pregnancy risks could be calculated for all amenorrhoeic women and are presented below.

In both the Matlab and the Dhaka slum cohorts, the majority of women were Muslim. The mean age of the Matlab women was 25.9 years and their mean number of living children was 3.1. For the Dhaka women, these figures were 25.1 years and 2.7 living children, respectively. Around 30 per cent of the Matlab women had received some schooling compared with 20 per cent of the urban women.

### Pregnancy reporting and adjustments

In the absence of hormonal data indicating the resumption of ovarian activity, the pattern of reported conception by time postpartum was used to assess the risks of pregnancy following birth. Relying on women's self-reports of pregnancy necessarily means that rates of conception are somewhat underestimated. A certain number of pregnancies that result in early miscarriage will remain undetected. In addition, experience suggests that women do not always report pregnancy soon after it occurs, either because they do not realize they are pregnant or, more likely, choose not to divulge the information to others at an early stage of the pregnancy. This delay is particularly likely in cases where the woman chooses to terminate the pregnancy. Reports of pregnancies that occur during postpartum amenorrhoea are likely to be subject to particularly long delays even where a woman wants to be pregnant, since she may not suspect pregnancy until familiar symptoms arise.

Recognizing the potential for delayed reporting of pregnancy, the RKS and USS data were carefully examined before embarking on an analysis of pregnancy risks. The nature of the analysis called for caution - it would clearly be unwise to underestimate the risks of pregnancy in the postpartum period, and draw exaggerated conclusions about the contraceptive potential of lactation. Examination of reported gestational lengths suggested that the vast majority of women in both Matlab and the Dhaka slums reported their pregnancy within three months of conception and therefore the following adjustments were made to the pregnancy reporting in the data sets:

RKS: For all live birth outcomes, the timing of conception was adjusted to give a gestational period of nine months. For pregnancies where the outcome was not a live birth, the timing of conception was adjusted back in time by three months (or less if this resulted in a period of gestation of nine months).<sup>3</sup>

USS: For all live birth outcomes, the timing of conception was adjusted to give a gestational period of nine months. For pregnancies where the outcome was not a live birth, the timing of conception was adjusted back in time by four

and a half months (or less if this resulted in a gestational period of nine months).<sup>4, 5</sup>

## Findings

### Durations of postpartum amenorrhoea and breastfeeding

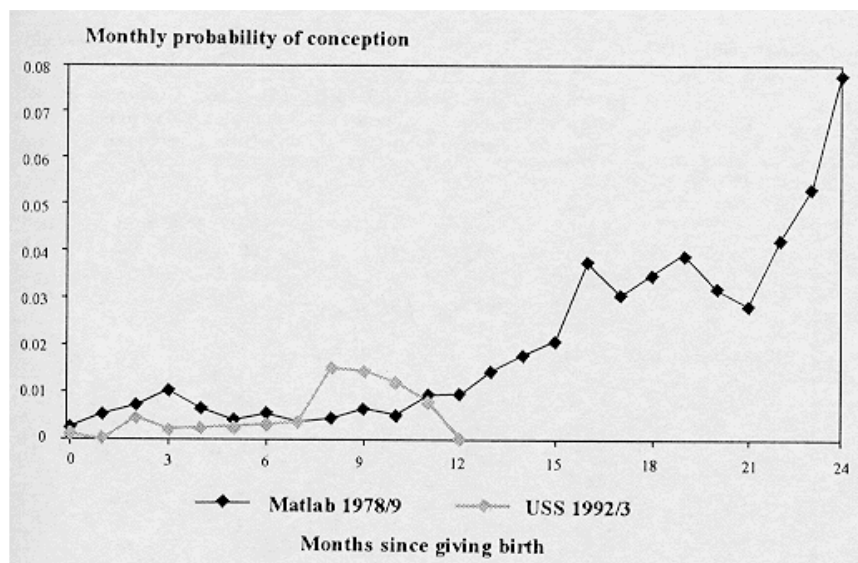
There was wide variation in the reported durations of postpartum amenorrhoea between and within the two cohorts of women. Among the urban women (1992/93), the median duration of postpartum amenorrhoea was 7.5 months ( $se=0.5$ ), whereas among the Matlab women (1978/79), the median was 13.7 months ( $se=0.2$ ). In both samples, some women reported resumption of menses very soon after birth. However, life table analysis showed that less than 1 per cent of the Matlab women reported resumption of menses within two months of giving birth compared with 13 per cent of the urban slum women.

As noted above, breastfeeding information was unfortunately not available for the cohort of urban women. However, information has been presented for the same surveillance area for a slightly earlier period (1990) by Baqui and others (1993).

Women in both populations appear to breastfeed for extended periods of time. The median duration of all breastfeeding (full plus partial) was 33.9 months ( $se=0.2$ ) in the Matlab 1978/79 cohort. Similarly, the data reported by Baqui and others (1993) indicate a median duration of all breastfeeding of over 30 months. Turning to exclusive breastfeeding, larger differentials were evident between the rural Matlab and the urban slum populations. Baqui and others (1993) reported that, among children aged three to five months in the USS areas, only 10 per cent were exclusively breastfed. In the Matlab 1978/79 cohort, at three months old 82 per cent of children were still fully breastfed, and by five months of age, this figure was 60 per cent. Though the difference may in part be explained by the fact that the USS definition of "exclusive" breastfeeding was more strict than the Matlab definition of "full" breastfeeding, field-level observations support the suggestion that supplementation of the infant's diet occurs earlier in the slum setting, even though the overall duration of breastfeeding remains long.

### Probabilities of conception during postpartum amenorrhoea

Figure 1. Monthly probability of conception among



In the first stage of the analysis of pregnancy risk, the monthly probabilities of conception during amenorrhoea by time after birth for women not practising contraception were calculated using life table analysis (cases being censored at loss to follow-up, resumption of menses, or adoption of contraception). Figure 1 plots the risks for all such women, regardless of breastfeeding status, for the RKS and USS data. The figure shows that in both Matlab and the Dhaka slum populations, the monthly probability of conception among amenorrhoeic women fluctuated at around 0.006 over the first 12 months postpartum. The estimates for the USS are based on smaller numbers and are therefore less stable. When the analysis was repeated excluding women whose child died within the first two months of life (and thus ceased breastfeeding soon after birth or were not breastfed at all), the pregnancy risks were lower, as expected, fluctuating around 0.004 for the first 12 months. The small numbers and truncated follow-up in the USS sample make it difficult to draw any firm conclusions about changing risk of pregnancy over the first 12 months postpartum. However, the figures for Matlab suggest that the probability of conception begins to rise only beyond 10 months postpartum.

Table 1. Life table cumulative percentage of amenorrhoeic women not practising contraception, conceiving, by time since birth, in Matlab (1978/79) and Dhaka slums (1992/93) Months after giving birth All women  
Excluding women whose child died before two months of age

Months after giving birth	All women			Excluding women whose child died before two months of age		
	Effective sample size	Cumulative percentage	Standard error	Effective sample size	Cumulative percentage	Standard error
Matlab 1978/79						
0	5,532.5	0	(0)	5,123.0	0	(0)
1	5,459.5	0.2	(0.1)	5,072.0	0.1	(0.04)
2	5,264.0	0.7	(0.1)	4,950.5	0.2	(0.05)
3	4,889.0	1.4	(0.2)	4,685.0	0.3	(0.08)
4	4,431.5	2.4	(0.2)	4,323.0	0.7	(0.1)
5	4,044.0	3.0	(0.2)	3,983.0	1.0	(0.1)
6	3,744.5	3.3	(0.3)	3,704.5	1.2	(0.2)
7	3,477.5	3.8	(0.3)	3,448.5	1.6	(0.2)
8	3,236.5	4.1	(0.3)	3,211.5	1.9	(0.2)
9	3,020.5	4.5	(0.3)	2,999.0	2.3	(0.2)
10	2,822.5	5.0	(0.3)	2,803	2.8	(0.3)
11	2,643.5	5.4	(0.4)	2,626.0	3.2	(0.3)
12	2,453.5	6.2	(0.4)	2,438.5	3.9	(0.3)
13	2,257.0	7.0	(0.4)	2,245.0	4.6	(0.4)
14	2,050.5	8.2	(0.5)	2,041.0	5.9	(0.4)
15	1,848.5	9.8	(0.5)	1,839	7.4	(0.5)
Dhaka slums 1992/93						
0	1,051.0	0	(0)	975.0	0	(0)
1	854.0	0.1	(0.1)	805.0	0	(0)
2	688.0	0.1	(0.1)	667.0	0	(0)
3	580.0	0.5	(0.3)	571.5	0.3	(0.2)
4	500.5	0.7	(0.3)	496.5	0.5	(0.3)
5	432.5	0.9	(0.4)	429.5	0.7	(0.3)
6	378.5	1.1	(0.4)	376.0	0.9	(0.4)
7	330.5	1.4	(0.5)	328.5	1.2	(0.5)
8	277.5	1.7	(0.6)	276.5	1.5	(0.6)
9	221.0	3.1	(0.9)	221.0	2.9	(0.9)
10	178.5	4.4	(1.1)	178.5	4.2	(1.1)
11	141.5	5.5	(1.4)	141.5	5.3	(1.4)
12	108.0	6.2	(1.5)	108.0	6.0	(1.5)

Notes: Includes all amenorrhoeic women regardless of breastfeeding status.

In the first 12 months, out of all women in the Matlab cohort, 2,480 cases were censored. Of these, 63 per cent were due to the return of menses, 31 per cent due to the adoption of contraception and 6 per cent due to loss to follow-up.

In the first 12 months, out of all women in the Dhaka slum cohort, 1,005 cases were censored. Of these, 59 per cent were due to return of menses, 7 per cent due to start of contraception and 34 per cent due to loss to follow-up.

Standard errors are given in parentheses.

Table 1 shows the cumulative percentage of amenorrhoeic women not practising contraception who conceived by time since birth in the Matlab and USS cohorts. In Matlab, among all women who remained amenorrhoeic, 3.4 per cent (se=0.3) conceived within six months of their birth, and 6.2 per cent (se=0.4) by 12 months. In the USS population, these figures were 1.1 per cent (se=0.4) and 6.2 per cent (se=1.5). When the women whose child died within two months were excluded, less than 2 per cent of the remaining amenorrhoeic women not practising contraception conceived by six months postpartum in both Matlab and the Dhaka slums. That is, among women whose child survived to at least two months of age, the cumulative risk of conception among all those who remained amenorrhoeic regardless of their breastfeeding status was less than 2 per cent by six months and less than 3 per cent

by nine months (table 1).

#### Differentials in pregnancy risk during postpartum amenorrhoea

The above analysis suggests that lactational amenorrhoea provides good protection against pregnancy in the first six to nine months following birth for Bangladeshi women. We turn now to examine differentials in pregnancy risk during postpartum amenorrhoea. It is of particular interest to explore whether breastfeeding status has an important influence on the risk of pregnancy during amenorrhoea for Bangladeshi women. Furthermore, to what extent postpartum amenorrhoea affords the same protection against pregnancy among different subgroups of women is an important issue and one that has not been addressed in most earlier studies. Data for the 1978/79 Matlab cohort provided an opportunity to explore in more detail the change in risk of pregnancy during lactational amenorrhoea by time postpartum, as well as the risks associated with different breastfeeding patterns and other maternal characteristics. Unfortunately, breastfeeding data were not available for the USS cohort and the sample size was too small to perform hazard model analyses using the USS data.

#### Methodological comments

In order to explore these relationships, the logistic formulation of the hazard model was used. Hazard models are now commonly employed in demographic analysis in order to allow the incorporation of time-varying covariates and censored observations (John, Menken and Chowdhury, 1987; Becker and Ahmed, 1994). In the logistic formulation of the hazard model, each individual's period of observation is represented in the model by several observations, one for each time unit of observation. In the present case, each individual woman contributes several months of observation to the analysis, one for each postpartum month during which she was followed up. A woman's period of follow-up continues from the month of her child's birth until she becomes pregnant again or is censored. In this case, censoring can occur for any of three reasons: loss to follow-up, adoption of contraception, or resumption of menses. In each observation, the dependent variable takes the value of "1" if pregnancy occurred, and "0" if pregnancy did not occur. Fixed covariates take the same value in every observation relating to a particular individual, for example age, education or number of living children. However, the value of time-varying covariates is allowed to change between monthly observations. In addition, the models can be used to test whether the effects of variables vary over time. The models estimated therefore test the general hypothesis that the probability of a woman conceiving during amenorrhoea depends on both the time since her last birth and a number of other factors.

The logistic model for the odds of conceiving in a given month after birth can be expressed as:

$$\log \frac{\pi}{1-\pi} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \dots + \beta_n x_n + \varepsilon$$

where:

$\pi$	=	probability of conceiving during amenorrhoea in a given month.
$\beta_0$	=	constant term representing the value of $\log (\pi / (1-\pi))$ for months with the baseline value of all variables to $x_1$ to $x_n$ in the model.
$x_1$ to $x_n$	=	independent variables associated with the month of observation (which may be fixed characteristics of the woman, or time-varying characteristics, including time postpartum).
$\beta_1$ to $\beta_n$	=	unknown regression coefficients associated with the independent variables $x_1$ to $x_n$ . A unit change in the corresponding independent variable produces a change in $\log (\pi / (1-\pi))$ of this amount.
$\varepsilon$	=	error or disturbance term representing unobserved variables that influence the risk of conception.

In the present example, one time-varying covariate was of interest, namely breastfeeding status. The RKS data available included three categories of breastfeeding status: full, partial and none. Defining breastfeeding status and collecting information on breastfeeding patterns is complex, and comparisons between different populations are often difficult. Breastfeeding patterns are diverse and transitions between states gradual. In Matlab, "full" describes those women who give no regular supplementation to the baby's diet in addition to breastmilk, whereas the "partial" category includes women who give foods other than breastmilk (either liquid or solid) on a regular basis. "None" describes women who are not feeding their child at the breast at all. Because the "partial" category is clearly broad and includes a variety of breastfeeding patterns, the technique used by John, Menken and Chowdhury (1987) was followed in order to divide the partial category into two groups, depending on how many months earlier supplementation had been initiated. In this way, breastfeeding status for each woman was described by up to four categories over the period of follow-up: full; partial (supplementation occurred 0-6 months earlier); partial (supplementation occurred seven or more months earlier); and no breastfeeding. The rationale for this categorization

is that the process of weaning is gradual, with supplements to breastmilk being introduced occasionally at first, and then more often later. Therefore, the frequency of supplementary feeds and the proportion of all feeds that are supplementary are likely to be greater among women who initiated supplementation of the child's diet longer ago, than among those who started supplementation only recently. In cases where the value of the breastfeeding variable changed in the same month as pregnancy status, it was assumed that the change in the independent variable occurred first. Though it is unreasonable to assume that this sequence is valid in all cases, findings from previous research suggest that this is the most appropriate assumption to make.

#### Time postpartum and breastfeeding status

Initial analysis explored the pattern of risk of pregnancy by time postpartum. Life table analysis presented above suggested that the risk of pregnancy does not increase significantly until around 10 months postpartum. In the present logistic regression analysis, having examined the monthly risks of pregnancy graphically, four categories of time postpartum were initially selected: 2-6 months, 7-10 months, 11-15 months and 16-24 months.<sup>6</sup> Results of the basic model, which included only time postpartum, suggested that risk of pregnancy does not differ between the 2-6-month time period and 7-10-month period (odds ratio 1.37,  $p=0.097$ ), but that the risk does increase significantly beyond 10 months.

Next, the relationship between breastfeeding status and risk of pregnancy was explored. Results of the model which included only breastfeeding status suggested that partial breastfeeding, even when it has been only recently introduced, does significantly increase the risk of pregnancy compared with full breastfeeding (odds ratio 1.85,  $p=0.003$ ), and that the risk is increased further for partial breastfeeders who initiated supplementation longer ago, and further again for women who are not breastfeeding at all.

However, further analysis revealed that the relationships between time postpartum, breastfeeding status and risk of pregnancy, are not simple. Evidence of effect modification (or interaction) was found, so that the effect of a change in breastfeeding status was seen to differ at different times postpartum. Table 2 presents the results of four basic models including only the breastfeeding variable, one for each of the four time periods: 2-6 months, 7-10 months, 11-15 months and 16-24 months.

Table 2. Logistic regression odds ratios of conception during amenorrhoea associated with breastfeeding status, modelled for different time periods after childbirth, Matlab (1978/79)

Breastfeeding status	Time period after birth							
	Model 1 2-6 months		Model 2 7-10 months		Model 3 11-15 months		Model 4 16-24 months	
	Odds ratio	P	Odds ratio	P	Odds ratio	P	Odds ratio	P
Full breastfeeding	1		1		1		1	
Partial, 0-6 months	1.83	-- 0.05	1.23	-- 0.60	1.10	-- 0.27	1.56	
Partial, 7+ months			2.85	33.09 0.03	1.22	8.99 0.59	1.71	3.38 - 0.54 0.24
No breastfeeding	66.10	<0.001	12,055	<0.001	10,767	<0.001	8,211	0.04
N <sup>a</sup>	20,938							

a N refers to the total number of months of observation contributed by all women in each group.

It should be noted that some categories contained smaller numbers of observations, such as "full, 16-24 months" and "no breastfeeding 2-6 months", so that the power to detect differences was lower for these subgroups. Nevertheless, the results suggest that the odds ratios for partial breastfeeding and no breastfeeding compared with full breastfeeding decline with increasing time since the birth. In the first six months postpartum, women who introduce supplements to their child's diet are at higher risk of pregnancy than those who breastfeed fully (though the odds ratio only just reaches significance at the 5 per cent level). However, beyond this time, there is no significant difference in the risks of pregnancy associated with full breastfeeding and partial breastfeeding where supplementation has been introduced within the past six months. In the time period 7-10 months, women who are breastfeeding partially and who introduced supplements seven or more months previously are at higher risk of pregnancy than full breastfeeders (and partial breastfeeders who introduced supplements within the previous six months). Beyond 10 months postpartum, there is no significant difference in the risks of pregnancy associated with partial breastfeeding compared with full breastfeeding, even if it has been initiated seven or more months previously. This suggests that women who introduce supplements to their child's diet within the first six months postpartum are at higher risk of pregnancy during the first six months, and remain at higher risk up to 10 months postpartum. Thereafter, as long as these women continue to breastfeed, it appears that their risk is not significantly higher than women who introduced supplements later in the child's life, or continue to breastfeed fully.

The risk of conception among non-breastfeeders remains significantly higher than among full breastfeeders at all

times postpartum, though the odds ratio declines with increasing time since the last birth. Several factors may contribute to the declining odds ratios with time. First, the risk of pregnancy for full breastfeeders appears to increase sharply beyond 10 months postpartum. Second, a selection mechanism is in operation where the more fecund among the partial and non-breastfeeding women conceive rapidly, leaving a pool of less fecund women behind in these groups. Third, women who are not breastfeeding at all in the early months postpartum are a selected group, largely consisting of women whose child has died. These women may have particularly high risks of pregnancy owing to higher coital frequency.

As well as comparing the risks of pregnancy to a baseline of full breastfeeding, it is of interest to examine the differentials in risk between partial breastfeeding and no breastfeeding at all. The results suggest that up to 15 months postpartum, partial breastfeeding continues to provide some additional protection against pregnancy compared with no breastfeeding at all. In the period 11-15 months, the odds ratio of no breastfeeding compared with partial breastfeeding with supplementation seven or more months previously was 7.4 ( $p<0.001$ ). Beyond 15 months, women who were still fully breastfeeding or had initiated supplementation within the previous six months had significantly lower risks of pregnancy than those who were not breastfeeding at all. However, for women who had started supplementation seven or more months earlier, the risk of pregnancy was not significantly lower than for those who were not breastfeeding. It can therefore be concluded that women who start to introduce supplements to their child's diet at around five or six months postpartum (as currently recommended) but continue to breastfeed partially, can enjoy a significantly higher degree of protection against pregnancy during amenorrhoea for well over a year following the birth, than women who wean their child completely.

Further exploration confirmed that risks of pregnancy do not increase with time postpartum per se until beyond 10 months postpartum. Two models were estimated where the pattern of risk with time postpartum was examined, first for full breastfeeders alone, and second for partial breastfeeders who had initiated supplementation within the previous six months. The results showed no significant difference in the risk of pregnancy among full breastfeeders in the period 7-10 months compared with the period 2-6 months. Beyond 10 months, however, the risk of pregnancy increased significantly. The same pattern was seen among partial breastfeeders who had introduced supplements within the previous six months (results not shown).

#### Other maternal characteristics

In addition to examining the pattern of pregnancy risks during amenorrhoea by time postpartum and breastfeeding status, it was of interest to explore whether other maternal characteristics are associated with risk of conception. In this stage of the analysis, age, number of living children, religion, education and household area (a measure of socio-economic status) were considered as independent variables. Bivariate analyses suggested that risk of pregnancy during amenorrhoea is negatively associated with age, and positively associated with education. No significant association was found with number of living children, religion or household area.

The associations observed could be explained by differing breastfeeding patterns, and/or differing levels of underlying fecundability (fecundity and/or coital frequency). When models were estimated that included breastfeeding status, the effect of education was found to lose significance, suggesting that the higher risks of pregnancy among more educated women are explained by their tendency to introduce supplements to their child's diet earlier.

Table 3. Logistic regression odds ratios of conception during amenorrhoea: final model, Matlab (1978/79)

	<b>Odds ratio</b>	<b>P</b>	<b>95 per cent confidence interval</b>
Women's age (years)			
30+	1	-	-
<30	1.89	<0.001	1.56-2.29
Time postpartum and breastfeeding status			
2-10 months, full	1	-	-
2-10 months, partial	1.87	0.005	1.21-2.87
2-10 months, none	54.62	<0.001	32.74-91.10
11-15 months, full	5.44	<0.001	2.69-10.97
11-15 months, partial	6.63	<0.001	4.57-9.60
11-15 months, none	54.65	<0.001	27.14-110.04
16-24 months, full	12.64	<0.001	4.92-32.51
16-24 months, partial	22.66	<0.001	16.08-31.92
16-24 months, none	52.62	<0.001	23.78-116.47



N = 51,970 months of observation contributed by all women.

In the case of age, however, even when breastfeeding status was controlled for, a significant negative association persisted, and in fact the size of the effect increased. Table 3 presents the results from the model where time postpartum and breastfeeding status were controlled for using an interaction term. In order to keep the number of cells manageable, three categories have been used for breastfeeding status: full, partial and none. A baseline of full breastfeeding during the 2-10-month period has been used. The odds ratio for risk of pregnancy for women aged less than 30 years compared with women 30 years or older was 1.89 ( $p < 0.001$ ). No significant difference was found between women aged less than 20 years and those aged 20-29 years.

Table 4. Percentage of amenorrhoeic women not practising contraception, conceiving, by time since birth, under different breastfeeding scenarios (based on predicted probabilities from Matlab 1978/79 regression model)

Hypothetical scenario	Percentage of women who would conceive		
	By 6 months postpartum	By 9 months postpartum	By 12 months postpartum
Breastfeed fully for 6 months	1.1		
Age <30	0.6	-	-
Age 30+ Breastfeed fully for 6 months and partially from 6 to 12 months	1.1	2.3	5.5
Age <30	0.6	1.2	3.0
Age 30+ Breastfeed partially from birth to 12 months			
Age <30		3.3	6.4
Age 30+	2.1	1.7	3.5
	1.1		

Having fitted the final model, the predicted probabilities were used to calculate cumulative risks of pregnancy for hypothetical scenarios as shown in table 4. In this way, it was estimated that 0.6 per cent of women aged 30 or older who fully breastfeed for six months would conceive during amenorrhoea by six months postpartum, compared with 1.1 per cent of women aged less than 30. For women who fully breastfeed for six months and then go on to partially breastfeed up to one year, 1.2 per cent of women aged 30 or older would conceive by nine months postpartum and 3.0 per cent by 12 months, compared with 2.3 per cent and 5.5 per cent, respectively, of women aged less than 30. For women who partially breastfeed from birth onwards, the risks are somewhat higher, though still low. Among women aged 30 or older, 1.1 per cent would conceive by six months postpartum, 1.7 per cent by nine months and 3.5 per cent by 12 months, compared with 2.1 per cent, 3.3 per cent and 6.4 per cent, respectively, among women aged less than 30.

#### Comparisons with findings from other populations

The results suggest that postpartum amenorrhoea afforded significant protection against pregnancy in these two contrasting Bangladeshi sub-populations. Whereas the data from Matlab were from an older cohort, i.e. 1978/79, among whom breastfeeding was relatively intense and extended, the USS 1992/93 data came from a population among whom supplementation occurred soon after birth in many cases (Baqui and others, 1993). Despite these differences, risks of pregnancy during lactational amenorrhoea were found to be low among women in both the cohorts. Among women whose child survived to at least two months of age, the cumulative risk of conception among women who remained amenorrhoeic by six months was less than 2 per cent in both populations. In line with other studies, hazard model analysis of the Matlab 1978/79 data showed that full breastfeeding affords significantly greater contraceptive protection than partial breastfeeding. However, partial breastfeeders were also found to enjoy good protection against pregnancy during amenorrhoea in the months after birth.

Results also suggest that lactational amenorrhoea can afford good protection against pregnancy beyond six months postpartum. The Matlab analysis showed that the monthly probability of conception during amenorrhoea does not start to rise until around 10 months postpartum, and in both study populations, the cumulative percentage of amenorrhoeic women (whose child survived to at least two months) conceiving by nine months was less than 3 per cent.

Earlier estimates of monthly probabilities of conception during amenorrhoea have not been very consistent. The present results for women whose child survived beyond two months accord very well with the figure of 0.0032 for the monthly probability of conception during the first six months after birth, estimated by Campbell and Gray (1993) for a sample of American women. They are also in line with the estimates presented by Zablan (1985) for Filipino women. Moreover, the current findings, which suggest that lactational amenorrhoea provides good contraceptive

protection even when supplementation is provided and that this protection may extend beyond six months, are consistent with findings from other recent studies. Table 5 shows that the current estimates are remarkably similar to those from a pooled data set including data from eight countries (Kennedy and Visness, 1992). Other recent studies in Pakistan (Kazi and others, 1995) and Rwanda (Cooney and others, 1996) have also reported low risks of pregnancy for amenorrhoeic women beyond six months postpartum.

Table 5. Life table cumulative percentage of amenorrhoeic women not practising contraception, conceiving, by time since birth: findings from different sources compared

Months after birth	Matlab 1978/79		Dhaka slums 1992/93		FHI pooled data	
3	0.3	(0.1)	0.3	(0.2)	0.4	-
6	1.2	(0.2)	0.9	(0.4)	2.9	(2.3)
9	2.3	(0.2)	2.9	(0.9)	2.9	-
12	3.9	(0.3)	0.6	(1.5)	5.9	(4.7)
N	5,144		1,063		346	

Notes: FHI pooled data come from eight different countries and were reported by K.I. Kennedy and C.M. Visness (1992). "Contraceptive efficacy of lactational amenorrhoea" *Lancet* 339(8787):227-230.

Matlab and Dhaka slum estimates are from the samples where woman whose child died before two months of age (and were therefore breastfed for only a very short time or not at all) were excluded.

Life table analyses. For the FHI pooled estimates, women were censored if menses resumed or they stopped breastfeeding altogether, or at loss to follow-up. In the Matlab and Dhaka slum analyses, women were censored if menses resumed or at loss to follow-up. No information was available for the USS cohort on breastfeeding. However, we know that breastfeeding was extended in both the study populations. Therefore, very few women would have been censored due to the complete termination of breastfeeding had the information been available.

However, other studies have reported higher risks. A study of Australian women produced an estimate of the monthly probability of conception of 0.01 for the first six months postpartum and 0.025 for the second six months (Short and others, 1991), figures which are significantly higher than for the current data. This suggests that there may be real variations between populations of breastfeeding women in the risk of pregnancy during amenorrhoea, particularly in the second six months postpartum.

Table 6. Percentages pregnant by time since last birth among breastfeeding and non-breastfeeding women not practising contraception: findings from various studies compared

Breastfeeders					
Months postpartum	Punjab	Eskimo	FHI pooled data	Matlab 1978/79	Australia
3	0.4	0	-	1	3
6	2	1	8	3	14
12	13	19	17	8	51
N	800	300	346	5,370	101
Non-breastfeeders					
Months postpartum	Punjab	Eskimo	Chile	Matlab 1978/79	United Kingdom (UK)
3	7	9	5	18	6
6	40	44	72	50	46
12	55	82	85	79	84
N	200	100	74	188	90

Notes: Australian data are from R.V. Short, P.R. Lewis, M.B. Renfree and G. Shaw (1991). "Contraceptive effects of extended lactational amenorrhoea: beyond the Bellagio Consensus" *Lancet* 337(8743):715-717; and UK data from T.J. Cronin (1968). "Influence of lactation upon ovulation" *Lancet* 24 August, 2:422-424.

Punjab and Eskimo data are cited in J.K. Van Ginneken (1974). "Prolonged breast feeding as a birth spacing method" *Studies in Family Planning* 5(6):201-205.

Chilean data are from S. Zacharias, E. Aguilera, J.R. Assenzo, J. Zanartu (1987). "Return of fertility in lactating and

non-lactating women" *Journal of Biosocial Science* 19(2):163-169.

Breastfeeders were women who initiated breastfeeding, while non-breastfeeders were those who never breastfed. Some breastfeeders may have stopped breastfeeding prior to conception, but in all populations the great majority of women who initiated breastfeeding continued to do so for an extended period.

It is of interest to consider to what extent such differentials reflect differences in the breastfeeding patterns of the populations, and to what extent an alternative explanation is required, such as differing levels of underlying fecundability and maternal nutritional status. Table 6 presents results from the Matlab 1978/79 cohort and the Australian cohort (reported by Bracher, 1992), along with those from a number of other studies. Here, the percentage of women not practising contraception and conceiving (irrespective of menstrual status) by time since last birth is contrasted for women who breastfeed and those who do not. Among breastfeeders, the results reported for the Punjab and the Eskimo populations (cited in Van Ginneken, 1974), as well as those from the FHI study (Kennedy and Visness, 1992) and the results from the present analysis of the Matlab RKS data, show similar low percentages of women conceiving in the first year following the birth of a child. In contrast, the data from the Australian study show quite a different picture. Among the Australian breastfeeders, 3 per cent conceived within three months, 14 per cent by six months and 51 per cent by one year, compared with figures for the Matlab women of 1, 3 and 8 per cent, respectively.

Comparing results for non-breastfeeders should throw light on whether there are underlying differences in fecundability between the populations.<sup>7</sup> Unfortunately, the data Bracher (1992) presents for non-breastfeeders come from an older study in the United Kingdom of Great Britain and Northern Ireland. Table 6 shows the results for this population, together with those for the Punjab and Eskimo populations, a study in Chile and for the present analysis of Matlab data. Though the estimate at three months for the Matlab cohort is higher than for the other data sets,<sup>8</sup> at six months and one year, the estimates for the different populations are remarkably similar. At six months, the cumulative percentage of non-breastfeeding women who had conceived were 40, 44, 50 and 46 per cent for the Punjab, Eskimo, Matlab and British data, respectively. The estimate for the Chilean population is higher, at 72 per cent, although it is based on a rather small sample. Though comparisons between different populations are complicated by differing study designs and, in many cases, small sample sizes, the available data did not suggest important differences in underlying fecundability.

However, despite apparent similar levels of fecundability among non-breastfeeding women, it is possible that poor maternal nutritional status could interact with the demands of breastfeeding to lower the capacity to conceive among lactating women. Previous research in Bangladesh has shown a small but significant difference in the duration of postpartum amenorrhoea among women with differing body weights. Huffman and others (1987) reported an increase of 3 per cent in the risk of resuming menses for each kg in the mother's weight, having controlled for other factors in a hazard model analysis. They posited that the effect operates both directly via hormonal responses influencing resumption of menses and also indirectly via variations in infant suckling patterns as a response to differential milk output from mothers of differing nutritional status. However, no study that we are aware of has systematically investigated whether the risk of pregnancy while amenorrhoeic varies significantly with maternal nutritional status. Nevertheless, such a relationship is entirely plausible and may account in part for the differences found in the risk of pregnancy during amenorrhoea between the Bangladeshi (and other developing country settings) and the Australian samples.

Though maternal undernutrition may play a part, it seems likely that differences in patterns of breastfeeding are also an important explanation for the differing risks of pregnancy during lactational amenorrhoea observed between some populations. The data available in the present study were inadequate for elucidating important differences in frequency and intensity of breastfeeding between the study cohorts and other populations. Nevertheless, the available evidence suggests that breastfeeding in Bangladesh is relatively intense, with frequent suckling. For example, among urban slum mothers the mean number of breastfeeds per day (among exclusive and not exclusive breastfeeders) was around 13 for children aged up to 11 months of age, and around 20 per cent of children received 18 or more breastfeeds per day (Baqui and others, 1993). This frequency did not decrease greatly until beyond the second year of life. For the rural population, it seems likely that the frequency may be even higher. Gray and others (1990) reported significantly higher frequencies of breastfeeding throughout the first year of life among Filipino women than American women in their study of intensively breastfeeding women. The assertion of Bracher (1992:24) therefore seems questionable, i.e. that his data "present the best-case scenario in terms of durations of lactation and lactational amenorrhoea since few women in developing countries have the leisure to breastfeed with the dedication exhibited by the participants in the Australian study".

## Discussion and implications

The results from both study populations indicate a high degree of protection against pregnancy for amenorrhoeic women. Whereas the data from Matlab were from an older cohort, 1978/79, when breastfeeding was relatively intense and extended, the USS 1992/93 data came from a population where supplementation occurred soon after birth in many cases. Despite these differences, risks of pregnancy during lactational amenorrhoea were found to be

low among women in both cohorts. In Matlab, full breastfeeding was found to afford significantly greater contraceptive protection than partial breastfeeding, though partial breastfeeders were also found to enjoy good protection against pregnancy while amenorrhoeic in the months after birth. This effect is most likely the result of intensive breastfeeding despite supplementation. The results also suggest that lactational amenorrhoea can afford good protection against pregnancy beyond six months postpartum, particularly for women who fully breastfeed in the first six months. Findings from the multivariate analysis of the Matlab data also revealed an age differential that has so far been overlooked in most investigations of the risk of pregnancy during amenorrhoea. Older women were found to have significantly lower risks of conception during postpartum amenorrhoea than younger women.

Although the data allowed an examination of pregnancy risks among two large cohorts of Bangladeshi women, some potential limitations should be acknowledged. First, as noted above, women's reports of resumption of menses and timing of conception are necessarily subject to a certain degree of error. However, efforts were made during data collection to ensure good quality data and, at the time of analysis, conservative adjustments were made in order to avoid overestimating the contraceptive effect of lactational amenorrhoea.

Second, a number of unobserved factors could have resulted in the low risks of pregnancy recorded. No information was available on coital frequency. It might be suggested that low pregnancy rates compared with western populations are explained by postpartum abstinence and reduced coital frequency. Evidence from in-depth interviews with women presented elsewhere suggests that this is unlikely, and that Bangladeshi couples may often resume sexual relations even before the end of the traditional period of ritual impurity (Salway, 1996). Spousal separation could also contribute to low risks of pregnancy. However, data from the 1989 BFS suggest that in only very few cases do husbands spend longer than a month away from home (Islam and Islam, 1993). In addition, it is less likely that urban husbands would spend long periods away from home, especially following the birth of a child. Unreported menstrual regulation or abortion may also contribute to low pregnancy rates, though this is unlikely to be an important bias in the RKS where surveillance is extremely intense. Maternal undernutrition may also be an important factor in explaining the low pregnancy rates among our amenorrhoeic Bangladeshi women compared with those observed in some developed country settings. Although these factors may all contribute to the low risk of pregnancy observed in the study cohorts, it seems likely that intensive breastfeeding behaviour is an important determinant. It is also likely that changes in breastfeeding behaviour will be the most important factor in any decline in natural protection against pregnancy observed in coming years.

Despite an inevitable degree of uncertainty, we are confident that the risks of pregnancy during postpartum amenorrhoea in the two study populations were consistent with the Bellagio guidelines (Kennedy, Rivera and McNeilly, 1989). The next issue to be addressed is to what extent the findings from these two sub-populations can be extrapolated to the wider Bangladesh population today. The data for Matlab came from a relatively long time ago. However, the situation which prevailed in Matlab in 1978/79 does not appear to be hugely dissimilar to that of the national population in the 1990s in terms of breastfeeding and postpartum amenorrhoea. The 1991 contraceptive prevalence survey (CPS) estimated a median duration of postpartum amenorrhoea for the national rural population of 12.1 months (Mitra and others, 1993) and the 1993/94 Bangladesh Demographic and Health Survey (BDHS) estimated a median duration of 10.6 months (Mitra and others, 1994), compared with 13.7 months in the 1978/79 Matlab cohort. Also, it is apparent that any decline in the duration of postpartum amenorrhoea that has occurred in the national rural population over time has been to date quite small. Comparisons of breastfeeding patterns and trends in Matlab and the national rural population are fraught with difficulties. National surveys have shown little consistency in the selection of samples or the use of definitions or estimation techniques. Overall, the impression is that durations of all breastfeeding (full plus partial) have not changed greatly over the past 10 to 15 years. The 1991 CPS estimated the mean duration of all breastfeeding to be around 30 months (Mitra and others, 1993), almost as long as that reported for Matlab in the period 1978/79. There is evidence to suggest that patterns of supplementation may have changed somewhat over time in Bangladesh. An analysis of the trend in duration of "full" breastfeeding in the Matlab area revealed a decrease from a median of around six months in the period 1978/79 to around five months in the period 1986/87. Changes in breastfeeding patterns and declines in the duration of postpartum amenorrhoea appear to have been more marked among the urban population. The presentation of findings from the urban slum setting is therefore an important complement to the Matlab analysis.

The consistency in findings from both the study populations suggests that low risks of pregnancy during amenorrhoea may prevail for Bangladeshi women more generally. Taken together with evidence from other recent studies in Bangladesh (Weis, 1993) and other similar settings (Kazi and others, 1995), the present results suggest that lactational amenorrhoea deserves careful consideration within family planning programmes in this context.

At present, the family planning programme in Bangladesh does not promote breastfeeding for its contraceptive qualities, and in many cases actually undermines breastfeeding practices that are beneficial to birth spacing (as well as child health). Evidence suggests that contraceptive methods are promoted early in the postpartum period, commonly after 40-45 days, regardless of breastfeeding or amenorrhoeic status (Salway, 1996). Such an approach appears inappropriate because the majority of women in Bangladesh breastfeed and are naturally protected against pregnancy for an extended period of time. Moreover, it runs counter to strongly held beliefs. Most women are reluctant to initiate contraception soon after birth. Women are aware of the diminished risk of pregnancy during

postpartum amenorrhoea, and are also unwilling to use "strong", modern methods of contraception at a time when they feel weak and vulnerable, and have concerns about their child's breastfeeding and health (Salway and Nurani, 1998).<sup>9</sup> Also, since the majority of women deliver at home with the assistance of traditional birth attendants or relatives, contact between women and family planning services is no more likely at the time of delivery, or within the 40-45-day postpartum period, than at other times. Finally, contraceptive continuation rates remain low (Mitra and others, 1990; Salway and Nurani, 1998) so that early adoption will have a limited impact on birth intervals since use is unlikely to extend beyond the period of natural protection against pregnancy.

It is therefore clear that current policy regarding the timing of promotion of contraception among amenorrhoeic women in Bangladesh needs careful review. While a policy of withholding contraceptives in the early postpartum period from women who desire to initiate use cannot be justified, measures should be taken in order to provide greater support for breastfeeding and explicitly to incorporate lactational amenorrhoea into the range of methods promoted for women in the postpartum period. Findings from the present study and the increasing number of investigations in other parts of the world must be assessed, and a comprehensive and consistent policy developed for family planning programmes in Bangladesh.

Regardless of the exact policy guidelines that are developed, it is clear that in order to incorporate lactational amenorrhoea into family planning programmes, steps will be needed to increase both the knowledge of, and trust in, the contraceptive potential of breastfeeding among family planning providers (Salway, 1996). Efforts must also be directed at educating clients about the contraceptive potential of breastfeeding, including the importance of frequent and intensive suckling, the increasing risk of pregnancy beyond about nine months postpartum, and the need to initiate contraception promptly if menses resumes before this time. Despite findings which suggest that partial breastfeeding may confer good protection against pregnancy, it is nevertheless important that family planning and health workers still emphasize the importance of full breastfeeding for the first five to six months, since this will ensure lower risks of pregnancy as well as be beneficial for child health. Moreover, it should be stressed that, in cases where women do not breastfeed at all, or where menses resumes at 40-45 days, contraception is needed immediately if another pregnancy is to be avoided.

Though the wisdom of directing scarce resources to promoting breastfeeding as a contraceptive has been questioned (Bracher, 1993; Islam and others, 1998), such steps are likely to have positive effects on both child health and fertility. Findings from studies where women were actively using breastfeeding as a method of child spacing (rather than purely for child feeding) suggest that breastfeeding practices may be enhanced (Perez, Labbok and Queenan, 1992; Kocturk, 1988). In the context of Bangladesh, where many women currently prefer to delay the adoption of modern contraception until menses, such an approach would appear to be sensitive to the needs of those the family planning programme is seeking to serve.

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#### Endnotes

1 The Bellagio Consensus Statement recognized that "exclusive breastfeeding", wherein "the infant receives only breastmilk given directly from the mother's breast (with the possible exception of medicine or vitamin drops)" would maximize lactational protection against pregnancy. However, since such breastfeeding is rare in developing country settings (with the majority of infants being given, at the least, small amounts of traditional mixtures, water, teas or juices) the recommendations were based on "full or nearly full breastfeeding". No precise definition of "full or nearly full breastfeeding" was offered, and it was pointed out that local variations in breastfeeding habits make such a definition difficult. However, it was understood that "for breastfeeding to be sufficient to be used for family planning, the breastfeeding pattern must include at least these aspects: breastfeeding should constitute the overwhelming majority of the baby's diet; breastfeeding frequency and duration should be high, and not affected by additional feedings; and additional feedings should not act as replacements for breastfeeding" (Kennedy, Rivera and McNeilly, 1989:486-487).

2 In the Matlab 1978/79 cohort, 9 per cent of amenorrhoeic women had adopted contraception by six months postpartum, and 19 per cent by twelve months postpartum. In the USS 1992/93 cohort, these figures were 7 and 10

per cent, respectively.

3 In the RKS 1978/79 cohort, 90 per cent of pregnancies during postpartum amenorrhoea ended in a live birth, and 10 per cent ended in a non-live birth or were lost to follow-up before the pregnancy outcome.

4 In the USS 1992/93 cohort, 33 per cent of pregnancies during postpartum amenorrhoea ended in a live birth, and 67 per cent ended in a non-live birth or were lost to follow-up. The percentage that ended in a live birth is much lower than in the case of the RKS because the duration of follow-up was shorter and so many pregnancies were censored prior to the pregnancy outcome. In order to test the sensitivity of results to the type of adjustments made, analyses were also conducted using a more extreme adjustment. In this, the same adjustment was made for live birth outcomes, but in the case of non-live birth outcomes, the timing of conception was adjusted back in time by six months in the RKS file, and by seven and a half months in the USS file. The results were found to be very similar for both adjustments. Therefore, only the results arising from analysis of the data sets where the smaller adjustments were made are presented here (since these are felt to be the most reasonable considering the patterns of pregnancy-reporting in the two populations).

5 As well as the pregnancies that were reported and recorded, some women may have been pregnant at the time of loss to follow-up but not have reported this (Trussell, 1991). In order to overcome this potential bias, the period of follow-up was shortened for any woman whose observation was censored. In the same way as the reported pregnancies were backdated, the period of follow-up was shortened by three months and four and a half months.

6 Since the probability of pregnancy was very low in the first month postpartum and this could potentially affect the estimates for the whole of the first six-month period, the first month was omitted from this stage of the analysis.

7 It should be remembered that many of the non-breastfeeders are women whose child has died. Therefore, there may be other factors, aside from lactational protection against pregnancy, such as coital frequency, which explain the difference between the two groups in terms of the time to conception. Nevertheless, breastfeeding is assumed to be the most important factor.

8 This large difference may in part be explained by the fact that the Matlab data set was adjusted for late reporting of pregnancy, which was probably not the case for the Punjab or Eskimo data sets.

9 Similar findings have been reported in Rwanda (Cooney and others, 1996).

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Client Perspectives on Quality of Reproductive Health Services in Viet Nam

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Many clients lack correct and specific information about side-effects for the method they are using

The family planning programme of Viet Nam, which was started early in the 1960s, has achieved positive results in encouraging the population to have smaller families. A number of factors have contributed to smaller family size including increased knowledge about and use of contraceptives, improved access to and increased options for contraception, government policies that encourage couples to have two or fewer children, free and on-demand abortion, incentives for doctors to provide long-term contraceptive methods and allowances that compensate couples for the time and cost associated with obtaining sterilization. According to the most recent Demographic and Health Survey (DHS, 1997), the total fertility rate 12 months prior to the survey was 2.37, down from 4.0 in 1988. Also, use of modern contraceptive methods has risen from 38 per cent of couples in 1988 to 56 per cent in 1997 (Thang and Huang, 1998).

The most important success of the intensive programme over the last 10 years is that a demand was created for family planning. Although the family planning programme is widely supported by the Vietnamese people, the increasing demand for family planning will challenge the national programme in coming years. Improvements in the quality of reproductive health services must be made in order to maintain the past success of the population programme and continue to meet the demand for reproductive health methods and services.

The Government of Viet Nam is concerned about the quality of care in family planning and reproductive health services. As the experience of population programmes in other countries shows, choice of methods, information and counselling given to clients, technical competence, interpersonal relations, mechanisms to encourage continuity, and an appropriate constellation of services are critical issues in improving the quality of care (Bruce, 1990). These fundamental elements are reflected in the strategy for population and family planning in Viet Nam to the year 2000.

As mentioned previously, there are many challenges to improving the quality of reproductive health programmes in Viet Nam. Programmes do not always provide all methods or even sufficient methods for prospective users. Information and counselling provided to clients have focused more on the importance of using a method than on how to use a method, the method's side-effects, or where to obtain the method. Counselling on contraceptive use for abortion clients is virtually absent from family planning clinics and maternal and child health/family planning (MCH/FP) centres throughout the country. The mechanism for method distribution is not very well specified. This situation has caused a shortage, or even a complete lack, of certain contraceptives at some MCH/FP centres.

A number of efforts have been launched to research and evaluate the quality of family planning services and policies related to the programme. The Ministry of Health is collaborating with a number of national and international non-governmental organizations (NGOs) to improve the quality and delivery of health services. Additionally, the National Committee for Population and Family Planning (NCPFP) runs a national information, education and communication (IEC) programme which conducts outreach campaigns to generate awareness of the population and family planning programme. Information focuses on the importance of the programme and encourages men and women to use contraceptives. Unfortunately, however, the IEC programme does not provide information about how to use contraceptives, their side-effects, or where to obtain them. Also, the IEC programme does not provide counselling on contraception.

Even though the contraceptive prevalence rate is reportedly high, actual demand for family planning and actual client satisfaction remains a question in view of the fact that (a) a high percentage of women (32.7 per cent in 1996) deliver a third birth despite the national policy favouring families with two children and (b) there is a high rate of abortion. In Viet Nam, abortion is legal (Belanger and Hong, 1998). In recent years, even though the contraceptive prevalence rate has been increasing, the number of abortions has remained high at about 1.4 million procedures per year according to the Ministry of Health (Ministry of Health, 1997a). The 1994 Viet Nam Intercensal Demographic Survey (ICDS) estimated that the average number of abortions per woman (i.e. the total abortion rate) is 1.25, which, according to Goodkind (1996), may underestimate the actual number by 50 per cent. According to the advisory committee for the 1997

DHS, the abortion rate is estimated to be 1.78.

Although the actual number of abortions performed each year in Viet Nam is contested, the high abortion rate suggests a substantial unmet demand for reproductive health services. This situation presents a challenge to IEC programmes, counselling services, clinical services, and to those who make policies related to incorporating post-abortion family planning as a standard part of abortion-care service delivery (Ministry of Health, 1997b). Recent studies and data suggest that some women experience medical complications related to abortion, including hemorrhage, retained tissue and infection (Jarnbert, 1996). Also, a case control study from Viet Nam indicates strong associations between a history of abortion and subsequent symptoms associated with pelvic inflammatory disease (PID) and/or ectopic pregnancy (Ngoc, 1996). As abortion techniques are improved through programmes such as the Reproductive Health Programme, further research will be needed to increase understanding of abortion safety and patterns in Viet Nam.

### Reproductive Health Programme

The Viet Nam Ministry of Health, in collaboration with the Reproductive Health Programme, has initiated a comprehensive and replicable reproductive health and family planning training model designed to improve the quality of services in selected provinces. At the time of this study, the programme was being implemented in the provincial maternal and child health and family planning centres at Hue, Ho Chi Minh City, Soc Trang and the MCH/FP centre and the Hanoi Obstetrical Hospital.<sup>1</sup> Working with the Ministry of Health, the programme has developed a comprehensive training curriculum for reproductive health-care providers. The centres in Hanoi, Hue and Ho Chi Minh City serve as training sites for the programme. All four programme centres provide a wide range of integrated reproductive health care services.

This article presents a follow-up study conducted in the period 1997-1998 to assess client perspectives on the quality of reproductive health services; it was undertaken in collaboration with programme partners, namely Pathfinder International, Ipas and AVSC (Access to Voluntary and Safe Contraception) International, and the Centre for Population Studies and Information (CPSI), which is a division within NCPFP. The sample size for the initial client recruitment interview was 774; almost all (98.7 per cent) of the clients agreed to participate in the follow-up interviews. The sample size for the three-month follow-up interview was 686 (11 per cent were lost to follow-up). The sample size for the eight-month follow-up was 536 out of 547 expected subjects (an additional 2 per cent were lost to follow-up).<sup>2</sup> In addition, group interviews were conducted with clients at the recruitment and eight-month follow-up intervals.

The study examined perspectives on abortion, temporary contraceptive use and sterilization at three study sites: Hanoi, Soc Trang and Tay Ninh provinces. Researchers examined indicators such as the proportion of abortion clients who left sites with a modern contraceptive method, clients' self-reported side-effects and complications, three- and eight-month continuation rates and patterns of contraceptive use, and number of subsequent pregnancies. Client satisfaction was assessed using variables such as the following: Did a client receive her/his contraceptive method of first preference? Was the quality of information she/he received adequate? Did she/he understand the proper use of the method selected?

### Profile of study respondents

The majority of respondents in this study ranged in age from 25 to 39 years. The distribution of participants by age is similar to that found within the general population in the provinces. The average age for respondents at each site ranged from 30.7 to 31.7 years.

The educational level of the participants varied considerably by site. In general, respondents from Hanoi had attained a higher level of education than those from Soc Trang and Tay Ninh. Nearly two-thirds of the women in Hanoi had completed primary school and 34.3 per cent had finished high school or college. In Soc Trang and Tay Ninh there were more respondents who were illiterate or who completed only primary school.

More than half the clients in Tay Ninh and one-fourth in Soc Trang were working in the agricultural sector. About one-third of the clients in Hanoi were students, housewives, or not working. Almost all of the study subjects were married. However, about 5 per cent who attended the Hanoi hospital were unmarried; these were mainly students. The number of unmarried women may have been higher than reported since some younger women who use contraceptives or seek abortion services may be reluctant to say they are single owing to cultural proscriptions against premarital sexual intercourse (see also Belanger and Hong, 1998).

The study sites are located in the city/provincial towns. Nearly half (47.2 per cent) of the total study

participants came from urban areas and 52.8 per cent from rural areas. However, it is important to note that during the time of the recruitment interviews, there was a family planning campaign in Tay Ninh to bring clients from rural areas to the MCH/FP centre. Also, interviews were conducted in three communes visited by the Tay Ninh mobile sterilization team. Because of the family planning campaign, we sampled a disproportionate number of rural clients in Tay Ninh (86.3 per cent), whereas in Hanoi and Soc Trang rural clients accounted for 19.1 per cent and 29.1 per cent, respectively.

#### Desire for more children

On average, respondents interviewed at the three sites had two living children. The ideal number of children they said that they wanted was two to three, and 40 per cent of the clients said that they wanted another child in the future. The proportion who reported that they do not want more children was lower in Tay Ninh because over one-third of the sample population were seeking sterilization services.

Table 1. Percentage desiring more children, by number of living children among all respondents: all study sites in Viet Nam

Desire for children	Number of living children					
	0	1	2	3	4	5
	N=40	N=223	N=256	N=135	N=57	N=48
Want no more children	0.0	6.7	82.6	97.8	96.5	97.9
Want to have another within 2 years	60.0	13.5	2.7	0.7	1.8	0.0
Want to have another in 3-5 years	15.0	29.1	5.8	0.7	0.0	0.0
Want to have another in 5+ years	7.5	38.1	2.3	0.0	0.0	0.0
Undecided	17.5	12.6	6.6	0.7	1.8	2.1

Table 1 provides a clearer picture of clients' desire for more children. Approximately 83 per cent of clients who had two children said that they did not want more children. The highest percentage of clients who said that they wanted another child was among those who had no children or only one child.

#### Knowledge of and access to methods

Awareness of family planning methods and where they can be obtained is an important factor in the decision to select a modern method. In Hanoi, 100 per cent of the clients were aware of at least one modern method; clients had heard of an average of seven methods. In Tay Ninh, 99 per cent of women were aware of at least one modern method and had heard about five methods on average. In Soc Trang, 99 per cent of clients were aware of at least one modern method and had heard about an average of four methods. Differences among the sites in the average number of modern methods that clients had heard about appears to reflect the number of methods available at each site. Education level had little effect on the percentage of clients who had heard of at least one modern method (96 to 100 per cent); however, education did appear to affect the average number of modern methods recognized by respondents.

Table 2. Contraceptive method status at the time of the recruitment interview among all clients, by study site in Viet Nam

Method	Hanoi	Soc Trang	Tay Ninh	Total
Modern method	50.6	91.0	96.9	84.3
IUD	25.8	69.7	54.1	52.5
Pill	17.4	13.5	2.3	9.3
Condom	3.9	7.8	0.3	3.5
Injection	3.4	0.0	0.0	0.8
Female sterilization	0.0	0.0	35.0	15.9
Vasectomy	0.0	0.0	5.1	2.3
No method	49.4	9.0	3.1	15.7

The study also shows that, among modern methods, the IUD was the most widely recognized method (97 per cent), followed by the pill (88 per cent), condoms (84 per cent) and female sterilization (75 per cent). Table 2 shows that most clients who said they knew about the IUD also knew where to obtain IUD services (97 per cent). Among clients who had heard of the pill, 88 per cent knew where it could be obtained;

among clients who had heard of the condom, 88 per cent knew where to obtain it; and, 89 per cent of clients who had heard of female sterilization knew where this procedure is performed.

**Accessibility to facilities.** Access to family planning services is an important factor affecting the use of modern contraceptive methods. Viet Nam has a number of programmes to increase people's access to services. There are health posts, MCH/FP centres and hospitals throughout the country. Population Committee volunteers provide information, distribute pills and condoms, and make referrals to health centres. In some places, free transportation is provided to clients who require family planning and reproductive health services. For example, clients living in the Tay Ninh rural districts who desired sterilization were offered free transportation to the MCH/FP centre during the recruitment stage of the study; therefore, the average time is skewed. The average time people traveled to get to the study site was 38 minutes.

The average waiting time for people to receive services at the three study sites was 31 minutes. On average, 79 per cent of the respondents considered the amount of time they waited acceptable. The remaining 21 per cent said that they had waited too long for services. In Hanoi, the average wait was 39 minutes; in Soc Trang the average was 26 minutes, and in Tay Ninh it was 30 minutes.

**Modern contraceptive acceptance during recruitment and follow-up.** The results from the recruitment interviews indicate that 84.3 per cent of all clients who visited one of the study sites accepted a modern contraceptive method. Table 2 shows the distribution of methods accepted, by study site. On average, the IUD was the most commonly accepted method, followed by female sterilization, the pill and condoms, among the clients we interviewed at the three study sites. As illustrated in the site-specific tables, however, the distribution of methods at each site varied considerably. Providing clients with access to sterilization was a priority in Tay Ninh, a situation which is reflected in the high percentage of sterilization operations performed there during the recruitment stage of interviews. No sterilization procedures were performed during recruitment in Hanoi. Soc Trang did not have the capacity to perform sterilization, which explains the higher use of other methods, especially the IUD.

#### Temporary contraception

One of the goals of this study was to assess the experience of clients who received temporary family planning services at the three study sites, including any woman who had an abortion and left the service site with a temporary family planning method. Researchers gathered data on the percentage of clients who were aware of family planning methods and knew where they could be obtained, the percentage of women who received family planning counselling at the sites, and how comprehensively clients understood method use. Three- and eight-month follow-up interviews assessed contraceptive continuation rates. Among the 433 temporary family planning clients who participated in the recruitment exit interview, 132 were new family planning clients, 222 came for a routine check-up or re-supply, and 79 to switch or stop using a method.

#### Contraceptive method switching

Among the 433 temporary clients who participated in the recruitment interviews, 60 had come to the centre to switch to another method. Table 3 shows that, among those who wanted to switch methods, 90 per cent received an alternative method.

Table 3. Contraceptive switching among temporary family planning clients who came to the study site to switch methods (all study sites in Viet Nam)

Method left with	IUD	Pill	Condom	Female sterilization	Male sterilization	Received no method	N
Method arrived using:							
IUD	NA	8.6	5.7	68.6	0.0	17.1	35
Pill	53.8	NA	0.0	46.2	0.0	0.0	13
Condom	66.7	8.3	NA	0.0	8.3	16.7	12

Note: NA = Not applicable.

#### Problems experienced with method used

Among all clients who participated in the recruitment interview, 301 came to the centres for a routine check-up or re-supply, or to change to another method, or to stop using a method. Each of these women was asked if she had experienced a problem with the method she was using prior to coming to the centre. Fifty-three per cent reported experiencing a problem. Immediate physical health concerns (e.g. abnormal vaginal discharge, cramping, headaches) were mentioned by women as the leading problem (20 per cent). The highest percentage of women reporting problems with a method was found among the users of depot-medroxyprogesterone acetate (DMPA), followed by users of the IUD, the pill and the condom.<sup>3</sup> Table 4 shows the types of problems experienced by women using each method.

Table 4. Method problems experienced by temporary family planning clients in Viet Nam prior to recruitment interview, by method

<b>Problem reported with method</b>	<b>IUD N=251</b>	<b>Pill N=26</b>	<b>Condom N=20</b>	<b>DMPA N=5</b>	<b>Total N=302</b>
Women stated having a problem	56.6	34.6	25.0	80.0	53.0
Immediate health concerns	22.4	5.6	11.1	66.7	20.0
Potential physical health problems	3.0	1.4	0.0	0.0	2.5
Mental health problems	1.0	1.4	0.0	0.0	1.0
Pressure from partner	0.2	1.4	0.0	0.0	0.4
Other	5.4	2.8	0.0	0.0	4.7

Note: Percentages may exceed 100 because respondents reported multiple problems.

#### Family planning information and counselling

Less than half the clients who participated in the recruitment interview and accepted a modern method said that they had received counselling about how to use the method. In Hanoi, 39 per cent of the clients said they had received counselling. In Soc Trang, 30 per cent of clients said they received counselling and in Tay Ninh 11 per cent of the clients said that they had received counselling. Clients were asked if they knew about the possible side-effects of the method that they had selected. Judging from the results, in many cases, clients did not know about or understand the possible side-effects associated with the method they had selected. Whether this was due to poor counselling or poor retention of information provided by the counsellor is unclear (see table 5). Among IUD users, less than 50 per cent could list the possible side-effects. The percentage of women who accepted the pill or DMPA who could list the possible side-effects was also low.

Table 5. Awareness of side-effects associated with method selected among temporary family planning clients and abortion clients, by study site in Viet Nam

Awareness of potential problems associated with method	Hanoi	Soc Trang	Tay Ninh	Total
<b>IUD:</b>				
Cramps				
Abnormal spotting				
Heavy bleeding	30.4	8.2	29.5	20.7
Abnormal vaginal discharge	40.0	37.1	54.7	45.3
Not feeling well	19.6	12.9	14.2	14.3
Abdominal pain	6.5	8.8	13.2	10.6
<i>Mean number of side-effects known</i>	8.7	22.4	7.4	13.8
<i>known</i>	30.4	22.9	42.6	33.0
<b>Pill:</b>	1.3	1.1	1.6	1.4
Irregular bleeding				
Headache	16.1	18.2	12.5	16.7
Nausea/vomiting	22.6	18.2	87.5	27.8
Depression	29.0	21.2	75.0	30.6
<i>Mean number of side-effects known</i>	3.2	3.0	0.0	2.8
<i>known</i>	0.7	0.6	1.8	0.8
<b>Condom:</b>				
Decreased sensitivity	28.6	15.8	NA	18.5
Leakage	57.1	21.1	NA	29.6
Breakage	28.6	26.3	NA	25.9
Latex allergy	28.6	0.0	NA	7.4
<i>Mean number of side-effects known</i>	1.6	1.3	NA	1.3

<i>known</i>				
DMPA:	33.3	NA	NA	33.3
Absence of menses	16.7	NA	NA	16.7
Irregular periods	33.3	NA	NA	33.3
Spotting	0.0	NA	NA	0.0
Heavy/prolonged bleeding	0.0	NA	NA	0.0
Weight gain	0.8	NA	NA	0.8
<i>Mean number of side-effects</i>				
<i>known</i>				

Note: NA = Not applicable.

Clients were also asked if they knew whether or not their contraceptive method protected them from sexually transmitted diseases (STDs) including HIV. As shown in table 6, few clients knew if their method would safeguard them against STDs.

Table 6. Awareness among all temporary family planning clients in Viet Nam about protection from STDs and HIV infection, by current method

	IUD clients	Pill clients	Condom clients
Can your contraceptive method protect you from getting an STD or AIDS? Yes	10.0	6.0	71.0
No	48.0	50.0	0.0
Don't know	42.0	44.0	29.0

Finally, respondents were asked why they had selected the centre they had visited for family planning services. Twenty-three per cent said that they had heard that the services were good, 13 per cent said that the clinic had been recommended by a friend, 3 per cent said that they came because of the physician, 16 per cent said that they had visited the clinic before and 1 per cent said that they did not know of another place to go (data not shown).

#### Contraceptive use at three and eight months

A total of 533 temporary method clients were interviewed at three and eight months post-recruitment (this includes abortion clients who accepted a temporary contraceptive method after their abortion) to determine how many were still using a modern method and to assess their knowledge of the proper use of the method. The percentage of respondents who reported using a modern contraceptive during the eight-month period following recruitment remained high: 90 per cent at three months and 88 per cent at eight months post-recruitment. Among the 523 respondents interviewed at the three-month follow-up, 91.4 per cent said that they had used a modern method in the first month after recruitment. By the third month, use of a modern method had dropped to 89 per cent. At the eight-month follow-up, 87.6 per cent of the respondents reported that they were still using a modern method. During the eight-month period, the IUD was the most commonly reported method in use (68.7 per cent).

During the eight-month follow-up, women were asked to discuss the information they had received about the proper use of the method they had chosen. The study found that clients had received information about the method from a variety of sources. The main sources of family planning method information reported by clients were as follows: family and friends, family planning collaborators and health facility staff members (see table 7).

Table 7. Percentage of temporary family planning clients who received family planning information and sources at the eight-month follow-up interview, by study site in Viet Nam

Information and sources	Hanoi N=99	Soc Trang N=190	Tay Ninh N=179	Total
Received information	97.0	96.3	98.3	97.2
Source of information				
Study site: at exit interview	38.5	30.4	10.8	24.6
Commune health centre	1.04	2.7	6.8	5.9
Other MCH/FP centres	0.0	4.9	1.1	2.4
Family planning mobile team	1.0	0.5	0.0	0.4

Family planning collaborators	0.0	13.6	42.6	21.9
Private doctors/pharmacy	0.0	1.1	0.0	0.4
Family or friends	17.7	29.9	27.3	26.3
IEC activities/messages	32.3	16.8	11.4	18.0

Clients were also asked to discuss the type of information they had received. Table 8 shows the type of information clients reported they received. Approximately 40 per cent of the clients said that they had been instructed in the proper use of the method, 27 per cent about the possible side-effects, and 21 per cent reported that they received information about where to obtain the method. Approximately 70 per cent said that they were told about the benefits of family planning.

Table 8. Type of information provided to temporary family planning clients at the eight-month follow-up interview, by study site in Viet Nam

Type of information	Hanoi N=99	Soc Trang N=190	Tay Ninh	Total
How to use method correctly	68.7	50.0	15.6	40.8
Where to obtain method	26.3	31.1	7.3	20.9
Possible side-effects	16.2	28.9	31.3	27.1
Benefits of using method	57.6	66.8	81.0	70.3

### Sterilization

At recruitment, only clients from Tay Ninh had received sterilization services. Sterilization services are available at the Hanoi Obstetrical Hospital, but not at the MCH/Family Planning Centre in Soc Trang. A total of 123 tubal-ligation clients and 18 vasectomy clients were interviewed at recruitment. Thirty-two of the women had an abortion on the same day they underwent the sterilization procedure.

The demographic profile of women from Tay Ninh differed significantly from the profile of women from the other two study sites. As one would expect, these women were older and had more children; they also had less education. The majority (69 per cent) of these women worked in the agricultural sector. The men who had a vasectomy at Tay Ninh were on average 39.7 years of age and had 4.6 living children; as was the case with the women clients, the majority (67 per cent) of men also worked in the agricultural sector.

### Factors in the decision-making process

All sterilization clients were read a series of statements about reasons for choosing sterilization instead of other methods and asked to respond to whether the factor was important in their decision to choose sterilization. As shown in table 9, the majority of women stated that the fact that they were certain they wanted no more children was important in their decision to choose sterilization. Other important reasons given were that sterilization is a more effective method for family planning and that it is perceived as being better for one's health. Vasectomy clients gave similar reasons: all said that they were certain they wanted no more children; five of the men said that it is a better method for one's health.

Table 9. Reasons for selecting female sterilization over other methods of family planning in Viet Nam (per cent)

Reason for choosing tubal ligation

Reason for choosing tubal ligation	%
Certain about wanting no more children	95.1
Sterilization is more effective than other family planning methods	41.5
Sterilization is better for health	34.1
Sterilization is permanent	30.1
More convenient to use	10.6
Do not like other family planning methods	8.9
N	123

Note: Because multiple responses were allowed, percentages sum to more than 100.

Nearly all the women (98 per cent) and men (89 per cent) reported that they spoke to their partners about

the decision to choose sterilization and the majority of partners agreed with the decision. When respondents were asked who made the final decision for sterilization, nearly all the men reported "themselves" while only 43 per cent of the women reported "themselves". All others reported that husband and wife made the decision jointly (data not shown).

#### Information and counselling about the sterilization procedure

An important objective of sterilization counselling is to ensure that clients understand what the procedure entails, that the procedure might cause some pain, that they are aware that other family planning methods exist, and that the procedure should be considered as permanent. Nearly all of the women and men reported that a service provider gave them a general overview of what the operation entailed, including the likelihood that there might be some pain associated with the operation. Nearly all the women and all of the men reported that sterilization should not be used if a person wanted to have more children. Clients were also asked if they thought the sterilization (vasectomy or tubal ligation) could be reversed. One man reported that he thought a vasectomy could be reversed; 30 per cent of the women were not sure about reversing tubal ligation.

Awareness of the existence of other family planning methods is an important element of informed choice for sterilization clients. The sterilization clients were asked to spontaneously name as many family planning methods as possible. As shown in table 10, most clients named at least one other contraceptive method; however, six of the men and 23 of the women could not name a single method.

Table 10. Awareness of family planning methods among female and male sterilization clients in Viet Nam

	<b>Females N=123</b>	<b>Males N=18</b>
Percentage who are aware about		
IUD	68.3	44.4
Pill	18.7	0.0
Condom	10.6	33.3
Injectable	1.6	0.0
Implant	0.8	0.0

All vasectomy clients are supposed to be counseled about the use of condoms following the vasectomy. Each of the men but one reported that he was given condoms and advised about their use during the post-operative period.

All clients were asked if they thought that their method (tubal ligation or vasectomy) could protect them from sexually transmitted diseases including HIV/AIDS. Over half of the men and two-thirds of the women erroneously believed they would be protected or were not sure if they would be protected.

#### Experience during the sterilization procedure

The 1994 Ministry of Health medical standards for sterilization recommend that both female and male sterilization procedures be performed under local anesthesia in order to reduce the risks associated with general anesthesia and to lower the cost of the services. Because women undergoing tubal ligation would be awake during the procedure, the national medical standards also recommend that women receive two pre-operative medications (a mild sedative and a pain management medication). Although these are the recommended standards for sterilization operations, not all doctors comply with the standards (Khairullah, 1998). Because most clients were probably conscious during the operation, they were asked about any pain they experienced during the operation and whether it was as expected, or more or less than expected. Most (86.2 per cent) of the tubal ligation clients reported that they experienced pain from the operation. Half of the women reported that the pain was less than expected and approximately one-third reported that the pain was more than they expected. Most of the vasectomy clients also reported experiencing some pain from the operation; however, for most it was less than expected.

#### Results at three-month follow-up

As described previously, all sterilization clients who were interviewed at recruitment were requested to participate in a follow-up interview three months later to assess their satisfaction with the decision to undergo sterilization and to learn if they experienced any problems following the operation. Sterilization clients were re-interviewed only at the three-month interval. Interviewers were able to conduct follow-up interviews with 68 per cent of the original female sterilization group (N=84) and 89 per cent of the



vasectomy group (N=16). At eight months, instead of individual interviews, three group interviews (one for men and two for women) were conducted.

The national guidelines for sterilization do not contain information about post-operative follow-up visits for tubal ligation or vasectomy services. Women are usually advised to stay in the hospital for up to three days following the operation. Often, women who have a tubal ligation stay in a nearby health centre for up to five days. Less than 10 per cent of the tubal ligation clients returned for a follow-up visit during the week following surgery and none of the men returned. Despite not having gone to the clinic for a routine follow-up visit, 26 per cent of the women reported experiencing a problem with the operation (none of the men reported any problems). About half the women did seek care within 10 days of the operation; about one-fourth experienced some sort of problem later than one month after the operation.

All of the women and men interviewed at the three-month follow-up reported that they were satisfied with their decision to have the operation.

## Abortion

For this study, researchers conducted recruitment interviews with 240 abortion clients at the three study sites in March and April 1997. Of the 240 original abortion clients, 190 were visited at their home for the first follow-up interview (three months post-recruitment) and 184 subjects were interviewed at the second follow-up interview (eight months post-recruitment). The abortion sections of the client interview focused on reproductive history, treatment, quality of care and reproductive health/family planning issues. Questions about treatment were not asked in the eight-month follow-up interview.

As part of each follow-up interview, all clients were given a urine pregnancy test. Of the 70 abortion clients who still did not use a contraceptive method after having had an abortion, 50 of them underwent the pregnancy test and three of them (6 per cent) tested positive for repeat pregnancy. The 20 clients who were not tested reported that they were menstruating at the time of the follow-up interview.

Table 11. Results of pregnancy tests at first and second follow-up interview, abortion clients, by study site in Viet Nam

	<b>Hanoi</b>	<b>Soc Trang</b>	<b>Tay Ninh</b>	<b>Total</b>
Total number interviewed at first follow-up	75	83	31	189
Test not given (client was menstruating)	32.0	9.6	19.4	20.1
Negative results	65.3	85.5	74.2	75.7
Positive results	2.7	4.8	6.5	4.2
Total number interviewed at second follow-up	71	83	23	177
Test not given (client was menstruating)	11.3	14.5	0.0	11.3
Negative results	87.3	83.1	100.0	87.0
Positive results	1.4	2.4	0.0	1.7

Tables 11 and 12 compare the results of pregnancy tests given to abortion clients (table 11) and temporary method users (table 12) at the first and second follow-up interviews. The number of pregnancies identified among abortion clients was almost twice as high as for temporary method users. These data are not representative; however, they do suggest that abortion clients are at higher risk of a repeat unplanned pregnancy.

Table 12. Results of pregnancy tests at first and second follow-up interview, temporary family planning clients, by study sites in Viet Nam

	<b>Hanoi</b>	<b>Soc Trang</b>	<b>Tay Ninh</b>	<b>Total</b>
Total number interviewed at first follow-up	58	136	172	366
Test not given (client was menstruating)	22.4	5.1	13.4	11.7
Negative results	74.1	92.6	84.9	86.1
Positive results	3.4	2.2	1.7	2.2
Total number interviewed at second follow-up	54	136	167	357
Test not given (client was menstruating)	22.2	7.4	3.0	7.6
Negative results	77.8	91.9	96.4	91.9

Positive results 0.0 0.7 0.6 0.6

Family planning services are available at each study site; however, this study shows that not all clients were offered or made use of these services post-abortion. Most abortion clients reported that they were treated respectfully by the medical staff who cared for them. However, only one-fourth of the women reported receiving information about what to expect during the procedure. Just over half received information about antibiotics and pain management, and 63 per cent were provided information about contraception.

Another quality of care indicator included the item of checking by the provider before leaving the clinics. Most abortion clients reported that they were not checked by a provider immediately prior to leaving the health centre. Tay Ninh was the exception where nearly 70 per cent of the 33 clients reported they were checked by the provider. Nearly all the women in Hanoi said that they were given antibiotics following the procedure, whereas just under half of the women at the other two study sites said that they received antibiotics. However, at follow-up nearly all the women reported having used antibiotics they obtained from the centre where they underwent their abortion. Most of the women in Hanoi said they were advised to return for a check-up, whereas only three-fourths of the women in Soc Trang and two-thirds of the women in Tay Ninh said that they were advised to do so.

The number of women who answered "yes" when asked "did you have any problems following abortion?", ranged from approximately 15 per cent in Tay Ninh to 27 per cent in Hanoi. It is important to remember that there were relatively few abortions performed at the Tay Ninh study site. When we asked (probed) about specific medical problems, we obtained the responses shown in table 13. The "problems" reported were typically prolonged bleeding and discomfort, and did not seem to include procedural complications.

Table 13. Responses to specific questions about post-abortion perceptions of well-being, by study site in Viet Nam

Hanoi N=106	Soc Trang N=101	Tay Ninh N=33	Total N=240
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Clients who said "yes" to the question: "Did you

Approximately half the abortion clients did not experience bleeding or bled only for one day post-procedure. The amount of bleeding was not assessed. The majority of women (55 per cent) experienced no pain post-abortion. Seventy-five per cent of the women said they felt "normal" or "strong" following their abortion procedure.

#### Post-abortion contraception

Women who have unwanted pregnancies either do not use, or inappropriately use, contraception, or in rare cases the contraceptive method fails. These women are also at higher risk of future unwanted pregnancy and abortion (as shown in tables 14 and 15). Table 14 shows that the majority of abortion clients did not use a modern contraceptive method prior to their abortion.

Table 14. Contraceptive use by abortion clients at the recruitment interview, by study site in Viet Nam

	Hanoi N=106	Soc Trang N = 101	Tay Ninh N = 33	Total N = 240
No method	34.0	67.3	48.5	50.0
IUD	2.8	0.0	0.0	1.3
Oral pill	3.8	0.0	0.0	1.7
Oral pill but forgot to take	3.9	4.0	3.0	3.6
Condom	6.6	5.0	6.1	5.8
Condom but forgot to use	22.3	1.0	9.1	11.3
Breastfeeding	0.9	2.0	0.0	1.3
Traditional methods	26.4	20.8	33.3	25.0

When abortion clients were asked when they could get pregnant again, 31 per cent gave a correct answer - immediately/first intercourse/within two weeks - and 69 per cent gave a wrong answer or did not know.

Nearly two-thirds (65 per cent) of the abortion clients said they left the clinic with a modern contraceptive method (table 15). At recruitment, 60 per cent of the abortion clients said that they were planning to use a method post-abortion.

Table 15. Contraceptive method provided to clients post-abortion, by study site in Viet Nam

	Hanoi N=106		Soc Trang N = 101		Tay Ninh N = 33		Total N = 240
Offered contraceptive method							
Method received:	67.9	12.3	67.3	45.5	48.5	45.5	65.0
IUD	19.8		20.8		6.1		30.8
Pill	1.9		14.9		0.0		18.3
Condom	0.0		0.0		24.2		7.1
Female sterilization	0.9		0.0		0.0		3.3
Injection	65.1		18.8		24.2		40.4
Did not accept a method							40.0

## Conclusions and recommendations

Overall the findings from this client follow-up study show that in general clients are aware of several family planning methods. The desire to use an effective method is high and most respondents reported that they wanted to delay their next birth or did not want another child at all. Although awareness of family planning methods is high among the respondents in this study, as it is nationally, many clients lack correct and specific information about side-effects for the method they are using. In addition, most clients are not aware whether or not their contraceptive method protects them from STDs including HIV/AIDS. Although family planning counselling services have been introduced at the three sites through their participation in the Reproductive Health Programme and the AVSC project, more work needs to be done to strengthen the services.

**Recommendation:** Special attention should be given to providing accurate information on all available methods to all clients. Once a method is chosen, specific information on method use, potential side-effects, when to return for a check-up and any re-supply issues should be discussed with the client. All clients need information about STD and HIV prevention practices, since the most widely used methods in this study (IUDs and sterilization) do not protect couples. Abortion counselling should include information about family planning and highlight the fact that return to fertility is immediate. Sterilization counselling should include informed consent and post-operative instructions.

**Recommendation:** Clinic flow should be analysed to identify additional time for providing counselling and information to women undergoing abortion procedures. In settings where it is not feasible to provide thorough individual counselling to every client, alternative ways of educating clients about what to expect should be developed. For example, client posters or pamphlets should be available and group counselling/information sessions could be considered.

The majority of abortion clients (over 80 per cent) said that they were treated respectfully by the service providers. Nearly two-thirds of these women reported that they received information about family planning before they left the clinic, and nearly the same proportion obtained modern contraceptive methods at the time of their abortion. This is a substantial increase compared with the situation at the sites before the counselling training interventions were introduced. However, not all methods are available to all clients.

**Recommendation:** The Ministry of Health and NCPFP need to reduce barriers to post-abortion reproductive health services. These barriers include the lack of condoms in some clinics and the lack of a clear policy permitting post-abortion IUD insertion. A full range of methods should be available to every eligible abortion client.

Most of the abortion clients were not checked prior to discharge from the clinic and most did not know they could become pregnant within the two-week period following the abortion.

**Recommendation:** Clinics should adjust staffing assignments to ensure that every abortion client is checked for four things before she leaves the clinic: (a) that she is feeling well and is ready to leave, (b) that she knows how to take her antibiotics and under what circumstances she should return to the clinic, (c) that she knows she can get pregnant almost immediately and receives comprehensive information about all family

planning services that are available to her and (d) that she receives a contraceptive method if she wants one.

The findings from the interviews with sterilization clients revealed that they made well-informed decisions about the choice of a permanent method of contraception: they were sure they wanted no more children and felt that sterilization was a better option for preventing additional pregnancies than other methods. Both men and women received proper information about what to expect from the operation; all the men and more than half the women reported that the pain they experienced was as expected or less than expected.

All of the men and women reported receiving a compensation payment at the time of the operation. Only one man and one woman reported that this payment played a role in their decision to choose sterilization. Awareness of other family planning methods is lower among sterilization clients than among temporary method users. This factor could be related to the role of family planning volunteers who often act as motivators for attracting male and female sterilization clients in local communities. It should be noted that in Tay Ninh most of the sterilization clients had been referred for services through a community-based sterilization campaign carried out by community volunteers. Some volunteers may not adequately present information on the full range of family planning options in sufficient detail to clients who have expressed an interest in sterilization.

Recommendation: Although only two clients reported that the compensation payment was a factor in the decision-making process for sterilization, policy makers should review the use of payments for sterilization and other family planning/reproductive health services (i.e. IUD insertion and abortion). Payments are provided to clients as an allowance to cover lost time and expenses incurred while undergoing the sterilization procedure; payments are also given to doctors as an incentive for providing the procedures (as well as other services). These payments may actually result in a bias against the provision of other temporary family planning/reproductive health methods and discourage counselling. Clients reported that payments made to them did not influence their decision about which method they used. Alternatives to payments for sterilization should be explored, using the funds saved to improve overall services.

Recommendation: Population Committee volunteers need refresher training in family planning methods and their information-giving skills should be upgraded. Volunteers should be able to give clients an objective understanding of the available family planning methods and how clients can access these methods. In addition, a full counselling session, which includes informed consent procedures and information on other family planning methods, must be conducted prior to male or female sterilization. The purpose is to improve client knowledge about the procedure, such as risks, warning signs for possible complications and condom use, as well as promote a discussion about the advantages and disadvantages of temporary methods versus permanent methods. Further, there should be a final check of a client's understanding about the sterilization procedure at the service delivery point prior to the operation.

#### Endnotes

1 Beginning in 1998, the programme was expanded to four other provinces: Can Tho, An Giang, Vinh Phuc and Quang Ninh.

2 Sterilization clients were excluded from the eight-month follow-up.

3 Few women were using DMPA and condoms, which makes analysis problematic.

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Suicide in Countries and Areas of the ESCAP Region

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In view of the comparatively high suicide rates in the region, greater attention needs to be paid to the gravity of the situation

Murray and Lopez (1996), assessing the global burden of disease, estimated that about 534,000 deaths by suicide occur annually in the ESCAP region. This is a minimum estimate; the actual number is undoubtedly greater and, probably, considerably so. There are at least two reasons for the uncertainty about the actual incidence of suicide. One is the fact that deaths are poorly recorded in most countries of the region and even where deaths are registered, the cause of death is inadequately established or, quite often, not stated at all. The other is the well-known fact that the act of suicide is sometimes concealed and the death is attributed to accidental causes. Hence, suicides are under-reported even in countries which have complete death registration and well-established systems of certifying the cause of death.

Data sources and their quality

The quality of data on suicide mortality is to a considerable degree associated with the procedures underlying the ascertainment of a suicide. This is a two-stage process: first, the death has to be recognized as being due to other than natural causes; second, it has to be established that it was caused by a deliberate act of the deceased with the intention of ending his or her own life. The procedures and the responsibility for determination of suicide as the cause of death vary from country to country. In many countries, death can only be recognized as suicide by a coroner after a judicial enquiry; in others, the decision is made by an officially designated medical doctor. In most countries, the investigation of the circumstances in which sudden death occurred is carried out by the police (WHO, 1974). As a result, some inter-country variation in suicide mortality is undoubtedly due to the differences in certification practices. In addition, there is no doubt that the incidence of suicide is always underestimated by the official statistics, because in most countries the verdict of suicide requires legal proof beyond reasonable doubt that the deceased intended to end his/her life; intention cannot be presumed on the basis of circumstantial evidence alone or on the balance of probabilities.

Table 1. Age-standardized suicide mortality rates in selected Asian societies

Society	Year	Suicide rate *	
		Males	Females
Australia	1993	16.4	3.8
China (rural)	1994	24.1	27.8
China (urban)	1994	5.8	6.0
Hong Kong	1994	11.4	9.1
Japan	1994	17.3	7.2
New Zealand	1993	18.7	4.9
Republic of Korea	1994	12.6	5.5
Singapore	1994	13.1	8.5
Sri Lanka	1986	49.0	17.5

Source: WHO, World Health Statistics Annual, 1995.

\* Annual standardized rate per 100,000 persons according to WHO world population standard.

Data on deaths by suicide are available in the eight countries and areas of the region listed in table 1. However, in the Republic of Korea death registration and cause of death certification are incomplete (Kim, 1990:52-56). In that country, the cause of death is certified by a physician in only about 30 per cent of all deaths (Suk, 1992). Deaths due to external causes, i.e. accidental injuries, poisonings and suicides, are investigated by the police; thus, more reliable data about the incidence of suicide may be obtained from the records of the National Police Headquarters. As expected, the proportion of registered deaths certified by a physician is higher in urban than in rural areas of the country; a large proportion of deaths with medically certified cause occurred in hospitals.

In the remaining countries and areas examined here, registration of death is considered complete according to the United Nations definition, although in Sri Lanka the certification of the cause of death is not very reliable. In 1983, for instance, 29 per cent of male and 36 per cent of female deaths were attributed to "senility, signs, symptoms and other ill-defined conditions". However, at least some of them should undoubtedly have been assigned to specific

diseases and external causes, e.g. accidental deaths and suicides. Moreover, because of the country's civil disturbances, the registration of deaths has been incomplete because parts of the country are outside the administrative control of the government.

Cause of death registration, according to the principles of the World Health Organization (WHO) International Classification of Diseases and Causes of Death, was introduced in China in the 1980s and annual returns have been supplied to WHO since 1987. The registration of causes of death is not carried out on a nation-wide basis. Instead it is carried out in samples which together comprise about 10 per cent of China's population. There are 61.4 million people in the urban sample, consisting of Beijing and 36 other major cities, and 53.3 million people in the sample taken from rural areas in the eastern provinces.

In India and Bangladesh, fragmentary information is available on causes of death based on certification of symptoms by lay persons. In both countries the investigations are carried out in samples of rural populations.

In India, the Registrar General in 1965 introduced a "model" Rural Registration Scheme. Under the scheme, the paramedical staff of the Primary Health Centre gather information on deaths occurring in the villages under the Centre's responsibility and, from the reporting of symptoms and conditions prior to death, they assess the likely cause of death. The system has many limitations. In particular: the data are not representative even for the rural areas, not to say for India as a whole; the determination of cause of death from symptoms and conditions prior to death is fraught with problems. Deaths of women and children are under-reported in the survey.

Another source of data on suicide in India is the Civil Registration System (CRS). However, only about one quarter of all deaths in India are registered and, of them, only about 10 per cent are medically certified. Deaths from homicide and suicide are particularly under-reported. It was partly to overcome the shortcomings of the CRS that the Rural Registration Scheme was instituted.

According to the Indian Criminal Procedure Code, all unnatural deaths or deaths under suspicious circumstances have to be reported to the nearest police station or magistrate. Their cause is then determined by a medical examiner. The statistics are compiled by the Bureau of Police Research and Development in New Delhi and are published annually in Accidents and Suicides in India and Crime in India.

Accordingly, there are three different sources of information on mortality from violence in India; each of them provides some information about the incidence of suicide, but none of the information is of a high standard (Bhat, 1991). The discrepancies between the various sources of data on suicide in India can be gleaned from table 2. At least one-third of suicides are missed in police records. Medically certified deaths from the vital registration system identify merely about 15 per cent of deaths by suicide, largely because the system omits non-institutional deaths, but partly also in order to avoid making the judgement of suicide.

Table 2. Estimates of suicide mortality in India from different sources

Source of data	Death rate per 100,000 population	Male deaths per 100 female deaths
Bureau of Police Research and Development, 1980-1984	6.4	148
Medically certified deaths from Vital Registration, 1982-1984	1.6	133
Causes of Death Survey (rural) 1984-1988	10.2	135

Source: Bhat, Mari (1991). Mortality from Accidents and Violence in India and China. Research Report 91-06-1 Center for Population Analysis and Policy, Humphrey Institute of Public Affairs, University of Minnesota, Minneapolis, United States.

In Bangladesh, the only information about causes of death is available in the records of the Matlab field station of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). As with the Indian Rural Registration System, the certification of the cause of death is based on lay reporting of symptoms. The data are collected in a rural area inhabited by about 210,000 people. The quality of the cause-of-death data is not high (Zimicki and others, 1985); moreover, as a Muslim country, there may be a tendency in Bangladesh to disguise suicide as accidental death (table 3) since suicide is socially and religiously unacceptable.

Table 3. Suicide mortality in the Matlab field station of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B): 1980-1996 annual rates per 100,000

Age	Male suicides	Average annual rate	Female suicides	Average annual rate	Male to female ratio
10-19	15	3.6	38	9.7	0.37

20-29	38	15.6	48	18.5	0.84
30-39	8	4.6	7	3.4	1.35
40-49	6	4.5	5	3.6	1.25
50-59	9	8.7	4	3.6	2.41
60 +	7	6.1	2	1.9	3.21
All ages	83	7.0	104	8.6	0.81

Source: ICDDR,B annual reports.

To obtain data on suicide in the populations of the Pacific islands, one has to draw on police records and data of health authorities; only exceptionally do vital registration systems exist. Further, the data vary in completeness and quality. As in other countries, under-reporting of suicides is due to concealment as well as to uncertainty of intent to end one's life. Data which are considered comparatively reliable are shown in table 4 (Booth, forthcoming).

Table 4. Age-standardized suicide mortality rates in selected Pacific island societies

Population	Year	Standardized rate <sup>*</sup>	
		Males	Females
Melanesia			
Fiji			
Fijian	1982/83	3	3
Indians	1982/83	41	27
Micronesia			
Micronesia (Federated States of)	1960-1987	36	3
Chuuk State	1970-1985	57	4
Guam	1988-1992	24	4
Polynesia			
French Polynesia	1988-1992	12	5
Samoa	1981	49	18

Source: Booth, H. (forthcoming). "Pacific island suicide in comparative perspective" Journal of Biosocial Science.

\* WHO world standard: average annual rate per 100,000 persons.

For the majority of the countries and areas in the ESCAP region, there is no information about the incidence of suicide at all or only from small-scale studies reporting analysis of data on hospital admissions (for instance, Ladrado-Ignacio and Gensaya, 1992; Choprapawon and Visalyaputra, 1992).

It should be pointed out that only a small proportion of suicidal acts, however, result in death. In developed countries, it is estimated that there are about 8-10 attempted suicides (para-suicides) for every registered fatal case (WHO, 1968:31; Chesnais, 1976). Some estimates put this ratio as high as 20 attempts per suicide achieved (United Nations, 1996). The suicide-attempt-to-suicide-achieved ratio is also dependent on age and sex. In Australia in the period 1995/96, hospital discharge statistics show that, among young men aged 15-24, there are about six attempted suicides for each fatal case. Among young women of that age, however, there were as many as 55 attempted suicides for each registered self-inflicted death. Consequently, suicide incidence based on reported deaths may be considered only the proverbial tip of the iceberg.

One of the differences between suicides and para-suicides is the seriousness of intent to end one's life. Not all suicidal acts are intended to be fatal -- some are meant as a warning or "call for help". One of the pioneers of modern epidemiology, S. Peller, established that those who commit and those who attempt suicide differ statistically by age and sex, the latter being predominantly female and in the younger age groups (Peller, 1932). Suicides and attempted suicides also differ in the selection of method used, which is partly associated with the seriousness of the intent to die. Women in their suicidal acts most often use methods that leave, fortunately, quite a good chance to intervene and save the person's life: various therapeutic drugs, sedatives or pain killers are typical examples; cutting one's wrist is another. In contrast, suicidal acts by men are dominated by hanging, use of firearms or, lately, motor vehicle exhaust gas, all methods that have a very high case-fatality rate and leave little possibility for effective intervention.

It has been established that individuals who threaten suicide or attempt suicide are at high risk of actually committing the act and, possibly, dying as a result (Stengel, 1973).

Statistics on para-suicides are compiled either from the records of the police or from hospital admissions; as for completeness, they are even more deficient than the statistics on suicide.



## Cultural and legal attitudes towards suicide

In addition to the formal restraints on passing a verdict of suicide, there are social and cultural impediments in operation. Most often they are anchored on the attitude of the dominant religion towards self-destructive behaviour. The Christian churches, in particular the Roman Catholic Church, traditionally have considered a person who has committed suicide to have died in mortal sin. As a temporal punishment, no religious rites are to be conducted at the tomb of such a person, no Mass should be said for the repose of that person's soul, and the body should not be treated with respect or buried in consecrated ground. The Roman Catholic Church has never altered its unequivocal position on the subject; however, in practice, the rigid provisions of Canon Law are often mitigated by individual members of the clergy. The Reformation did not relax the Church's position with respect to suicide but the reformed denominations adopted a more lenient attitude, in particular with respect to the burial of a suicide (Dublin, 1963).

In the Chinese cultural tradition, Confucianism stresses the virtue of family affiliation, teaching that one should not injure one's own body because it is given to a person by her/his parents. Implicitly, attempting suicide is prohibited except in cases where it promotes loyalty to the family. Chinese Buddhists, on the other hand, stress that human life is primarily one of suffering and one should learn to cope with it from childhood to maturity. Suicide happens through lack of one's ability to tolerate stress. Contemporary Chinese thinking generally does not look on the act of suicide as heroic or brave; on the other hand, it would not condemn it either (Rin, 1975; Wai-Hoi, 1992).

In Indian Hindu culture, various religious and philosophic writings have enunciated views on suicide. Some permitted suicide on religious grounds (the best sacrifice was man's life itself); others censured suicide. Sati -- the self-immolation of a widow -- received the sanction of religion: by her self-destruction on the funeral pyre of her husband, the widow would atone for the sins of her husband, free him from punishment, and open the gates of paradise for him.

In general, Hindu philosophy held rather tolerant attitudes towards suicide based on the view that life does not end with death; death, after all, only leads to rebirth in another body or form (Rao, 1975; Keith, 1912).

With regard to Islam, there is no specific interdiction of suicide in the Koran but according to historical tradition suicide is a violation of a divine command contained in the holy books of Islam. An acceptance of life's events is the cardinal factor in obedience to God; suicide, consequently, is an act of revolt against God and the perpetrator of such an act risks His wrath.

Suicide statistics are more difficult to obtain in Muslim societies than in other countries; where available, they show a very low incidence of suicide (Patton, 1912). This is illustrated in Singapore, for instance, by the marked differences in suicide mortality among ethnic Chinese, Indians and Malays: between 1968 and 1971 the suicide rate was 11.2 per 100,000 for Chinese, 10.8 per 100,00 for Indians, and 7.2 per 100,000 for "other" races (mainly Eurasians and Europeans). The annual average suicide rate for Malays (predominantly Muslims) was only 1.4 per 100,000 during the same period (Hassan, 1983). In Kuala Lumpur, in the period 1985/86 the percentage distribution by ethnicity of suicides and attempted suicides recorded by University Hospital was in stark contrast to the distribution of the population:

Indicator	Chinese	Indian	Malays	Others	Total
Suicides	57.1	29.9	3.9	9.1	100.0
Attempted suicides	41.4	47.6	7.7	3.3	100.0
Population distribution	32.6	10.0	56.8	0.6	100.0

Both suicides and attempted suicides were heavily concentrated among the Indian and Chinese ethnic groups in Kuala Lumpur (Ong and Leng, 1992).

In some societies, suicide is considered a criminal offence punishable by law. Thus, the verdict of suicide has often been avoided whenever possible in order to spare both the reputation of the person who committed suicide and his or her family from further embarrassment and indignity. This is, for instance, the case in Malaysia (Ong and Leng, 1992). Even where suicide is not considered a punishable offence, complicity in another's suicide remains a felony. Such provisions of law apply in many countries; as one side-effect, they open physicians assisting in euthanasia to legal prosecution.

Suicide is often a response to "problem" situations; the problems may be emotional (e.g. unhappy love affair), family problems, bereavement, the "unbearable feeling of loneliness" (see Halbwachs, 1930), financial ruin or poverty, chronic painful disease, or mental disorder. It seems that, even when the incidence of suicide is attributed to mental disorders, social influences are implicated, at least partly. According to Halbwachs (1930) suicide does not occur as a result of factors purely "internal" to the individual -- there is always an interaction between the individual and his/her social environment.

In theory, marriage is often thought to "protect" against suicide (Durkheim, 1897; Halbwachs, 1930; Ruzicka and

Choi, 1993; Booth, forthcoming). However, in societies in which arranged marriage prevails and where divorce is difficult to obtain or is socially unacceptable, the only solution some unhappy wife sees to disharmony with her husband and/or in-laws is in taking her own life (Wai-Hoi, 1992; Bhat, 1991; Peng, 1992). Childlessness has been identified as a specific element adding to or provoking marital problems. The continuing low status of women is another component in the societal environment contributing to high female suicide rates.

The social and cultural structures of the society may permit suicide or even suggest it as the appropriate or honourable form of action in particular circumstances. For instance, many Japanese believe that death brings forgiveness for any transgressions committed during one's life. Therefore, suicide may be opted for as a way of solving one's problems. It may be an honourable death committed to maintain the honour or the hierarchy of a family, state and nation (Ong and Leng, 1992; Yoshimatsu, 1992): note the suicides during this year of several Japanese businessmen and bankers bankrupted by the downturn in the economy.

#### Levels of suicide mortality

Durkheim (1897) argued that each country has a collective tendency towards suicide such that, providing the circumstances of the country did not change in any essential way, its suicide rate also would not change. Taking this position as given, Durkheim's followers have related suicide rates to components of the social structure or culture of the groups to which the rates refer.

The suicide rates set out in tables 1-4 provide only very fragmentary information about the incidence of suicides in selected countries and areas of the ESCAP region. Despite their limitations, the data demonstrate the enormous variation in the propensity to take one's own life between the peoples of the region. Among men, the highest incidence of suicide appears to be in Chuuk State of the Federated States of Micronesia, Samoa and Sri Lanka, and among Fijian Indians. Guam in Micronesia and rural areas of China have about the same level of incidence of fatal suicides. Among women, suicide rates in rural areas of China and among Fijian Indian women exceed markedly those of any other society; suicide incidence among women in Sri Lanka and Samoa, although considerably lower, is still high by international standards.

If allowance is made for under-reporting of women's deaths in the Indian rural Cause of Death Survey (CDS) in general and for under-enumeration of suicides in particular, India's rural men and women appear to commit suicide about as often as those in urban China or the Republic of Korea.

In most societies, women die less often by suicide than do men. This is particularly manifest in Micronesia where the risk of suicide is 6-14 times higher for males than females. In most countries and areas of the region, the ratio is between two and four; however, it is lower than that in Fiji both among ethnic Indians and Fijians, and in Hong Kong China and Singapore, both having predominantly Chinese populations. In urban China the risk of suicide is about the same for men and women while in rural China suicide rates of women exceed those of men.

#### Age patterns of suicide mortality

In most societies, stressful situations that may precipitate suicidal behaviour are more frequent in old age. Hence, in most societies the incidence of suicide among older men and women is higher than among younger ones. A typical example of such an age pattern of suicide mortality is furnished by the data for the Hong Kong China, Republic of Korea and Singapore in figures 1A and 1B.

Figure 1A. Age pattern of suicide mortality among males in Singapore, Hong Kong, China and Republic of Korea

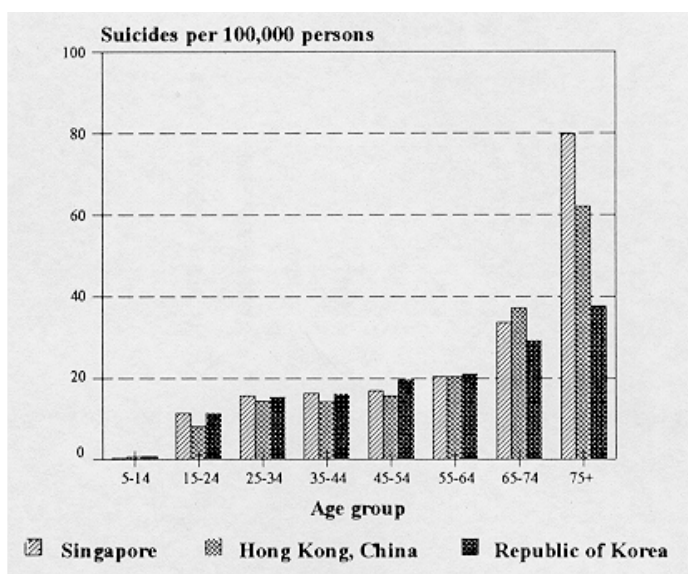
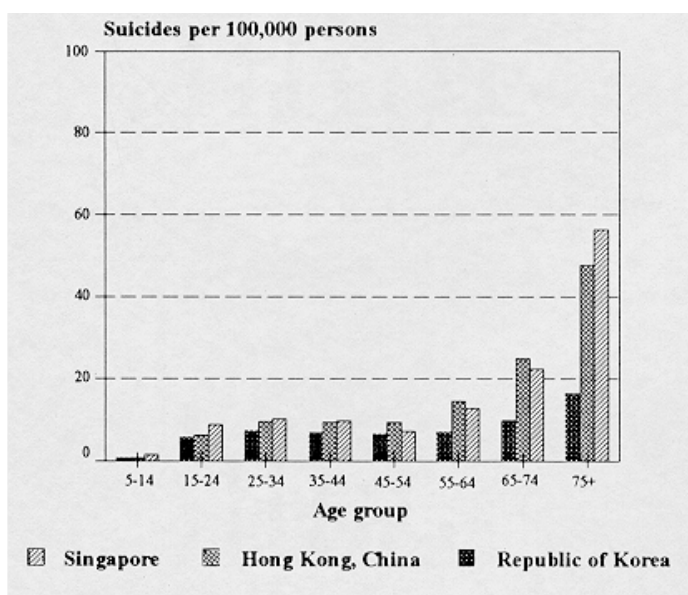


Figure 1B. Age pattern of suicide mortality among females in Singapore, Hong Kong, China and Republic of Korea



A similar pattern of steadily rising suicide mortality rates with increasing age has also been recorded in China and Japan. The incidence of fatal suicides in rural China exceeds by a considerable factor the incidence in urban areas. This is true for both men and women. In rural China, suicide rates of women below age 45 years exceed those of men in the same age group. This is a rather rare phenomenon, although there is some suspicion that a similar sex difference in suicide mortality may exist in rural India (Bhat, 1991) (see figures 2A-C).

Figure 2A. Age pattern of suicide mortality among males in China (urban and rural), 1994

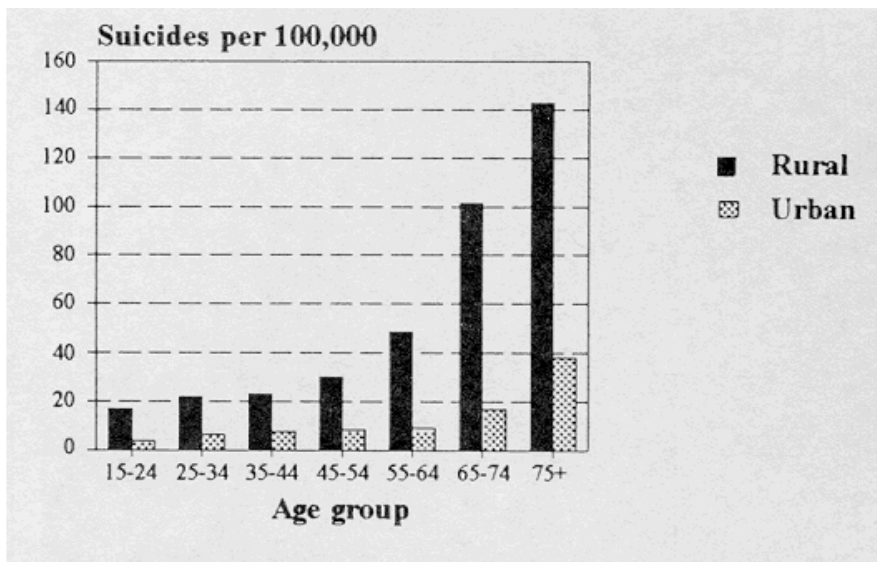


Figure 2B. Age pattern of suicide mortality among females in China (urban and rural), 1994

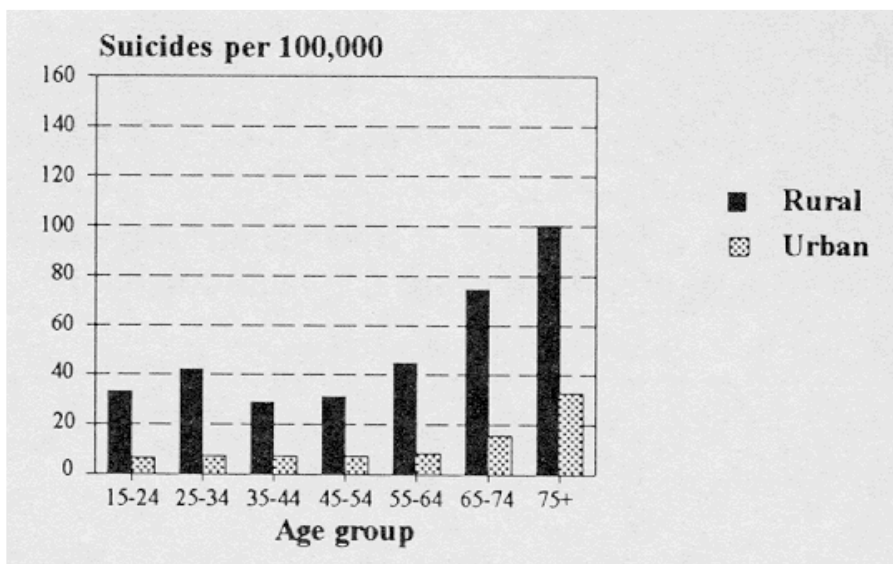
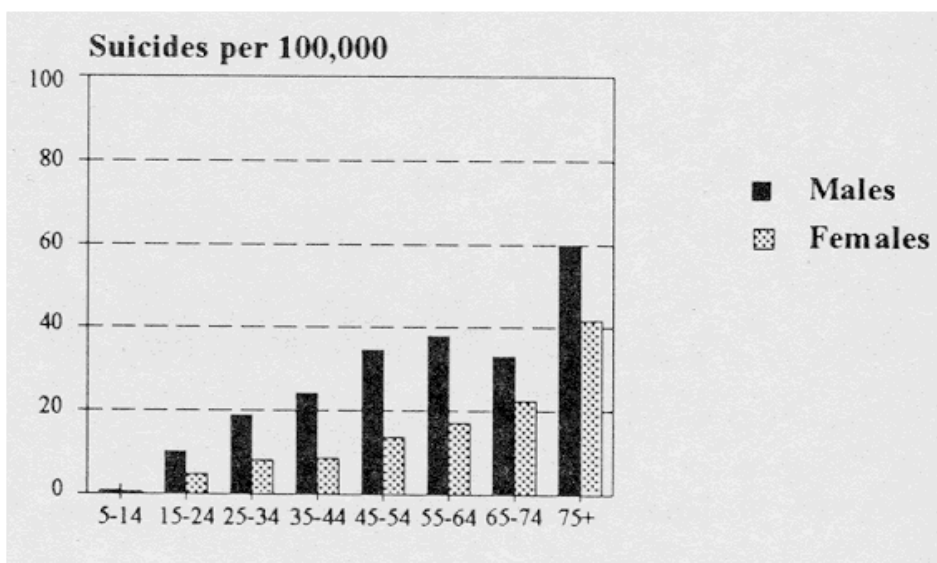


Figure 2C. Average annual suicide rates in Japan, 1992



However, the pattern of an increasing incidence of suicide with age is not universal. In a few countries, the incidence

of fatal suicides has been rising among young people. Since about the end of the Second World War and, in particular, since the early 1970s in Australia and New Zealand suicide rates among young adolescents have been steadily increasing. As a result, in the early 1990s, the incidence of suicide among men took up a bi-modal age pattern. In New Zealand especially, the probability of death by suicide peaks at ages 15-24 years; at ages 25-34 years, the rate is only marginally lower than at the highest age group 75 years and older. In Australia, the early peak appears to be at ages 25-34 years, followed by a decline to a trough at 55-64 years; thereafter, suicide rates increase with age, reaching the highest incidence at 75 years and older (figure 3A). Among women, suicide mortality is much lower than among men and the age pattern is less pronounced (figure 3B).

Figure 3A. Age pattern of suicide mortality among males in Australia and New Zealand

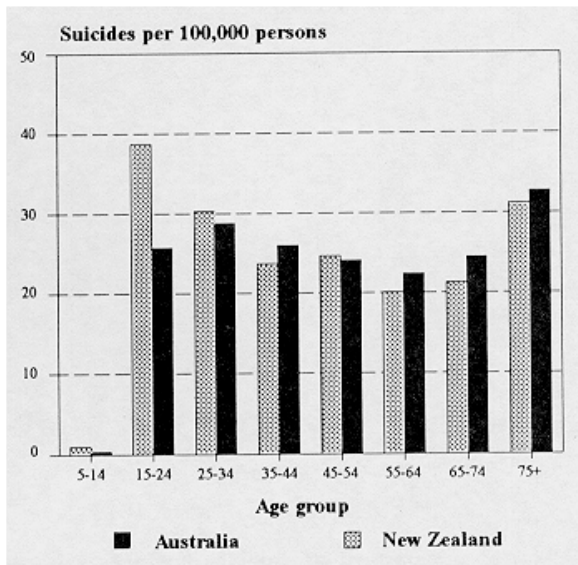
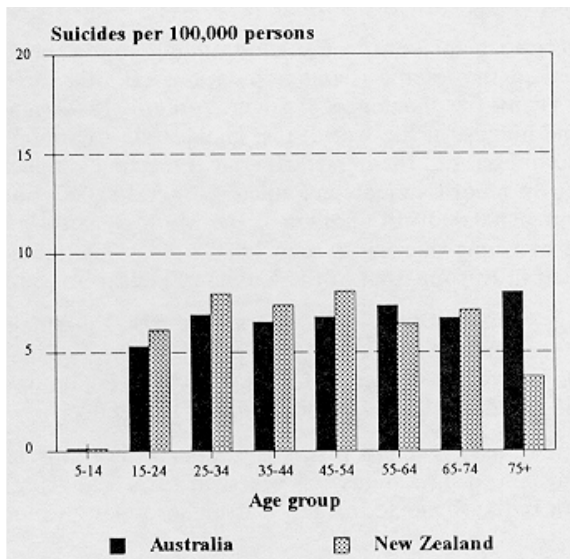
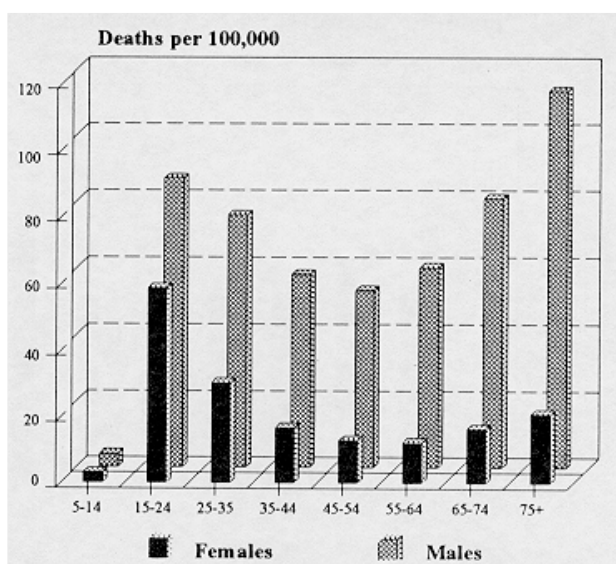


Figure 3B. Age pattern of suicide mortality among females in Australia and New Zealand



The U-shaped age pattern of suicide mortality rates has been even more evident in Sri Lanka. There young women appear to take their life almost as often as young men and only with rising age does this tendency decline noticeably (figure 4).

Figure 4. Average annual suicide rates in Sri Lanka, 1983-1986



The very high incidence of suicide among young men and women is also reported in the Pacific island populations (Booth, forthcoming 1998). In some of them, the incidence of suicide among 15-24-year-old men and women is the highest in the world: the suicide rate of young men in Chuuk State of Micronesia, i.e. 182 per 100,000, is three times higher than the next highest rates on record, namely in Samoa (64 per 100,000) and among Fijian Indians (57 per 100,000). In another of the Micronesian islands, Guam, the suicide rate of young men, at 49 per 100,000, is comparable to the highest level recorded in Europe, that of the Russian Federation (table 5).

Table 5. Suicide mortality of young adults aged 15-24 in selected countries and areas

Country/area in ESCAP region	Year	Suicides per 100,000		Male to female ratio
		Males	Females	
Bangladesh	1980-1996	9.3	19.6	0.5
China (rural)	1992	17.4	36.7	0.5
China (urban)	1992	5.6	10.6	0.5
Samoa	1981	64	70	0.9
Fiji (Indians)	1982-1983	57	60	0.9
Hong Kong	1994	9.5	8.7	1.1
Singapore	1994	11.7	10.2	1.1
Sri Lanka	1986	77	48	1.6
Republic of Korea	1994	11.0	5.9	1.9
Fiji (Fijians)	1982-1983	17	8	2
French Polynesia	1988-1992	23	11	2
Japan	1944	12.0	5.1	2.4
Guam	1988-1992	49	10	5
Australia	1990-1992	26	5	5
New Zealand	1990-1993	39	6	6
Micronesia (Federated States of)	1960-1987	91	8	11
Highest suicide rates in countries of Europe:				
Russian Federation	1994	49	9	5
Lithuania	1994	46	12	4
Finland	1994	46	8	6
Latvia	1994	40	4	10
Estonia	1994	38	10	4

Source: See tables 1 and 3.

Among women aged 15-24 years, the risk of suicide is highest in Samoa at 70 deaths per 100,000; it is closely followed by Fijian Indians at 60 per 100,000. The young women of Chuuk State and Guam have considerably lower risk of suicide at 12 and 10 per 100,000, respectively.

In rural China, as noted previously, suicide mortality is higher among women than men at ages below 45 years; in rural Bangladesh, Samoa and among Fijian Indians suicide incidence is higher among women than men at ages 15-24.

Although the statistics on causes of death are of poor quality in Peninsular Malaysia and Thailand, a similar sex difference in suicide mortality may be noted. In 1985, in Peninsular Malaysia, despite the very low incidence of suicides, mortality among young women aged younger than 25 years was 1.3 per 100,000, which was higher than among men in the same age group. Higher female than male suicide rates were also recorded at ages 45-54 years: i.e. 1.6 and 1.1 per 100,000, respectively. In Thailand, in 1984 suicide mortality among young women aged 15-19 years was, at 11.6 per 100,000, almost twice that of young men in that age group. In the next age group, 20-24 years, the incidence of fatal suicides among men slightly exceeded that of women: 13.8 and 12.5 per 100,000, respectively (Choprapawon and Visalyaputra, 1992).

## Discussion

Given its incidence, suicide is obviously a serious social as well as public health problem in several countries and areas of the ESCAP region. In some societies, specifically on the Indian subcontinent, those of Sri Lanka, China and some Pacific islands, high suicide mortality among women under 25 years of age has been widely noted, because of, among other factors, the method of suicide used. In these societies, suicidal acts often involve the use of highly toxic pesticides: for example, ingestion of the herbicide paraquat (dipyridilium), for which there is no antidote, is associated with fatality rates in excess of 50 per cent among Fijian Indians and Samoans (Booth, forthcoming). In contrast, young women in Australia, Japan and New Zealand most often use medicinal drugs; their fatality rates are low -- considerably less than 5 per cent -- and thus timely intervention is usually possible and death may be prevented.

In recent years, in several countries of the region the rising incidence of death by suicide among young adult males has become a matter of public concern. Economic conditions and social change are often identified as the main cause of suicides, or are at least considered as contributing factors. In some of the industrialized countries of the region, youth unemployment has reached levels never previously recorded. Moreover, the average period without a job is getting longer for each new generation of school leavers. In other societies, the transition from a traditional to a modern way of life and coinciding changes in social obligations and structures bring about inter-generational conflicts and pressures which appear to influence the propensity to commit suicide, especially among young males. An aggravating factor is the recent deterioration of the economic situation in some ESCAP countries. The serious economic and financial crises experienced in Indonesia, Malaysia and Thailand, for instance, will undoubtedly result in increasing proportions of individuals living below the poverty level and some of them will be at increased risk of taking their life.

There is considerable diversity in the ways in which societal transformation leads to increased suicide rates. In China, for instance, high suicide rates in rural areas are sometimes attributed to social stress resulting from inability to adapt to the new competitive economic environment. The break-up of collectives, which previously had held almost total control over the lives of peasants, has seriously weakened the influence of ideology and law and other institutions and has led not only to a resurgence in religious and supernatural belief systems but also to economic uncertainty (Phillips, 1998).

The diversity of responses to social and economic change is partly due to socio-cultural factors, both pre-existing in the traditional societies and developing in the modern structures. Among them are the influence of religion and its attitude towards self-inflicted death, the social stigma attached to suicide, often affecting the whole family of the person who committed suicide, and the legal considerations which may make an attempted suicide a punishable offence.

The comparatively high suicide incidence estimated to prevail in some of the countries and areas of the region points to the need for greater attention to be paid to the gravity of the situation. There is need to improve the completeness and quality of the data on suicide mortality by improving the death registration procedures and cause of death certification. In all societies, investigation of the circumstances leading to sudden death involves the police and special judicial officers, or coroners. It is important that adequate training be provided to the investigating officers to identify self-inflicted injury or intentional poisoning. In addition to cause of death data, hospital admission or discharge statistics with at least information on the cause of admission, gender and age of the patient and his/her marital status are needed to establish the extent of the problem of suicide in the society. To start with, such data could be obtained from teaching hospitals and the reporting gradually expanded to cover all public hospitals.

There is also a need in some countries to formulate policies in areas that have been established as having an association with levels of suicidal behaviour: one such area is the low status of women; another may be the adverse impact of economic transition and development. Yet another is easy access to popular methods of self-destruction, such as drugs or firearms. Thus, for instance, Sri Lanka's Government, in an attempt to curb high suicide mortality, introduced in 1980 a bill to regulate the distribution and sale of pesticides (Miller and Kearney, 1988). When

introducing the Bill, the cabinet minister concerned asserted:

"This Bill has become very necessary because every day when you open the newspapers ... you read about suicides. Owing to some little thing, a person gets angry with the wife or husband or mother, rushes to a boutique, buys insecticide and swallows it". (Miller and Kearney, 1988:115)

Suicide is a personal act in response to a problem. What is considered to be the "problem" and why taking one's life is seen as the only solution is the individual's conceptualization of the situation. Herein is the rationale for suicide prevention and intervention. Although effective suicide prevention is still an elusive goal in all societies, some programmes and actions, in particular those involving non-governmental organizations, such as Lifeline and the Samaritans, have been useful in counselling and assisting people in stressful situations. In most countries of the region, however, training in counselling and the provision of such services are poorly developed. Professional psychiatric health services are rarely available even in urban areas and totally lacking in rural areas. As a result, general practitioners may have to be called upon to play a more prominent role in suicide prevention. It has been observed that some potential suicides seek consultation with their physician for depression or uneasiness of mind. In such situations the physician's counselling may prevent a suicidal act even in situations where referral to a psychiatrist is not feasible.

The fact that in the ESCAP region each year more than half a million people kill themselves and more than 5 million attempt suicide is by itself a strong argument for action to achieve a real and sustained reduction in the overall incidence of suicidal behaviour. Such action has to be not only at the governmental policy level but also has to consider the role and potential participation by non-governmental voluntary organizations of concerned individuals.

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The last decade has seen increasing interest in population ageing, especially in the more developed countries of the world (Tinker, 1989). The explosion of books, journals and articles on ageing gives an indication of this growing interest. There are plenty of reasons for this interest: the profit motive, the debate about the provision of social services and health care, the involvement of elderly people themselves, and most importantly the changing age structure of the population, which will result in increasing dependency of the elderly on society.

During the twentieth century, there have been gradual changes in the age structures of the populations of many developed countries. As the size of young cohorts has declined, and the size of old cohorts has increased, the age of the national population has been increasing, resulting in gradual population ageing. A direct consequence of an increasing proportion of older people in the population is an increasing dependency ratio (gerontic). Although the total dependency ratio (young and old people combined relative to people in the working age group) may not change very much, the composition of the total dependency ratio may change dramatically. This has significant implications since elderly people need and use much more health and other social services than younger people.

It is projected that in some developing countries the elderly population will increase rapidly in the next few decades, with the current 4 per cent of the population over age 65 approaching the OECD average of 12 per cent. The population in China can be considered as a good example. Owing to China's success in implementing a relatively strict family planning programme, the level of fertility is low and the cohorts of children and young people are relatively small. Moreover, with the accompanying significant decline in mortality during the last few decades, the population in China is rapidly ageing. Because China is still a developing country, there are still serious shortcomings in its social security system. Under these circumstances, the rapid increase in the number of elderly people, both in absolute and relative terms, is confronting China with a more difficult situation than that experienced by the more developed countries.

In this paper, after a brief discussion of the past population changes in China, the future trends in population age structure are described with emphasis on the elderly. In the analyses of past changes, the discussion covers the national population as well as the subnational (provincial) and urban/rural population, in order to provide more information about the geographic distribution of the ageing population. In the trend analysis, nine population projection scenarios with three variants of fertility and three variants of mortality are made and analysed. The paper concludes with a brief discussion of the effects of population ageing on social and economic development, and a number of implications and suggestions are provided.

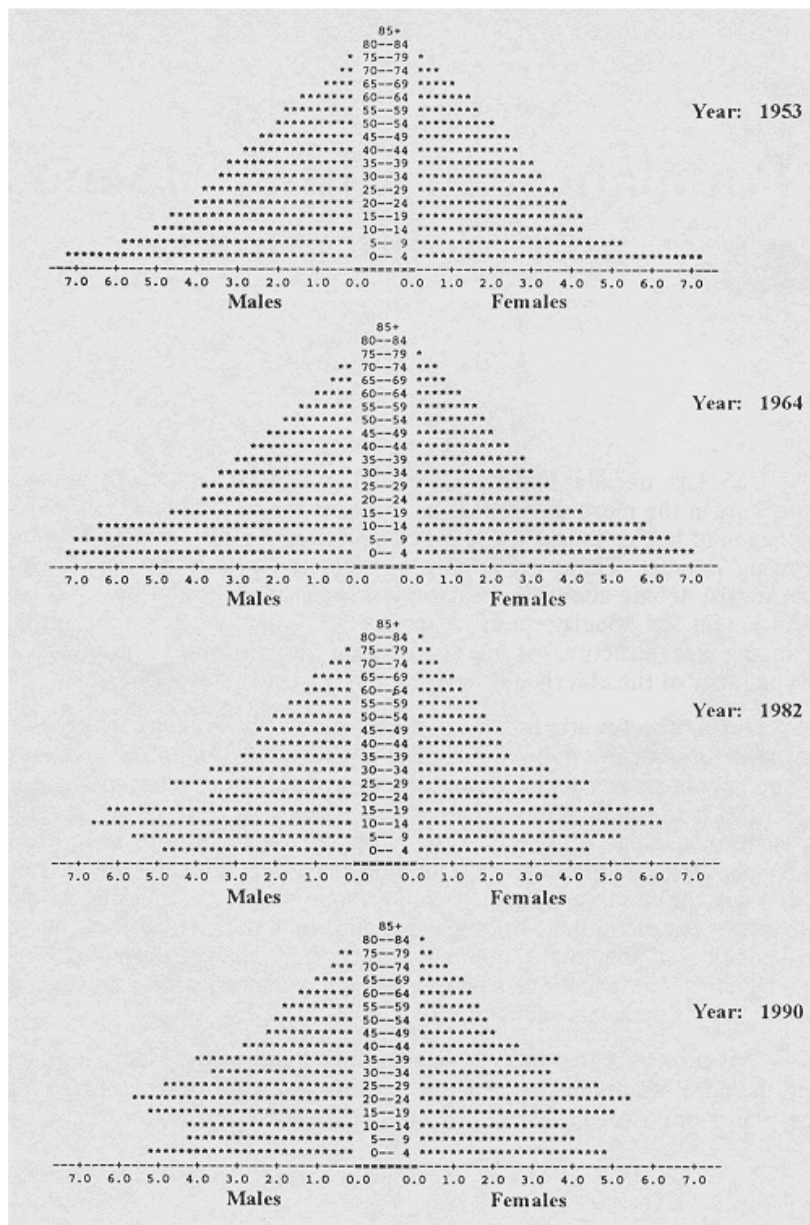
#### Past changes in age structure

As a direct result of the rapid fall (with some fluctuations) in mortality and fertility, the changes in age structure of China's population have been considerable. Before the foundation of the People's Republic in 1949, both mortality and fertility were at high levels: the expectation of life at birth was around 35-45 years and the total fertility rate (TFR) was around 6.0 live births per woman. The mortality rate declined dramatically in the 1950s and 1960s with the expectation of life at birth reaching about 61 years in 1969 and the TFR reaching 5.82 in 1970 and 2.24 in 1980 (Coale, 1984; Banister, 1987). These changes directly affected the age distribution of the population nationally and subnationally and in urban and rural areas.

#### The national population

As is well known, there are many measures (indices) to indicate the features of population age structure. The population pyramids in figure 1 show the changes in the overall population age structure. The sudden widening of the pyramid base in 1953 reflects the rapid increase in fertility after the foundation of the People's Republic. This trend was followed in the 1960s, resulting in a wide and thick base in the 1964 population pyramid, although there was a setback in fertility during the economic crisis and famine years: the peak births of the "baby boom" around 1963-1964 offset the low birth rate of the previous years, showing a slight increase in the age group 0-4. Eighteen years later, the 1982 pyramid shows a different picture of the population age structure. The top portion reflects the feature of slow and gradual growth; the bottom part (below the 30-34 cohort) of the pyramid depicts the effects on the age structure of the fluctuations in fertility (and mortality for a short period), resulting in an unstable age structure. It should be noted that the shrinking base of the 1982 pyramid clearly reflects the success of the family planning programme since the late 1970s. The increased proportion in the 0-4 age group in 1990 is mainly due to the increased number of fertile women in their twenties.

Figure 1. Population pyramids for China in four census years



Generally, according to the composition of its age structure, a population could be classified into three types of development: growing, stationary and declining. Before 1949, China's population grew slowly and gradually. After 1949, it grew rapidly in the 1950s and 1960s, with a relatively brief drop during the famine years, producing a typical growing type of population. In the 1970s, the family planning programme helped to reduce the growth rate. Currently, the population is becoming the stationary type, but basically is still a growing population. These changes produced the current pattern of population age structure.

Table 1. Indices of the age structure of China's population in four censuses

Items	1953	1964	1982	1990
Total (thousands)	567,447	689,705	1,003,931	1,130,511
0-14 (%)	36.28	40.69	33.59	27.69
15-64 (%)	59.31	55.74	61.50	66.74
65+ (%)	4.41	3.56	4.91	5.57
75+ (%)	0.96	0.81	1.36	1.65
85+ (%)	0.08	0.05	0.16	0.21
75+/65+ (%)	21.76	22.66	27.74	29.54
85+/65+ (%)	1.70	1.52	2.73	3.69
Young age dependency ratio	61.16	73.01	54.63	41.48
Old age dependency ratio	7.44	6.39	7.98	8.35
Total dependency ratio	68.60	79.40	62.61	49.83

Mean age (years)	26.49	24.90	27.10	28.73
Median age (years)	22.74	20.62	22.91	25.26

Source: Calculated from census age structure data for the years concerned.

For the purpose of international comparison, we can also look at the commonly used classification of broad age groups, namely 0-14, 15-64 and 65 and older (65+), as well as mean age and median age. With regard to the elderly, the age groups 75+ and 85+, and dependency ratios are also used. All the related indicators for the population in the four census years are given in table 1. The proportion of people aged 0-14 years to the total population has increased from 36.3 per cent in 1953 to 40.7 per cent in 1964, declining to 33.6 per cent in 1982 and 27.7 per cent in 1990. The proportion in the working age group (15-64) initially declined until 1964 and then increased to 61.5 per cent in 1982 and to 66.7 per cent in 1990. The change in the proportion aged 65 and older followed the same pattern, increasing to 5.6 per cent in 1990. The recent continuous increase in the proportion aged 65 and older signaled the start of population ageing in China. The overall age of the population has also shown an increase: mean age rose from 24.9 years in 1964 to 28.7 years in 1990 and the median age rose from 20.6 years in 1964 to 25.3 years in 1990. Although both the proportions aged 15-64 and aged 65 and older to the total population have increased since 1964, the dependency ratio of persons aged 65 and older still increased from 6.4 per cent in 1964 to 8.4 per cent in 1990. On the other hand, during the same period, the total dependency ratio declined, mainly owing to the larger reduction in the young age dependency ratio (73.0 per cent in 1964 and 41.5 per cent in 1990).

Among the elderly, the proportion of "old old" (75+) to the total population has increased a little, but is still small (less than 1.7 per cent in 1990). However, in terms of absolute numbers this group increased 334 per cent from 1964 to 1990, reaching almost 18.7 million in 1990.

A common feature of China's population is that the proportion of female elderly is higher than that of males. Also, the dependency ratio of elderly women is also higher than that of elderly men. These features are mainly due to women's greater longevity.

#### Provincial populations

China's population is not evenly distributed geographically, with most people living in the eastern, central and southeastern areas. Each of China's 22 provinces, five autonomous regions and three municipalities presents different patterns and features in terms of age structure (see tables 2 and 3). The North, East, Central-South areas of the country have populations that are older than the national average; the North-East, South-West and North-West have populations that are younger than the national average.<sup>1</sup>

Table 2. Percentage of people aged 65 and older in census years and other indices in 1990 in China's six large administrative areas

Areas	Percentage of people aged 65+				Mean age	Median age		Dependency ratio	
	1953	1964	1982	1990	Young age	Old age		Total	
Total	4.41	3.56	4.91	5.57	28.73	25.26	41.48	8.35	49.83
North	5.32	4.37	5.17	5.51	29.02	26.31	41.23	8.24	49.47
North-East	3.56	3.15	4.10	4.72	29.10	26.58	35.86	6.73	42.59
East	4.59	3.74	5.20	6.16	29.53	26.07	39.58	9.17	48.74
Central-South	4.52	3.72	5.17	5.68	28.10	24.39	45.84	8.79	54.63
South-West	4.03	2.77	4.64	5.33	28.66	24.47	39.49	7.85	47.35
North-West	3.59	3.07	3.91	4.39	27.16	23.65	45.30	6.68	51.98

Source: The Almanac of China's Population 1987 (Beijing: The Economic Management Press). The 1990 data are calculated from the 1990 census data.

Table 3. Percentage of people aged 65 and older in census years and other indices in 1990, by province of China

Area	1953	1964	1982	1990	Mean age (years)	Median age (years)	Old age dependency ratio
North							
Beijing	3.31	4.08	5.65	6.35	32.42	30.46	8.64
Tianjin	3.20	-	5.58	6.46	31.74	30.31	9.13
Hebei	6.24	4.77	5.67	5.81	28.86	26.03	8.92

Shanxi	4.74	4.35	4.99	5.39	28.43	25.32	8.11
Inner Mongolia	3.18	3.10	3.61	4.01	27.43	24.65	5.93
North-East							
Liaoning	3.84	3.28	4.81	5.68	30.56	27.85	7.99
Jilin	3.46	3.23	3.98	4.52	28.49	25.90	6.52
Heilongjiang	3.20	2.92	3.42	3.78	27.88	25.33	5.43
East							
Shanghai	1.97	3.60	7.43	9.38	35.33	33.82	12.96
Jiangsu	4.49	3.71	5.55	6.79	30.98	27.62	9.78
Zhejiang	4.08	4.19	5.76	6.83	31.10	27.74	9.77
Anhui	3.71	2.35	4.08	5.41	28.25	24.01	8.16
Fujian	3.31	3.15	4.38	5.07	27.18	23.45	7.99
Jiangxi	3.99	3.78	4.50	5.09	26.86	22.72	8.06
Shandong	6.31	4.49	5.62	6.20	29.58	26.40	9.23
Central-South							
Henan	5.13	4.25	5.23	5.83	28.15	24.33	8.99
Hubei	3.97	3.47	5.00	5.50	28.29	25.05	8.33
Hunan	4.65	3.30	4.97	5.60	28.54	24.83	8.42
Guangdong	3.98	3.85	5.43	5.93	28.23	24.54	9.24
Guangxi	4.62	3.28	5.11	5.42	27.09	22.86	8.85
Hainan *	-	-	-	5.41	27.12	23.17	8.79
South-West							
Sichuan	4.23	2.72	4.68	5.71	29.89	25.72	8.03
Guizhou	3.59	2.69	4.66	4.61	26.59	21.99	7.35
Yunan	3.63	2.98	4.50	4.90	27.04	22.78	7.72
Xizhang	-	-	4.60	4.63	26.16	22.06	7.74
North-West							
Shaanxi	3.94	3.51	4.57	5.15	28.01	24.97	7.81
Gansu	3.09	2.07	3.49	4.06	27.34	23.76	5.98
Qinghai	2.82	2.07	2.69	3.07	26.04	22.32	4.64
Ningxia	-	2.28	3.20	3.51	25.38	21.71	5.59
Xinjiang	3.92	4.05	3.68	3.91	25.94	21.95	6.20

Source: Same as table 2.

\* Hainan was newly established in 1986; prior to that the area it encompasses was included as part of Guangdong Province.

Briefly speaking, provinces younger in terms of population age are mainly inland boundary provinces, mountainous provinces which are characterized by backward economies and low levels of education. These two features have very high relationships with high mortality and high fertility, which produce younger age structures.

#### Urban and rural populations

In addition to changes in mortality and fertility, migration (rural-to-urban and urban-to-rural) also played an important role in the changes in age structure of the urban and rural populations.

Table 4. Indices of age structure of China's urban and rural populations in 1964, 1982, 1987 and 1990

Area/year	0-14 (%)	15-64 (%)	65+ (%)	Dependency ratio			Mean age	Median age
				Young	Old	Total	(years)	(years)
Urban								
1964	41.06	52.39	2.90	78.38	5.53	83.90	24.00	19.90
1982	26.01	69.30	4.68	37.53	6.76	44.29	29.09	26.07
1987	23.44	71.07	5.48	32.98	7.71	40.70	30.32	27.48
1990	22.33	72.57	5.10	30.76	7.03	37.80	30.34	27.53
Rural								
1964	4.31	55.81	3.64	72.22	6.52	78.74	24.16	20.25

1982	35.38	59.62	5.00	59.34	8.39	67.73	26.66	21.47
1987	30.60	63.88	5.52	47.90	8.65	56.55	27.87	23.10
1990	29.59	64.67	5.74	45.75	8.87	54.63	28.17	24.29

Source: Same as table 2.

Unfortunately, owing to a lack of data we can discuss only the changes in the urban and rural age structure at the national level, and only for the period after 1964. The available age structure indices are given in table 4. For the proportions aged 65 and older and aged 0-14, it can be seen that the rural (county) population has a higher proportion aged 65 and older than the urban (city and town) population in every given year, and that except in 1964, the proportion aged 0-14 is also higher in the rural areas than urban ones, which means that the rural population generally has relatively higher dependency ratios than the urban population. In 1990, the proportions of persons aged 0-14 and 65 and older were, respectively, 29.6 per cent and 5.7 per cent for the rural population whereas they were 22.3 per cent and 5.1 per cent for the urban population. The rural dependency ratios, child (45.8 per cent), old age (8.9 per cent) and total (54.6 per cent), were higher than the urban dependency ratios (30.8, 7.0 and 37.8 per cent, respectively).

The mean and median ages of the urban population have increased and become higher than those of the rural population. In 1990, the mean age and median age of the urban population were, respectively, 30.3 and 27.5 years while they were 28.2 and 24.3 for the rural population. These ratios can be explained as being a result of rural-to-urban migration. During the same time, age-selective migrants moving from the rural to urban areas resulted in an increase in the number of labourers aged 15-64 in the urban population. This phenomenon can be observed by the relatively high proportion aged 15-64 in the urban population compared with that in the rural population in the 1980s.

On the provincial level, the situation is even more complicated. There are two noticeable features that follow the pattern of the national level urban and rural population. One is that in almost all provinces (except Xingjiang) the proportion of young people (aged 0-14) is higher in the rural areas than in the urban areas. The other is that in almost all provinces (except Shanghai) the proportion of labourers aged 15-64 is higher in the urban areas than in rural areas. However, although at the national level the rural population accounts for a higher proportion aged 65+ than the urban population, the provincial populations show a diversified picture: about half the provinces have higher proportions aged 65 and older in the urban areas than in the rural areas. These can be considered as the combined results of past changes in mortality, fertility and migration. Generally, higher fertility contributes to a higher proportion of persons aged 0-14 in the rural population, age-selective migration from the rural to urban areas contributes to the larger proportions of labourers aged 15-64 in the urban population, while the decline in mortality contributes to the longevity of populations. Different levels and changes in mortality, fertility and migration have produced different urban and rural population age structures in each province.

#### Future trends in age structure change

How will the age composition of China's population change? Will the future process of ageing continue and will it be slow or fast? In this section several long-term projections for the overall national population are made in order to analyse these issues.<sup>2</sup>

#### Assumptions

How the age structure of the population will change depends mainly on the change in basic demographic factors: mortality, fertility and immigration/emigration. Thus, assumptions are made concerning changes in mortality, fertility and migration. Since the level of international migration is very small relative to the size of the population, the effect of migration is negligible in population projections; therefore, the focus will be on possible changes in fertility and mortality.

Future changes in fertility are uncertain; the effects of the family planning programme and the continued acceptance of it by the people must be taken into account when making assumptions. The strict implementation of the family planning programme dramatically reduced the total fertility rate in the 1970s and early 1980s. But recently there has been some resistance and the decline in fertility has slowed. The current TFR is approximately 2.4. Three assumptions are made concerning possible changes in fertility: low, medium and high variants. The low pattern assumes that TFR will decline from its current level, 2.39 in 1990, to 1.65 in 2000 and then remain at that level until 2050. The medium variant assumes that TFR will decline from the current level to 1.85 in 2000 and then remain at that level until 2050. The high variant assumes that TFR will decline to 2.11 in 1995 and then remain at that level until 2050. A TFR of 1.65 can be considered as the goal to be achieved under a strictly enforced family planning programme. A TFR of 1.85 allows for having around two children, while a TFR of 2.11 is considered as the possible level of fertility under a relatively loosely enforced programme (also it is the replacement level of fertility).

The outlook for mortality seems more stable and predictable than fertility. However, since we are concerned about the trend of ageing and the decline in mortality (especially at the older ages) which has certain effects on the trend of

the age structure, three assumptions about changes in mortality are made: low, medium and high patterns in terms of expectation of life at birth ( $e^0$ ). In the medium pattern the  $e^0$  is expected to increase from 68.7 years in 1990 to 77.1 years in 2050 for males and from 71.9 years in 1990 to 81.1 years in 2050 for females. The expectation of life at birth for both males and females in the low pattern is roughly three years less than for those in the medium pattern; in the high pattern, it is roughly three years more.

#### Changing age structure of the population

All the projections were made for comparison purposes, but for the convenience of analysis in this section, only three scenarios are discussed. (For a summary of the results see table 5.)

Table 5. Summary results of nine projections for China in 2050

Items	1990	Low fertility			Medium fertility			High fertility		
		$e^{\circ}_0$ Low	Medium	High	$e^{\circ}_0$ Low	Medium	High	$e^{\circ}_0$ Low	Medium	High
Total population	1,142,818	1,255,020	1,307,622	1,363,233	1,413,071	1,468,511	1,526,361	1,644,055	1,713,624	1,764,765
Sex ratio	106.12	101.13	100.70	100.49	101.79	101.39	101.19	102.54	102.17	101.98
Number:										
0-14	308,248	177,914	181,602	184,462	234,259	239,115	242,881	322,259	328,949	334,134
15-64	767,569	788,807	803,462	815,621	890,514	906,836	920,329	1,033,447	1,052,116	1,067,481
65+	67,003	288,299	322,559	363,150	288,299	322,559	363,150	288,299	322,559	363,150
75+	20,644	141,589	166,601	198,315	141,589	166,601	198,315	141,589	166,601	198,315
85+	2,660	25,931	33,035	43,734	25,931	33,035	43,734	25,931	33,035	43,734
Percentage										
0-14	26.97	14.18	13.89	13.53	16.58	16.28	15.91	19.60	19.31	18.93
15-64	67.16	62.85	61.44	59.83	63.02	61.75	60.30	62.86	61.76	60.49
65+	5.86	22.97	24.67	26.64	20.40	21.97	23.79	17.54	18.93	20.58
75+	1.81	11.28	12.74	14.55	10.02	11.42	12.99	8.61	9.78	11.24
85+	0.23	2.07	2.53	3.21	1.84	2.25	2.87	1.58	1.94	2.48
50-64/15-64	16.11	36.43	36.32	36.81	33.78	33.96	34.13	30.93	31.09	31.26
75+ /65+	30.81	49.11	51.65	54.61	49.11	51.65	54.61	49.11	51.65	54.61
85+ /65+	3.97	8.99	10.24	12.04	8.99	10.24	12.04	8.99	10.24	12.04
Sex ratio 65+	84.80	84.71	84.63	85.09	84.71	84.63	85.09	84.71	84.63	85.09
Males 65+	5.23	20.95	22.54	24.43	18.55	20.00	21.75	15.89	17.17	18.74
Females 65+	6.54	25.01	26.81	28.86	22.29	23.96	25.86	19.23	20.73	22.46
Dependency ratio:										
Young age	40.16	22.55	22.60	22.62	26.31	26.37	26.39	31.18	31.27	31.30
Old age	8.73	36.55	40.15	44.52	32.37	35.57	39.46	27.90	30.66	34.02
Total	48.49	59.10	62.75	67.14	58.68	61.94	65.85	59.08	61.92	65.32
Mean age (years)	29.08	44.95	45.74	46.69	42.63	43.38	44.29	39.90	40.59	41.43
Median age (years)	25.65	46.58	47.62	48.86	42.97	43.89	45.03	38.87	39.61	40.53

Note:  $e^0$  = Expectation of life at birth.

Figure 2. Population pyramids for China under three scenarios in 2050 Scenario: Low fertility and high expectation of life at birth

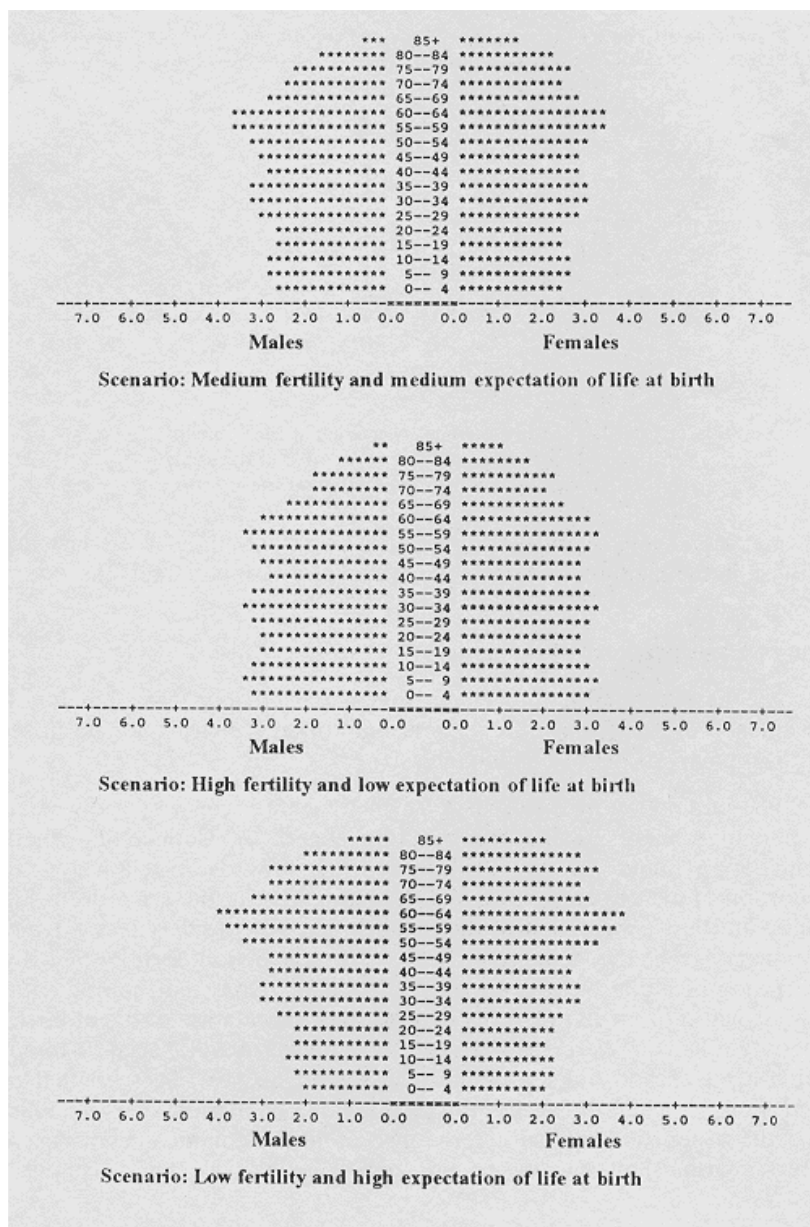
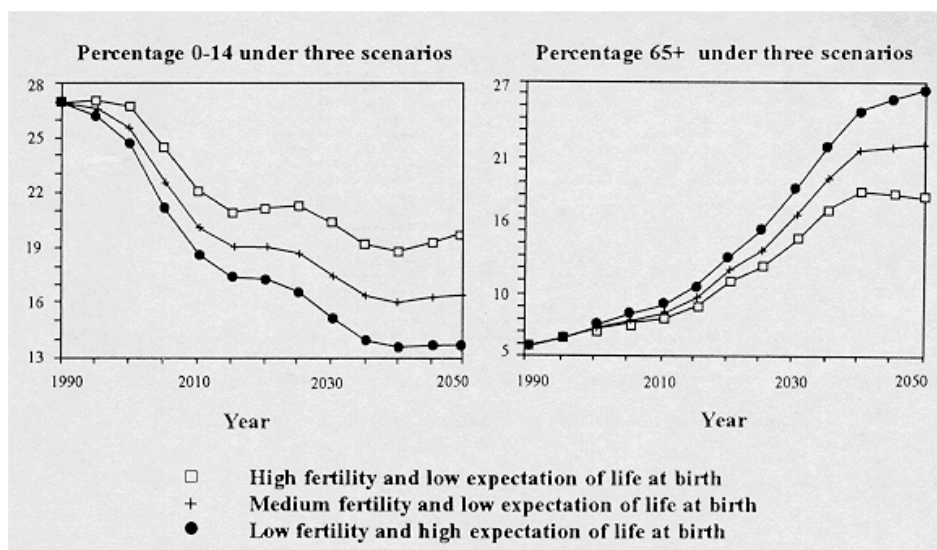


Figure 3. Proportions of people aged 0-14 and aged 65+ to total population of China



The population pyramids in 2050 for the three scenarios show clearly the possible changes in the age structure



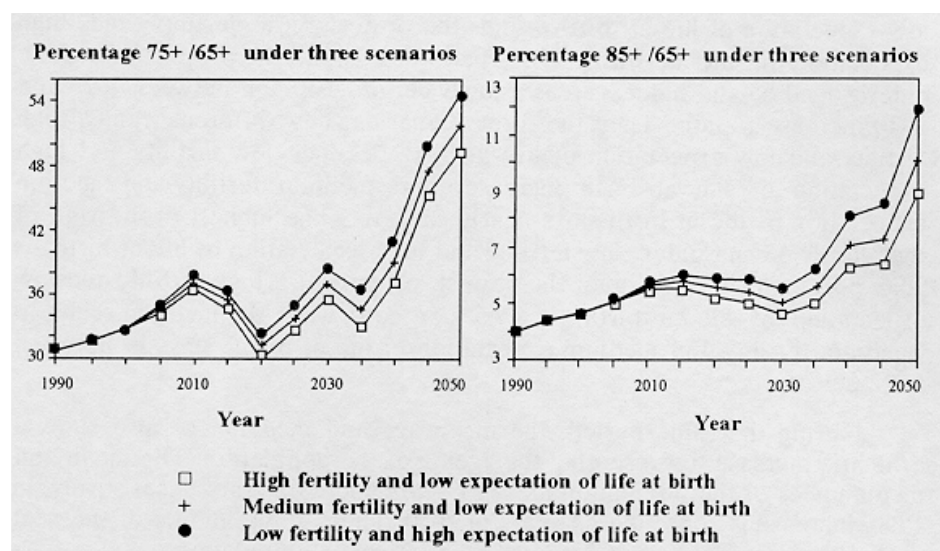
(figure 2). Compared with the population pyramid for 1990, all three shift towards a relatively large proportion of elderly persons. While the population in the scenario of high fertility and low expectation of life at birth can be considered as a typical "stationary" type, the population in the scenario of low fertility and high expectation of life at birth is a typical "declining" type, and the population in the scenario of medium fertility and medium expectation of life at birth is in between the two extremes. The proportions of people aged 0-14 and people aged 65 and older are shown in figure 3. It can be seen that the proportions of children aged 0-14 in the three scenarios keep declining, while the proportions of the elderly aged 65 and older are increasing. All three scenarios show that the proportions of children decline very quickly until 2015, and slow down until 2035, and then remain at nearly a constant level, with some 6 per cent difference between the highest (high fertility and low expectation of life at birth) and the lowest (low fertility and high expectation of life at birth). On the other hand, the proportions of the elderly aged 65 and older increase slowly before 2010, but between 2025 and 2040 increase rapidly. Then the three scenarios show different trends: high fertility and low expectation of life at birth declines, low fertility and high expectation of life at birth increases and medium fertility and medium expectation of life at birth stays nearly constant. The highest proportion of the elderly 65 and older (low fertility and high expectation of life at birth) is 26.6 per cent in 2050 and the lowest proportion (high fertility and low expectation of life at birth) is 17.5 per cent, while the medium scenario (medium fertility and medium expectation of life at birth) stays in between at 22 per cent.

During the same period, the mean age and median age also show a dramatic increase, representing the ageing of the population. The mean and median ages of the population are 29.1 years and 25.7 years, respectively, in 1990, increasing to around 44 years in 2050. Thus, in the middle of the next century the population of China will be a rather old population.

#### Changing age structure of the elderly population

The ageing of China's population is not only indicated by the rapid increase in the proportion aged 65 and older, but also by the increase in the proportion of those aged 75 and older, and 85 and older to the total of elderly people aged 65 and older. Figure 4 shows the relative proportions aged 75 and older and aged 85 and older to the total of elderly people aged 65 and older. It can be seen that both proportions will be increasing until 2010. After that, while the proportion aged 85 and older stays almost constant, the proportion aged 75 and older temporarily drops twice (in 2020 and 2035), mainly because the two "baby booms" in the 1950s and the 1960s increased the relative size of the elderly aged 65-74. After 2035, both proportions will increase very rapidly.

Figure 4. Proportions of people aged 75+ and 85+ to total elderly population aged 65+ in China



#### Changing dependency ratios

A major issue stemming from the ageing of the population is the increasing dependency ratio. With a rapid rise in the proportion of the elderly aged 65 and older, it is obvious that the dependency ratio will increase. The changes in the old age dependency ratio would follow almost the same pattern as that of the increase in the proportion aged 65 and older in figure 3 because the proportion of workers aged 15-64 stays nearly constant.

Figure 5. Dependency ratios for China

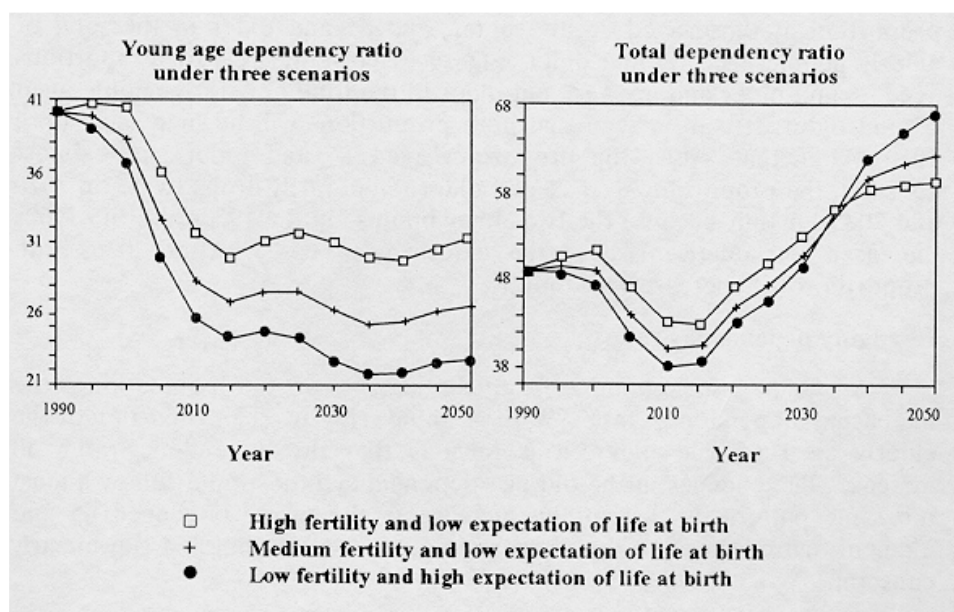


Figure 5 depicts the young age dependency ratio and the overall dependency ratio. The neontic (child) dependency ratio declines very rapidly in the first two or three decades until 2015 and then, with some fluctuations, stays at a relatively stable level. Its range of variation (from 40.2 to 25.4 per cent, taking the medium fertility and medium expectation of life at birth scenario as an example) is not as large as that of the change in the gerontic dependency ratio (from 8.7 to 35.6 per cent), so the aggregated total dependency ratio still shows an increase, although there is a slow drop around the period 2005-2020. But even as far as this drop is concerned, the composition of the total dependency ratio will change, with the gerontic dependency ratios becoming more important. It should be kept in mind that the real dependency of an elderly person (such as public and private costs of an elderly person's maintenance) is much higher than that of a child.

#### Conclusion and implications

The population of China is currently moving towards an old age structure, and it is certain that there will be rapid growth in the elderly population in the near future. Taking account of the currently backward economy in parts of China and the poor social security system, the specific features of the ageing population hold profound implications for social and economic policies.

The proportion of the population aged 65 and older will reach 7 per cent before the end of this century. After that, the speed of the population ageing process will be accelerated, and the growth of the elderly population will be much faster than that of any other age groups in China. It is estimated that the growth rate from 2000 to 2030 will be 32.1 per thousand for the elderly population, while it is only 5.1 per thousand for the overall population. Around the period 2025-2030, the proportion of the elderly will reach 15 per cent of the total population. This means that it will take only about 25-30 years for China's population to reach the degree of ageing that was reached by the United Kingdom's population over a 50-year period. Moreover, this proportion of the elderly population in China will continue to grow after the year 2030 and will reach a level of around 21-22 per cent of the total population within an additional decade beyond 2030 (see figure 2), whereas in the United Kingdom it will stay around 15-18 per cent (Grundy, 1986) and in most European countries it will eventually stabilize at 14-17 per cent (Guilmot, 1978).

Besides the rapid speed and high level of population ageing, the huge number of the elderly in China is also a particular characteristic of the population ageing process. It is estimated that the number of elderly people in China will finally exceed 322.5 million in 2050 (under the medium fertility and medium expectation of life at birth scenario, see table 5). Taking into account China's deficient pension system, all these features of ageing are a major concern for the government and the elderly. Only a small proportion of retired people in the non-agricultural population could obtain state pensions; the majority of the elderly do not enjoy such arrangements. Although the government has started to change this situation, owing to limited finances it will be a long time before a large-scale social security system is in place. In the meantime, the support and care of the elderly will remain the responsibility of the younger generation in their families. In order to reduce the future burden of dependency, it is suggested that the economic participation of women be increased and the retirement age postponed (Falkingham, 1987) and that the retired be able to continue their employment if they are in good health.

The number of elderly aged 65 and older was 67 million in 1990; this number is projected to increase to 240.2 million in 2030 and 322.6 million in 2050. In contrast, the number of youth aged 0-14 will decline from 308.3 million in 1990 to 239.1 million in 2050. This means that the number of elderly will exceed the number of young people aged 0-14 and become dominant among the dependent population. Furthermore, among the elderly

population, the number of old elderly (aged 75 and older) and the very old elderly (aged 85 and older) is growing much faster than the young elderly (aged 65-74). From 2000 to 2050, the growth rate will be 35.4 per thousand for those aged 75 and older and 42.9 per thousand for those aged 85 and older, while it will be only 26.5 per thousand for the total elderly population aged 65 and older. It is estimated that the number of the old elderly will be 166.6 million in 2050, accounting for about 51 per cent of China's total elderly population. As mentioned previously, this change in the age composition of China's overall population, and especially of the elderly, will have significant implications for policy purposes.

One of the most important of these is that the need for social and health services will increase greatly, since the maintenance of an elderly person is much more costly than that of a child (Grundy, 1986). The increasing size of the elderly population also means that there will be an expansion in the demand for products and services used by the elderly such as health care products and entertainment goods (Zhang, 1994).

The increase in the relative and absolute size of these old-age groups will result in greater burdens for the working-age population. The ageing process also has implications for China's birth control policy. As a consequence of fertility decline, population ageing is inevitable. However, the speed and the level of the process are highly associated with the speed and level of fertility decline. China's family planning programme helped to reduce the high level of fertility, but, faced with the rapid ageing of the population in the near future and taking into account the weak social security system, there may be room to adjust the programme in order to bring about a smoother age structure in the future.

Further, the effects of internal migration on the age structure change in specific regions must be taken into account. Since the majority of migrants are mainly adult workers, migration results in a younger population in the receiving areas and an older population in the areas from which they came (see table 4) (Zeng, 1990). China's "floating population" would also serve to alleviate the burden of the ageing population on the local working age population.

Also ageing may have an impact on the collective psychology of the population. Sauvy (1948) warned that population ageing might be associated with a decline in initiative and enterprise (see also Grundy, 1986). A report of the Royal Commission on Population (1949) suggested that an ageing population might become "dangerously unprogressive, falling behind other communities in technical efficiency and economic welfare". Although these attitudes towards ageing are somewhat negative, it is worth considering the issues they imply.

#### Endnotes

1 However, in terms of mean age and median age, the patterns are somewhat different. The populations of the North, North-East and East areas are older than the national average; the others are younger than the average.

2 The year 1990 was chosen as the base year for the projections.

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