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CONTRACEPTIVE PREVALENCE SURVEYS IN BANGLADESH:
LINKAGES BETWEEN FERTILITY VARIABLES AND CONTRACEPTIVE USE

by

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FOREWORD

The USAID/Bangladesh Mission has provided technical as well as financial assistance to conduct contraceptive prevalence surveys in the country. This research monograph reviews the achievements of these surveys in the field of providing data on linkages between fertility variables and contraceptive use. Several suggestions for continuing this success story are also given which, I am sure, will be of interest to survey organizers, demographers and population planners.

Nishkam Agarwal is a staff member of our Mission, and he has conducted this study as a personal contribution, in addition to his official duties, in association with two freelance researchers. In this monograph he suggests a close relationship between the contraceptive prevalence surveys and the underlying fertility model which was the subject of his earlier study. The views expressed are the authors' own, and not necessarily of the USAID/Bangladesh.

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I. INTRODUCTION

Bangladesh has actively participated in two major survey programs during the last fifteen years, which concentrated on fertility and contraceptive use and had world-wide coverage. The first of these programs was the World Fertility Survey (WFS), and the second is known as Contraceptive Prevalence Surveys (CPS). Under the former program, Bangladesh Fertility Survey was conducted in 1975 and the first report on this was published in 1978. Under the second program, four Contraceptive Prevalence Surveys have been conducted, in the years 1979, 1981, 1983 and 1985. Final reports on the first three of these surveys have been published, and Key Results of CPS-85 are also available, in advance of the final report thereon.

Although the nomenclature of the two programs might give the impression that the first one dealt with "fertility" and the second with "contraceptive prevalence", such exclusiveness was neither planned nor practised. Under the sub-title "History of the WFS and CPS Projects", a special issue of the Population Reports of the Johns Hopkins University clarifies the original intentions:

"The World Fertility Survey and later the Contraceptive Prevalence Surveys were established to answer the need for high-quality data on fertility and family planning". 1/

1/ The Johns Hopkins University, Population Reports, Special Topics, Series M, Number 8, September-October 1985, p. M-291.

The same view is expressed by Anderson and Cleland:

"Two major survey programs in developing countries covering the areas of fertility and contraceptive use started in the 1970's- the World Fertility Survey (WFS) and what have become known as contraceptive Prevalence Surveys (CPS's):...

"Similar to the WFS, the CPS obtains information on fertility, contraceptive use, and attitudes towards fertility". 2/

A look at the reports published on these surveys in Bangladesh also confirms that fertility and contraceptive use are among the common areas of interest in both types of surveys. In other words, the fertility survey has not ignored contraceptive use, and similarly the Contraceptive Prevalence Surveys have not ignored fertility.

Conceptually, there is a cause-and-effect relationship between contraceptive use and fertility level which has been quantified by the Population Council's fertility model. 3/ Of course, there are several other elements in this model, but

2/ Anderson, J. E. and J. G. Cleland, The World Fertility Survey and Contraceptive Prevalence Surveys: A Comparison of Substantive Results, Studies in Family Planning, Volume 15, Number 1, January-February 1984, p.1.

3/ Bongaarts, J. and J. Stover, The Population Council Target-setting Model: A User's Manual, The Population Council, New York, 1988, pp. 5-15.

assigning to them a minor role for the time being, a given increase in the contraceptive prevalence rate (CPR) by a target date is expected to bring about a predictable decrease in the fertility level. Is it enough, then, to estimate only CPR through the survey and not to bother about finding whether this has had the desired effect on fertility? Experience has shown that such a one-sided approach is not tenable. For one thing, all survey estimates are subject to sampling as well as non-sampling errors, which highlight the need for a cross-check. Secondly, the fertility model gives no guarantee that the CPR-related decrease in fertility is bound to occur. Thirdly, we have shown in an earlier monograph 4/ that a targetted decrease in one fertility variable (TFR) may not be accompanied by the desired decrease in another (CBR). This implies that unless we monitor the appropriate fertility variables along with CPR through the CPS itself, we might have a false sense of achievement and suddenly get a rude shock when the next census of population reveals the true level of fertility.

Historically, the CPS project was launched in many countries, as a substitute for the WFS project, to fulfil the need for more rapid, less costly, and more program-related data to guide family planning administrators. Accordingly, the CPS-questionnaire was much shorter than the WFS-questionnaire. However, in spite of the desire to make the CPS-questionnaire as

4/ Agarwal, N.S., K.K. Agarwal and S.P. Agarwal, A Modified Version of the Population Council's Fertility Model with Special Reference to Bangladesh, USAID/Bangladesh Research Monograph Number 1, May 1987, pp 12-17.

short as possible, care was taken to retain within it the essential fertility-related questions.

Although the fertility section has been retained as an inseparable part of the CPS-questionnaire, there was an occasional tendency (perhaps due to oversight) to under-rate its intrinsic importance in comparison to the sections devoted to contraceptive use in the same questionnaire. For example, if we look carefully at the objectives originally set for the WFS and the CPS (at the international level), we find that:

- i) the WFS-objectives specifically mention fertility as well as contraceptive use, whereas
- ii) the CPS-objectives concentrate on contraceptive use but make no specific mention of fertility. 5/

A similar remark can be made about the objectives stated in the Bangladesh CPS-reports. However, in practice, the fertility-chapter in these reports is as prominent as the one devoted to contraceptive use in the Bangladesh WFS-report. A similar reciprocity exists in regard to fertility-related questions in the CPS-questionnaire and contraceptive use-related questions in the WFS-questionnaire. Why then the omission of "fertility" from the CPS-objectives? We can only characterize it as a sort of partial inconsistency (perhaps unintentional) between the CPS-objectives on the one hand, and the CPS-questionnaires and reports, on the other.

5/ The Johns Hopkins University op.cit. p. M-293.

In this monograph we take the view that the fertility-related section in the CPS-questionnaires and reports correctly reflects the inseparable linkage between fertility and contraceptive use for purposes of these surveys. It was probably because of the static nature of the CPS-objectives, and for other reasons, that this linkage did not so far attain full recognition and an unchallengeable status in its own right. For this to be achieved in the future contraceptive prevalence surveys in Bangladesh, it is necessary to make a scientific study of the subject. This is what we have done in this monograph.

In section II, we present a brief review of what the contraceptive prevalence surveys in Bangladesh have already achieved, with particular reference to linkages between fertility variables and contraceptive use. Some limitations of these surveys in this field are also mentioned.

In section III, we stress that appropriate fertility variables need to be chosen and given special prominence, from the viewpoint of their particular relevance for the present study. Considerations which underlie such choice and status-elevation are also explained.

In sections IV to XV, we present an item-wise analysis of what already exists in the CPS-questionnaires, reports and sample design, together with possibilities of what new things can be done on all these items in the future contraceptive prevalence surveys.

Finally, the main results obtained and important suggestions based thereon are summarized in the concluding section, namely section XVI.

II. A BRIEF REVIEW OF SURVEY ACHIEVEMENTS AND LIMITATIONS

A good starting point for assessing the achievements of the contraceptive prevalence surveys is to recall what was expected from them at the time of their initiation in 1979. The following extract from the CPS-79 report states this very clearly:-

"In order to monitor the progress of the (family planning) program and to formulate service delivery plans, policy makers and program administrators need country-wide data on fertility patterns and contraceptive practices. Recognizing the need for this type of data, the Government of Bangladesh sought the assistance of the U.S. Agency for International Development (AID) for the purpose of conducting a national contraceptive prevalence survey". 1/

For purposes of our present study, the main point to note in the above extract is that data needs refer to fertility patterns as well as to contraceptive practices. In fact, the fertility-related section in the CPS-79 questionnaire was very prominent because it provided for the recording of the complete "pregnancy history" for the entire reproductive period.

1/ National Institute of Population Research and Training, Bangladesh Contraceptive Prevalence Survey-1979, Dhaka, 1981, p.4.

The "pregnancy history" approach was dropped from the CPS-81 questionnaire, and a new approach based on limited fertility data was adopted, which provided for the following:

- Number of children ever born;
- Number of living children;
- When did the last live birth occur ?
- Current pregnancy.

The CPS-83 questionnaire maintained the "limited fertility data" approach, but sharpened the question about the last live birth and specifically asked about "live birth in the last twelve months". It also added a question about "desire for additional children". This question existed in CPS-79 but not in CPS-81.

Apart from sharpening the above questions further, the most important additional questions in the fertility-section of the CPS-85 questionnaire related to "breast feeding".

A similar review of the section devoted to contraceptive use in the various CPS-questionnaires reveals that important modifications have been made, particularly from 1983 onward. For example, the CPS-79 questionnaire started with two main aspects, namely,

- Ever use, and
- Current use.

The CPS-81 questionnaire did not make any additions, but the CPS-83 questionnaire added two more aspects, namely,

- Reasons for current non-use, and
- Intended future use super-imposed upon current non-use.

Apart from sharpening the above aspects further, the most important additional questions in the section devoted to contraceptive use in the CPS-85 questionnaire related to:

- Duration and timing of use during 1983-1985.

Although our review of the CPS-questionnaire took into account all the four surveys conducted in Bangladesh so far, we can cover only the first three of them for reviewing the tabulations, because detailed tables of CPS-85 will be available only in the final report which has not been published so far. Our primary interest is in tables which show linkages between the fertility variables and contraceptive use. Tables of this type which appear in all the three reports show the following:-

- Contraceptive use by number of children ever born;
- Contraceptive use by number of living children.

Furthermore, the CPS-83 report provided detailed data on "reasons for non-use" of which the following deserve mention:

- Desire for additional children as the main reason for non-use;

- Breast-feeding or postpartum amenorrhea as the main reason for non-use;
- Current pregnancy as the main reason for non-use;
- Sterility as the main reason for non-use.

Apart from tables showing linkages, there are a large number of useful tables showing simple distributions by one classificatory variable at a time. These one-way tables include:

- Contraceptive use by age-group of women;
- Age-specific marital fertility rates;
- Desire for additional children by number of living children;
- Standard errors of current use rates by contraceptive method.

Without going into further details, we can say that the CPS-reports have accomplished a lot in the field of providing data on fertility, contraceptive use, and linkages between them. It is a fine "success story". What has contributed to this success is the fact that these surveys have introduced modifications in the questionnaire as well as the tabulation scheme, in the light of the experience gained and the general advancement of knowledge in the relevant fields with the passage of time.

While talking of modifications, we should mention that the CPS-83 made significant changes in regard to sampling, including the following:-

- a) It used a new sampling frame based on the 1981 population census;
- b) It introduced two more samples in addition to the eligible woman sample, namely, the husband sample and the couple sample. It was assumed that female methods of contraception were subject to less reporting bias among females, and similarly male methods among males. Selective use was thus made of the data on contraceptive use as given by the three samples. However, the fertility data were obtained only from the eligible woman sample.

An important question posed by the foregoing review is: Since modifications introduced from time to time in the questionnaire, tabulation scheme, and the sample frame have contributed to the success of the contraceptive prevalence surveys, can we formulate any criteria to guide this process of modifications? We feel that this process should be viewed as a never-ending one. In our opinion, these surveys can continue giving better and better results if they are linked with the improvements which are continuously being made in the underlying fertility model. Such linkage with the fertility model will provide the right direction and a scientific basis

for introducing modifications in the surveys. In fact, the absence of such a close and clear linkage between the survey and the underlying fertility model can be considered as a limitation. What this implies in practice will become clear as we proceed to make a systematic exploration of this "linkage hypothesis" in the sections that follow.

III. CHOICE OF FERTILITY VARIABLES AND CONSIDERATIONS
UNDERLYING SUCH CHOICE

We want to present in this section a preview of how we shall select the fertility variables for purposes of studying their linkage with contraceptive use. The term "selection" is not used here in a narrow sense; it includes the assigning of priority, which is unavoidable for drawing meaningful conclusions.

We noticed in section II that the latest CPS-questionnaire is capable of yielding information on several aspects of fertility as well as contraceptive use. It will help clarify the conceptual framework if we adopt a pooling device and think in terms of five main groups of fertility variables:

Group Number	Group Title	Fertility variables included in Group
I	Cumulative fertility	Number of children ever born Number of living children
II	Current fertility	Live births in the last twelve months.
III	Future fertility	Current pregnancies Desire for additional children
IV	Correlate of fertility	Breast-feeding
V	Negation or Disruption of fertility	Sterility Induced abortion

Moving next to contraceptive use, we observe that, up to CPS-83 we had three main aspects, namely:

- Ever use;
- Current use;
- Intended future use super-imposed upon current non-use.

However, the additional questions introduced in CPS-85, which relate to "duration and timing of use during 1983-1985", can, for conceptual purposes, be designated as

- Recent use.

Within the above-mentioned two-dimensional conceptual framework, the linkages which have been studied with the help of CPS-data are the following:-

- a) Cumulative fertility linked to current use of contraception;
- b) Future fertility linked to intended future use of contraception.

The main thrust of our present study will be to explore one more linkage, namely,

- Current fertility linked to recent use of contraception.

Although the actual process of exploration will start in section IV, we want to prepare the ground for a possible rearrangement of priorities that we need to attach to different fertility variables.

In demographic literature, the total fertility rate (TFR) generally occupies a place of honour. The age-specific components of this, namely ASFR can be obtained by dividing the "number of live births during the last twelve months distributed in five-yearly age-groups of mothers" by the number of all women in the corresponding age-groups. Since the CPS takes a sample of ever-married women (of whom currently married women constitute nearly ninety percent), the CPS-data provide primarily an estimate of total marital fertility rate (TMFR), rather than TFR itself. This would be an obvious shifting of priorities.

A sound theoretical basis for linking current fertility to recent use of contraception is provided by the Population Council's fertility model, which establishes a relationship between TFR and the contraceptive prevalence rate (CPR). The basic formulas on which the superstructure of this model rests, give a mathematical signal to a careful researcher, and direct him/her to allocate live births separately to recent contraceptors and non-contraceptors. Such allocation necessitates that we retain the primary data on live births together with characteristics of the women who have had those

births, and do not lose them in the labyrinth of the traditional fertility rates. From this consideration, the "live births that occurred during the last twelve months" will be the most important fertility variable, rather than any of the fertility rates mentioned above. In fact, the relevant fertility rates appropriate for the new approach will be the age-specific natural fertility rates (ASNFR) and the total natural fertility rate (TNFR).

Apart from the necessity of allocating live births separately to contraceptors and non-contraceptors, we will have to raise another basic question which has been found to be relevant for this type of data collected through sample surveys in most developing countries. The question relates to incompleteness of the live birth data, firstly to checking whether the data are incomplete, and secondly to the estimation of the degree of incompleteness. A connected problem would then be whether any meaningful use can be made of incomplete live birth data in conjunction with the data on contraceptive use.

The desire for additional children will be another important fertility variable for our study. The relationship between such desire and the use or non-use of contraception will be explored by us, as also the influence on such desire, of variables like the number of living children. This automatically leads us to the number of children ever born and the age distribution of respondents. In fact, we shall also

need to consider whether linkages between fertility variables and contraceptive use will be clearer if the selection of respondents is restricted to currently married women, instead of to ever-married women.

The fertility variables referred to in the above discussion can be called "core variables", but we need not confine our attention to only these. Other fertility-related variables which will also find a place in our study are the following:-

- Current pregnancies;
- Breast-feeding and its duration;
- Sterility;
- Induced abortion.

It should be clear from the above that we are adopting an innovative and penetrating approach so that the contraceptive prevalence surveys in future can achieve their full potential in terms of collecting and tabulating fertility-related information, closely interlinked with that on contraceptive use.

IV. THE BASIC LINKAGE BETWEEN THE SURVEY AND THE FERTILITY MODEL

Although the main objective of contraceptive prevalence surveys (CPS) in Bangladesh is stated to be to obtain first-hand information from a sample of eligible persons about the knowledge and use of contraceptive methods, they have also collected a certain amount of fertility-related information. The question that we want to discuss in this section is: "what should be the attitude of CPS-planners towards the collection and utilization of fertility-related information as a part of the CPS itself" ?

In our opinion, a sample survey like the CPS can yield the best results if it is viewed as a tool to facilitate the testing and application of an underlying model. The information collected through the survey can help in checking the validity of the various assumptions made in the model, as well as in preparing estimates of the parameters which constitute the characteristic features of the model. On its part, the model provides the basic approach and a framework which can help formulate the objectives, design and content of the sample survey.

We take the view that the role of fertility-related questions in a CPS ought to be determined by a fertility model which is appropriate for the country. A fertility model for developing countries in general was suggested by the Population Council, New York in December 1988, through their publication entitled "The Population Council Target Setting Models: A User's

Manual". For Bangladesh in particular we have put-forth, in May 1987, a "modified version of the Population Council's fertility model". The two models have some common elements but they also differ in important respects. For purposes of this monograph, we consider the model presented in our "modified version" as appropriate for this country. We shall also refer to the two models together while speaking of a feature which is common to both of them.

The basic assumption of both the models is that, although the non-users of contraceptive methods have the major share in the fertility-experience of the country, some of the live births can also occur to those who use temporary or traditional methods of contraception, that is, other than sterilisation (male or female). A clear understanding of the relationship between fertility and contraceptive practice is possible only if separate information is collected and tabulated on the fertility-experience of contraceptors and non-contraceptors. Once the validity of this statement is appreciated and recognised, possibilities of achieving this can be considered.

For the time being, we want to concentrate attention on the following fertility-related information which has been collected through contraceptive prevalence surveys:-

- a) Live births that occurred during the last twelve months;
- b) Pregnancies continuing at the time of the survey.

A relevant question is: "How can these births and pregnancies be recorded separately for contraceptors and non-contraceptors?" Obviously, to get a meaningful answer to this question, the contraceptive use-status of the respondent (that is, whether the couple was a contraceptive or non-contraceptor) has to refer to a time period going backwards up to twenty-one months from the date of the survey. In other words, we should know whether the women who had live births during the last twelve months were using contraceptive methods immediately prior to that, which means the births represented cases of failure of those methods. Similarly, we should know whether the women who were pregnant at the time of the survey represented cases of "unwanted pregnancies" because they were contraceptive users immediately prior to that.

The specific time period, with reference to which the contraceptive use-status of the respondent has to be determined to fulfill the above-mentioned requirement, is different from what is implied by the following:-

- i) Ever use;
- ii) Current use;
- iii) Intended future use.

These three categories of contraceptive method users are identified in the contraceptive prevalence surveys conducted up to 1983, but they are inadequate to determine whether the live births and pregnancies recorded in those surveys occurred to contraceptors or non-contraceptors.

Under the circumstances, a superficial reader would be tempted to take the view that all the recorded births and pregnancies can be attributed to those who are "not current users" of contraception. In fact, "current pregnancy" is shown as one of the reasons as to why a respondent in the CPS is not a current user of contraception. But such an interpretation of the survey would imply a negation of one of the basic assumptions of the underlying fertility model. Obviously, we cannot expect consistent results unless the survey and the model are interlinked in the sense that neither of them violates the basic assumptions of the other.

The upshot of the above reasoning is that the CPS questionnaire used up to 1983 needed to be modified so as to ascertain the contraceptive use-status of the women immediately prior to the births/pregnancies recorded in the survey. Such a modification has been made in the questionnaire used for CPS-1985 which ascertains whether the respondent used any contraceptive method during the period 1983-1985, and, if so, which method or methods. This information is collected in section III of the questionnaire whereas the fertility-related questions are in section II. Under such an arrangement, there is no automatic linkage between the two sections. It would be better to add two more questions which specifically make the necessary linkage, rather than draw inferences whose validity would otherwise remain unconfirmed. To any respondent who gave birth during the last twelve months and who also reported the use of any contraceptive method during the nine-month period prior to that birth, a specific question should be put, namely,

"Should I infer from your replies that you had an a child in spite of the prior use of such-and-such method of contraception?" A similar question should be added for the respondent who is pregnant at the time of survey and who also reported the use of any contraceptive method immediately prior to this pregnancy. Only with the help of such specific linkage between sections II and III of the CPS-85 questionnaire can we identify [with certainty] unplanned births and unwanted pregnancies to users of contraceptive methods. Under Bangladesh conditions, the information about the duration and timing of contraceptive use could be subject to unspecified margins of error, and therefore a cross-check is needed for obtaining reliable data on such an important methodological issue.

The suggestion made above would provide us [for example] with a table showing how many live births occurred during the last twelve months to contraceptors and non-contraceptors, separately. The usefulness of the table is increased by adding the age-variable to it. The information relating to non-contraceptors can be utilized to estimate "age-specific natural fertility rates". The procedure for doing so is explained in section IX. Similar details about "current pregnancies" can also be utilized by following the procedure explained in section X.

Next, the data on live births or pregnancies that occurred to contraceptors are intended to provide estimates of "unplanned children" or "unwanted pregnancies". In addition to having such estimates by age of the mother, it will be

particularly useful to classify them by the method used. In other words, this will throw light on the use-effectiveness of the various methods. This again stresses the basic linkage between the survey and the underlying fertility model, because use-effectiveness of contraceptive methods in different age-groups of currently married women is an important input for the model.

Before closing this section we would like to remark that an allocation of live births to contraceptors or non-contraceptors, in a way marks a "turning of the table". For example, the existing CPS-reports show contraceptive use by fertility variables like the number of children ever born or the number of living children. In these tables, the [cumulative] fertility variable is the classificatory variable, and entries in the tables show [current] contraceptive use. In the new tables that we are proposing, the [recent] contraceptive use becomes the classificatory variable, and entries in the tables show the number of live births (that is, current fertility data). In this way, genuine inter-linkage between fertility and contraceptive use can be analyzed in both the directions. We should clarify that our suggestion regarding new tables should not be interpreted as implying any discontinuation of the old ones. We have already [in section II] used the expression "a fine success story" while describing what the CPS-reports have achieved. Our proposals are intended only to add to this success, not to diminish it in any way.

V. LINKAGE BETWEEN CONTRACEPTIVE USE AND
DESIRE FOR ADDITIONAL CHILDREN

One of the commonest uses of contraceptive prevalence surveys is to identify those who do not want additional children but who are still not using contraception. This is done to measure "unmet need". In fact, this term can be defined in many ways, and the one implied by our preceding sentences is in line with John Kantner's use of the term "unmet need" under Indian conditions:-

"If couples who want no more children and are not currently using contraception became contraceptors, the total number of couples using contraception would equal two-thirds of all married couples. It is unlikely of course, that all couples not wanting more children would take steps to prevent further births. The exercise does suggest, however, that there is substantial unmet need for fertility regulation....." 1/

One could argue that Kantner's definition takes into account the fact that the Indian family planning program is concentrating on those who do not want additional children by emphasizing permanent methods involving sterilization. If temporary methods are emphasized, equally or even more, then unmet need should also cover those who want more children, but

1/ Kantner, J., Population in India's Development, USAID/India Occasional Paper Number 1, New Delhi, 1988, p.85

not immediately. While this is conceptually true, it is difficult to collect reliable data in adequate detail for this purpose, because so far the CPS-questionnaire used in Bangladesh only asks:

- Would you like to have more children in future ?
- If yes, how many more children would you like to have in future ?

In other words, there is no question asking "when would you like to have your next child? "

The CPS-83 report uses a different concept of unmet need, namely, those not currently using contraception but who express a desire to use contraception in future. 2/ We feel that this concept is likely to over-estimate unmet need because expressions of desire to use contraception in future might not be based on any deep conviction. This is pointed out by the World Bank [with reference to questions relating to future desire, in the light of a survey conducted in Kerala, India],

"The survey questions on desired number of children and on desire for additional children were sometimes answered rather casually by respondents; the answer given may not be based on any deep conviction. As a result, estimates of unmet need based on these questions may not be reliable" 3/

2/ Mitra and Associates, Bangladesh Contraceptive Prevalence Survey 1983, Final Report, Dhaka, 1985, p. 258.

3/ Zachariah, K. C., Anomaly of the Fertility Decline in Kerala, The World Bank, 1983, p.92

We need not be so discouraged by these difficulties as to give up all attempts to estimate unmet need. It is clear, however, that the concepts should be defined carefully and the practical procedure that we suggest for estimation should be consistent with the existing or proposed additional questions in the CPS-questionnaire. This is illustrated below.

All currently married women below 50 years of age are asked in section II on "fertility" whether they want additional children. The same women are later asked in section III on "fertility regulation" whether they (or their husbands) are using any contraception. Since an estimate of unmet need is going to be an important output from the survey, a probing question like the following should be added to section III:

"You mentioned earlier that you do not want additional children, but now you say you are not using contraception. Do you feel you might have unwanted children?"

In this way, a proper linkage will be established between contraceptive use and desire for additional children.

The CPS questionnaire used in Bangladesh so far does not contain any probing question of the type suggested above. How then can an estimate of unmet need be derived therefrom? It appears that this is sometimes done on the basis of the following question in section V which is devoted to "reasons for non-use":

"What is the main reason that you are not using any family planning method now?"

In reply to this question, the main reason given in CPS-93 was:

Main reason -----	Percentage of non-users who gave the reason -----
1. Desire for additional children	30.4
2. Currently pregnant	15.5
3. Belief that she is unable to have children	12.1
4. Breast feeding and/or post-partum amennorhoes	11.7
5. Religious reasons	7.1
6. Objections by husband	3.9
7. Fear of side-effects	3.7
8. Health reasons	3.4
9. Non-availability of methods	1.8
10. Other/Don't know/No reason	10.4

Total non-users:	100.0

Although only one reason is attributed to each non-user, we should not interpret it to be the only reason. In other words, if 30.4 percent mentioned "desire for additional children", it does not mean that the remaining 69.8 percent do not want additional children.

A careful study of the above data reveals that any estimate of unmet need derived therefrom cannot be considered realistic because this is not the correct procedure to make such an estimate.

One thing is clear, however. Since unmet need has to be defined by linking two or three questions, it will call for a two-way or three-way table based on those questions. The existing CPS-reports do not contain such detailed tables. We want to stress, for example, that a two-way table needed for estimating unmet need is essentially different from what is now available in CPS-reports, namely "two separate one-way tables without proper linkage". Furthermore, we want to make a strong plea against making an unscientific use of the available tables; rather the necessary two-way and three-way tables should be planned in advance.

VI. IDENTIFICATION OF SPACERS AND LIMITERS

There is no unique way in which users of contraceptive methods can be divided into spacers and limiters. Those who go in for permanent methods, namely male or female sterilization, can be called "limiters", but it does not follow that users of temporary or traditional methods are all "spacers". One possible way of distinguishing between the two categories has been suggested by John Kentner:

"The difference between "limitation" and "spacing" relates to the intention of the user rather than to the outcome of use. To base the distinction on outcome merits confusion. For example, a couple using contraception with the intention of putting an end to childbearing may, if the woman accidentally becomes pregnant due to the failure of the method, have achieved some spacing effect from the method but certainly not limitation. Similarly, a couple that has been using a method for spacing might find, when the method is discontinued in order to have another child, that the woman is unable to conceive. If her inability to conceive is method-related or due to the aging of one or both partners while the method was being used, it could be argued, on the basis of an outcome criterion, that the method had, in effect, "limited" the couple's fertility. Such confusion is avoided if the terms are used solely to refer to the reproductive goals the couple has in mind in deciding to use a particular method" 1/

1/ Kentner, John, Population in India's Development, USAID/INDIA Occasional Paper No. 1, January 1968, pp.66-67.

A feasible way of applying the above criterion could be the following:-

- i) Users of temporary or traditional methods who want additional children can be called "spacers";
- ii) "Limiters" include users of permanent methods as well as users of temporary or traditional methods who do not want additional children.

In order that this criterion can be applied, it would be necessary to establish linkage between two questions, one referring to method-specific current use of contraception (in section III) and the other referring to desire for additional children (in section II). Such linkage is possible at the tabulation stage, with the existing form of the questionnaire. The reliability of the information could be increased by adding one more question in section III: "You mentioned earlier that you want (or do not want) additional children. Since you are currently using a temporary/traditional method of contraception, do you agree that your intention is to achieve spacing (or limitation) ?

So far, the CPS reports on Bangladesh have not distributed contraceptive users among spacers and limiters. By following the suggestion given above, future reports can introduce this new feature which is already available in the CPS reports of several other countries.

Furthermore, if an additional question about the desired timing of the next child is introduced, as suggested in section V, a cross-tabulation of spacers with this new information will be useful.

VII. DISTRIBUTION OF CURRENTLY MARRIED WOMEN BY
AGE, PARITY AND CONTRACEPTIVE USE

For fertility-related information, the age of the currently married woman is obviously a very important factor. The reproductive span of thirtyfive years is divided into seven five-yearly age-groups, starting from 15-19 and going up to 45-49. In Bangladesh, since the traditional age at marriage was quite low, the contraceptive prevalence surveys also show one more age-group, namely "under 15". However, the number of currently married women in this age-group is very small, and will become negligible in the years to come. Therefore, it will be quite adequate in future if the CPS's confine themselves to ages between 15 and 49.

The term "parity" can be defined in two ways. First, it can refer to the number of children ever born to a woman. Secondly, it can refer to the number of living children. 1/ Both these items of information are collected in the contraceptive prevalence surveys. There are tables showing the distribution of currently married women by parity, that is, whether they gave birth to n children each (n = 0, 1, 2, 3,....) and also whether they have n living children each (again

1/ The term "parity" referring to the number of living children is used in Population Reports, Special Topics, Series M, Number 8, September-October 1985, the Johns Hopkins University, p. M-298.

The term "gross parity" referring to the number of children ever born, and "net parity" referring to the number of living children, is used in Zechariah, K.C., Anomaly of the Fertility Decline in Kerala, The World Bank, December 1983, pp. 75-79

n being equal to 0, 1, 2, 3,.....). From the view point of contraceptive use or desire for additional children, the number of living children is more relevant than the children ever born. Unless otherwise stated, we shall mean by parity the number of living children.

Having described the information which the CPS-reports already contain on this subject, we now want to suggest that these reports should present a two-way distribution of currently married women by age and parity. In order to keep the two-way table within manageable limits, the parity variable can take six values, namely, 0, 1, 2, 3, 4, 5 or more. In other words, we are suggesting a pooling of those women who have 5 or more living children each. The number of age-groups being seven, the total number of cells in the two-way table will be forty-two. However, not all the cells will be relevant in practice. For example, since women in the age-group 15-19 usually have 0 or 1 living child each, the remaining four cells in that row will be irrelevant.

The joint distribution of currently married women by age and parity will present a clearer picture of the fertility situation than the two one-way tables (showing age and parity separately) are doing in the existing reports. For example, the two-way table will show that if women are encouraged to move towards a norm of "not more than four living children", the age by which such a norm is completed can also be estimated.

Once the feasibility and usefulness of preparing a two-way table (as suggested above) is appreciated and recognised, we can think of going a step further and adding one more dimension. Since we are exploring linkages between fertility variables and contraceptive use, the additional dimension that will be particularly relevant for this purpose should refer to contraceptive use. There are two useful forms in which a three-way table showing age, parity and contraceptive use can be presented. The first one would be a traditional form, in which age and parity together are used as classificatory variables and entries refer to contraceptive use. The second form can be called non-traditional, because here the basic classification would separate contraceptors from non-contraceptors, and each of these categories would then be distributed by age and parity. We are encouraged to mention this possibility because the CPS-85 questionnaire can identify what we may call "regular users", "irregular users", and "non-users" of contraception based on the duration and timing of contraceptive use for the years 1983-1985. A distribution of each of these groups by age and parity would be useful.

In the foregoing discussion, we have primarily used the term "parity" as referring to the number of living children. However, the concept of parity as referring to the number of children ever born is also useful. The existing CPS-reports present data on contraceptive use by parity classes of currently married women defined in this manner. Apart from this traditional use (and those mentioned above where parity can be defined in either manner), there are other possibilities:

too. We shall give details of such new possibilities in sections XI and XIII.

VIII. CHECKING THE RELIABILITY OF DATA ON LIVE BIRTHS

Reports on CPS-79 and CPS-83 have utilized the data on live births by mother's age to calculate age-specific marital fertility rates. However, the report on CPS-81 says:

"Unfortunately the quality of the data obtained was not adequate to derive these rates". 1/

Although the other two CPS-reports did not take the same view about the quality of data on births during 1979 and 1983, it need not follow that they succeeded in obtaining complete and reliable information on this subject. In fact, the 1979-report warned the reader of the likelihood of under-reporting:

"Although an attempt was made to obtain accurate information on pregnancies during field operations, it is not certain whether these data are complete and accurate..... It is likely that, because of mis-reporting by the respondents, the fertility rates shown are underestimated to a certain degree". 2/

1/ Ministry of Health and Population Control, Bangladesh Contraceptive Prevalence Survey - 1981, Dhaka, April 1983 P.88.

2/ National Institute of Population Research and Training, Bangladesh Contraceptive Prevalence Survey - 1979, Dhaka, June 1981, pp. 82-83.

In the light of what we have learnt since the conducting of CPS-79, we can say that the value of total marital fertility rate (TMFR) given by that survey, namely 6.48, was a gross under-estimate, since the accurate value of TMFR for 1979 could not possibly be less than 7.8. Any value less than this would be inconsistent with the entire series of commonly accepted values. For example, TMFR for 1981 = $\frac{TFR}{C_m} = \frac{6.3}{0.84} = 7.5$, where C_m is the proportion of currently married women to all women in the broad age-group 15-49. All indications are that TMFR in 1979 was higher than TMFR in 1981, since TFR values fell more rapidly with time than C_m values.

If we want to avoid inconsistency between 1979 and the post-1981-census years, we have to be mentally prepared to accept a significant degree of under-estimation (nearly 17%) in the survey estimate of TMFR for 1979. A large part of it was probably due to omission of those live births in CPS-79 where the infants had died before the survey was conducted. Although it is difficult to allocate the share of such births in the ones which went unrecorded in the survey, we find support for our view from researches conducted in other countries where the infant mortality rate (IMR) is high (IMR in Bangladesh for 1979 was close to 135 per 1000 live births). The problem of under-counting of live births has been recognised in the 1983-CPS report also.

"Omissions of children who have died are selective. That is, they occur more in association with female than male children, more with dead than living children, and more with children who died shortly after birth than those who survived longer. Under-reporting of the number of children is also partly due to failure on the part of respondents to distinguish between what is a live birth and what is not. Often a live-born child who dies immediately after the birth is excluded in their report.

3/

If we adopt a similar procedure (as we did above for 1979), we find that the TMR value of 6.0, as given by CPS-83, was subject to nearly 16% of under-estimation. This was better than the corresponding figure for 1979, but still quite large. Much of it can be attributed to omission of those live births where the infants had died before the survey was conducted. Such omission can be described as "non-sampling error", which includes "inaccurate responses, interviewers' errors, and incorrect data processing". 4/ This type of error cannot be estimated from within the survey data itself, and has to be identified on the basis of comparison and consistency-check with other sources of information. Nevertheless, it would be helpful to the reader if the TMR estimate is accompanied with

3/ Mitra and Associates, Bangladesh Contraceptive Prevalence Surveys 1983, Final Report, Dhaka, July 1985, p.83.

4/ The Johns Hopkins University, Population Reports, Special Topics, Series M, Number 8, September-October 1985, p. M-318.

an estimate of "sampling error" which can be worked out from CPS-data. So far, the CPS-reports in Bangladesh have provided sampling error estimates of contraceptive prevalence rates, and they should have no difficulty in doing the same for TMR, as suggested by us. Even if the sampling error of TMR is found to be as high as 6 per cent of the TMR estimate, it would be in line with the values obtained for other countries by Anderson and Cleland. 5/ In that case, the upper limit of confidence interval could be nearly 12 per cent higher than the TMR estimate. Since the degree of under-estimation in the TMR estimate in 1983 is nearly 16%, we can say that both sampling and non-sampling errors contributed to this fairly large margin of error.

The reliability of data on live births as given by CPS can also be checked by calculating the crude birth rate (CBR). For example, if the age-specific marital fertility rates obtained from CPS-83 are multiplied by the number of currently married women in the country in 1983, and then summed up, the resulting CBR works out to be 36.3. This is 11.9 per cent less than the commonly accepted value of CBR for 1983 which is 41.2. Similar calculations for 1979 tell the same story. This provides further evidence that the live birth data of the CPS's are incomplete.

5/ Anderson, J. E., and J. G. Cleland, The World Fertility Survey and Contraceptive Prevalence Surveys: A comparison of Substantive Results, Studies in Family Planning, Vol.15, No.1, January-February 1984, pp.1-11.

A relevant question about the above discussion is: "Inclusion of the fertility section in the CPS-questionnaire is justified on the grounds that this will help in assessing whether increased contraceptive use is bringing about the anticipated decline in fertility. Now that the CPS gave low estimates of TMR and CBR, we are questioning their accuracy. How can we reconcile these two positions?"

A reply to this can be given as follows:-

- a) If we recommend the inclusion of any section in the questionnaire, it does not mean that we should accept the data obtained thereby without proper checking;
- b) Demographers have suggested several methods of checking the reliability of fertility data, and of making necessary adjustments. For example, the Panel on Bangladesh of the Committee on Population and Demography found that the fertility data of the Bangladesh Fertility Survey of 1975 (which gave TFR estimate of 6.337) needed substantial adjustment. The Panel concluded that:

"Total fertility rate has probably averaged somewhere in the range of 8.8 to 7.3 over the 15 years or so prior to 1975. There is no firm evidence of any significant trend in fertility up to 1975". 6/

6/ Committee on Population and Demography, Estimation of Recent Trends in Fertility and Mortality in Bangladesh, National Academy Press, Washington, D. C., 1981, p.82.

- c) A consistent time series of estimates should be worked out by utilizing all available data, including the data collected through CPS. Obtaining incomplete data through CPS is better than obtaining no data at all.
- d) Apart from the adjustments which demographers have traditionally made, some new possibilities of utilizing incomplete data on live births should also be explored. We shall do this in sections IX and XI.

IX. POSSIBILITIES OF UTILIZING INCOMPLETE DATA
ON LIVE BIRTHS

We have indicated in section VIII that the data on live births recorded through the contraceptive prevalence surveys of 1979 and 1983 were so incomplete that the total marital fertility rate (TMFR) calculated therefrom was an under-estimate to the extent of 17% and 16% respectively. The degree of incompleteness was probably worse for 1981 because the authors of that year's CPS-report considered the live birth-data unfit for publication. It should be recognised, however, that under-reporting of live birth-data is practically a universal problem (for developing countries). Although future contraceptive prevalence surveys will undoubtedly try to minimise or eliminate both sampling and non-sampling errors, possibilities of making the best possible use of incomplete data on live births should also be explored at the same time.

One possible use of live birth data could be to obtain an approximate idea of the underlying pattern of natural fertility. We have explained in an earlier monograph ^{1/} what such a pattern means and how it can be utilized to estimate the total fertility rate (TFR) and the crude birth rate (CBR). Since the model formulated for this purpose is a new one, we shall outline briefly what our suggestion implies in the present context.

1/ Agarwal, N. S., K. K. Agarwal, and S. P. Agarwal, A Modified Version of the Population Council's Fertility Model with special reference to Bangladesh, USAID/Bangladesh Research Monograph No.1, Dhaka, May 1987

The term "natural fertility" has been defined by the Committee on Population and Demography as "the age pattern of marital fertility observed in non-contraceptive populations where reproductive behavior is not affected by the number of children already born". 2/ In order that the CPS-data on live births can be used to obtain an idea of the underlying pattern of natural fertility, it is necessary to identify those births which occurred to non-contraceptors. That is why we suggested in section IV that the CPS-questionnaire should be modified so as to enable separate recording of births to those who were using or not using contraception immediately prior to those births.

Assuming that births occurring to non-contraceptors are separately identified, can we still use them for our model if the data are incomplete? The answer is "Yes" provided that the degree of incompleteness is not strongly concentrated for any particular age-groups of mothers. This is so because our model can be applied if age-specific natural fertility rates (ASNFR) are available in relative terms. Obviously, relative values of ASNFR can be worked out from incomplete data on live births (without serious error) if omissions are spread over all the age-groups. Furthermore, we have noticed, by using several patterns of natural fertility, that estimates of TFR and CBR, as given by our model, are not very sensitive to moderate variations in such patterns.

2/ Committee on Population and Demography, Panel on Bangladesh, Estimation of Recent Trends in Fertility and Mortality in Bangladesh, Report No.5, National Academy Press, Washington D.C., 1981, p.110

Although the CPS-reports published so far in Bangladesh do not give separate data on live births that occurred to non-contraceptors, we shall illustrate how the underlying natural fertility pattern can be worked out. For this purpose we take the data on live births reported in CPS-83 and assume (since there is no other choice) that all of them occurred to non-contraceptors. The computations involved are shown below (which are necessarily of an hypothetical nature):

Table 9.1

 Illustrating the derivation of natural fertility
 pattern for 1983

Age- Group	No. of live births (B)	No. of non- contraceptors (N)	Ratio B - N	Natural fertility pattern
15-19	394	1400	0.2814	0.81
20-24	457	1317	0.3470	1.00
25-29	370	1141	0.3243	0.93
30-34	197	723	0.2725	0.79
35-39	98	560	0.1750	0.50
40-44	35	467	0.0749	0.22
45-49	4	440	0.0091	0.03

Values in the last column are obtained by taking as unity the highest value of the ratio (B/N) from those given in the previous column. The highest ratio is for the age-group 20-24

which is similar to the finding of Coale and Trussell. 3/ In fact, the natural fertility pattern derived above can be viewed as a modified version of the Coale-Trussell Pattern. If we use these modified values as an input into our model, we obtain the following estimates for 1983:

$$\text{TFR} = 6.02$$

$$\text{CBR} = 42.62$$

The corresponding estimate for TMFR = 7.18, which shows that by adopting an indirect procedure involving the identification and use of the underlying natural fertility pattern, we are able to utilize even incomplete data on live births, as given in CPS-83, to obtain a realistic estimate of TMFR for 1983. It should be added that, if the live birth data for non-contraceptors were separately available, the procedure followed by us would be fully justified by our model, and that would give ^{you} greater confidence in the estimates obtained therefrom.

Another possibility of utilizing incomplete data on live births is discussed in section XI.

3/ Coale, A. J. and T. J. Trussell, Model Fertility Schedules: Variations in the Age structure of childbearing in Human Populations, Population Index, Vol. 40, 1974, pp. 195-228.

X. POSSIBILITIES OF UTILIZING DATA ON CURRENT PREGNANCIES

The CPS-reports in Bangladesh have hardly made any use of the data on current pregnancies recorded at the time of the survey. Not that the number of such cases was negligible or insignificant in any way. According to CPS-79, nearly 13.3 percent of currently married women in the broad age-group 15-49 were pregnant at the time of the survey. This percentage rose to 14.1 in CPS-81, but fell again to 13.2 in CPS-83.

Considering that a fairly high percentage of respondents are pregnant at the time of the survey, possibilities of utilizing this information should be explored. Two points are worth mentioning in this connection. First, it can be assumed that the percentage of under-reporting is smaller for these data, as compared to those on live births which occurred during the last twelve months. We are excluding those women who are not sure at the time of the survey that they are pregnant. Secondly, although current pregnancies by themselves do not constitute readily usable fertility data, a large majority of them can be assumed to materialise as live births within a period of six to seven months from the date of the survey. Therefore, it may be better to consider current pregnancies as potential live births, rather than ignore them completely.

If we consider using pregnancy data as potential live births, then issues similar to those mentioned in section IV come to the forefront. For one thing, we should be able to allocate pregnancies to those who were contraceptors or non-

contraceptors immediately prior to becoming pregnant. Secondly, we should have a distribution of pregnancies by age of the contraceptors and non-contraceptors separately. Thirdly, we should be aware that, while data on live births were obtained with a twelve-month reference period, no definite reference period can be specified for the live births which will result from the successful completion of the bulk of the current pregnancies.

The CPS-questionnaires used up to 1983 were not designed to record pregnancies separately for those who were contraceptors or non-contraceptors immediately prior to becoming pregnant. Such a possibility has been introduced to a certain extent in the 1985 questionnaire, but the practical outcome of that still remains to be seen. For the purpose of this monograph we have no choice but to assume that all the current pregnancies are allocated to non-contraceptors. We recognise that this assumption could be a source of significant error.

Regarding the age-distribution of currently pregnant women, the CPS-reports of 1981 and 1983 have retreated from what was shown in 1979. Whereas it is possible to obtain such age-distribution indirectly from the different tables given in CPS-79, no similar possibility exists in CPS-81 and CPS-83. 1/

1/ Mitra and Associates who prepared the CPS-report for 1983 have the requisite data on the computer from which the age distribution of pregnant respondents can be obtained as a special tabulation.

If we can get through or ignore the constraints mentioned above, we can think of utilizing the pregnancy data for obtaining the underlying natural fertility pattern. The procedure is similar to that shown in section IX in relation to incomplete data on live births. The fact that our model can use the natural fertility pattern expressed in relative terms takes care of the incompleteness of the data (to a large extent), provided that, in the case of pregnancies, the percentages that will successfully result in live births are almost similar for all the age-groups. Illustrative computations for 1979 are shown below:

Table 10.1

 Illustrating the derivation of natural
 fertility pattern for 1979

Age- Group	No. of Pregnancies (P)	No. of non- contraceptors (N)	Ratio P - N	Natural Fertility pattern
15-19	476	2421	0.1966	0.93
20-24	555	2635	0.2106	1.00
25-29	398	2333	0.1706	0.81
30-34	225	1531	0.1470	0.70
35-39	155	1386	0.1118	0.53
40-44	37	916	0.0404	0.19
45-49	18	1093	0.0148	0.07

Values in the last column are obtained by taking as unity
 the highest value of the ratio $\frac{P}{N}$ from those given in the

previous column. The highest ratio is again for the age-group 20-24 which is similar to the finding of Coale and Trussell. The natural fertility pattern derived above can be viewed as another modified version of the Coale-Trussell pattern. If we use these modified values as an input into our model, we obtain the following estimates for 1979:

$$\text{TFR} = 7.03$$

$$\text{CBR} = 48.53$$

The corresponding estimate for TMR is 8.31 which looks like an over-estimate by nearly six per cent. This should not discourage us, because no adjustments were made to neutralize the effect of so many constraints that we mentioned above. If the data on pregnancies for non-contraceptors were separately available, the above procedure is likely to give a more realistic estimate of TMR.

XI. DISTRIBUTION OF BIRTHS ACCORDING TO BIRTH ORDER

We have mentioned in section IX that incompleteness of live birth data obtained in the contraceptive prevalence surveys is a universal problem, and instead of finding excuses or explanations, possibilities of making the best possible use of incomplete data should be explored. One such possibility, involving the estimation and use of the underlying natural fertility pattern, has been described in section IX.

Another possibility of utilizing incomplete data on live births is the estimation of "birth order distribution". 1/ Since such a distribution is not yet available for Bangladesh, we shall explain how a beginning can be made on the basis of live birth data collected through contraceptive prevalence surveys.

To begin with, we should clarify the meaning of "birth order". When a woman gives birth to her first child, we call it a birth of the first order. When the same woman has her second child, we call it a birth of the second order, and so on. It need not be mentioned that only live births are taken into account.

During a year, if a total of N births take place, then N_1 can be called "births of the first order", N_2 can be called "births of the second order", and so on. Obviously, $\sum N_i = N$.

1/ For a theoretical discussion of this subject, see Pressat, R., A Workbook in Demography, Methuen and Co. Ltd., London, 1974, pp. 173-209.

In a traditional society, several women have seven or eight children each during their entire reproductive period. Therefore, some of the births that take place during any year are births of the seventh or eighth order.

When the family planning program makes headway, births of higher order become fewer and fewer.

Under Bangladesh conditions, it will be useful to know what percentages of births during one year are births of the i^{th} order, where i can take values 1, 2, 3, 4, 5 or more. In other words, we are interested in values of $100 \times \frac{N_i}{N}$. To reflect the progress in family planning already made, we are suggesting a pooling of the births of the fifth and higher orders.

The possibility of utilizing incomplete data on live births rests on two assumptions:

- i) that for every live birth recorded as occurring during the last twelve months, the birth order can be worked out, because the number of children ever born (that is parity) is available in the same questionnaire. This way of using "parity" is in addition to those described in section VII.
- ii) that the degree of incompleteness is spread over births of all orders, in the sense that values of the percentages $100 \times \frac{N_i}{N}$ calculated from incomplete data are fairly close to the actual percentages.

By the term "birth order distribution", we mean that values of the percentages $\frac{100 \times N_i}{N}$ are calculated for $i=1, 2, 3, 4, 5$ or more. The sum of these percentages is 100.

If birth order distributions are available from two CPS's conducted at an interval of five years, then the progress made by the family planning program can be assessed by comparing these two distributions. We should expect, for example, that $\frac{100 \times N_5}{N}$ will show a significant decrease, where N_5 means births of fifth and higher orders. In fact, a statistical test of significance can also be conducted. 2/

If the test for $\frac{100 \times N_5}{N}$ is found to be significant, then a similar test can be carried out for

$$\frac{100 \times N_4}{N} + \frac{100 \times N_5}{N}$$

If both these tests are found to be significant, then a similar test can be conducted for

$$\frac{100 \times N_3}{N} + \frac{100 \times N_4}{N} + \frac{100 \times N_5}{N}$$

We expect that the first two tests will show significance in the medium term, and that all the three tests will show significance in the long run.

2/ For a methodology of conducting such a test, see Daniel, W. N., Biostatistics: A Foundation for Analysis in the Health Services, John Wiley and Sons, New York, 1978, p. 188

XII. POSSIBILITIES OF UTILIZING DATA ON BREAST-FEEDING

Breast-feeding and the related index of postpartum infecundability [denoted by C_1] is a very important factor in the Population Council's fertility model. 1/ If a reliable estimate of C_1 be available, it will help in calculating the total natural fertility rate [TNFR] by using the formula:

$$TNFR = TF \times C_1$$

where TF is the total fecundity rate whose value is concentrated in a narrow range centered at 15.3. The TNFR and the age-specific natural fertility rates [ASNFR] are important inputs for a modified version of the Population Council's model. 2/

It is important, therefore, that breast-feeding data collected through the contraceptive prevalence surveys should be fully utilized. What we need most is the average duration of postpartum infecundability caused by breast-feeding or postpartum abstinence. If this average duration be denoted by i , then the index C_1 is given by the formula

$$C_1 = \frac{20}{18.5 + i}$$

Detailed justification for this formula is given by Bongaarts and Potter. 3/

1/ Bongaarts, J. and J. Stover, The Population Council Target-setting Model: A User's Manual, The Population Council, New York, 1986, p.8.

2/ Agarwal, N. S., K. K. Agarwal, and S. P. Agarwal, A Modified Version of the Population Council's Fertility Model, USAID/Bangladesh Research Monograph No.1, Dhaka, 1987, p.20.

3/ Bongaarts, J. and R. G. Potter, Fertility, Biology, and Behavior, An Analysis of the Proximate Determinants, Academic Press, New York, 1983, p.86

In Bangladesh, the contraceptive prevalence surveys of 1979 and 1981 did not collect any information on breast-feeding. The CPS-83 made a beginning by including breast-feeding and post amenorrhea as possible reasons for not using contraception. However, the tabulations only reveal that, out of 6,195 currently married women who were not using contraception, those who mentioned breast-feeding and post-amenorrhea as the main reason for non-use were 723 or 11.7 per cent. The percentage of these women among all currently married women (that is, users as well as non-users totalling 7662) was 9.4. We do not have the age-distribution of these (breast-feeding) women, nor the age-distribution (in months) of the babies who were being breast-fed. The non-availability of such tabulation comes in the way of our using "the current status method" for obtaining an estimate of the mean duration of breast-feeding, described by Jain and Bongeaerts. 4/ In the hope that the necessary information will be tabulated in the final report of CPS-85 (which has added three new questions on this subject), we give below the formula to be used for estimating the mean duration of breast-feeding (say b) from which it can be derived through various techniques:

$$b = \sum_{t=0}^m \frac{B(t)}{N(t)}$$

where t is the age of the child in completed months, $B(t)$ is the number of women who are breast-feeding a child of age t at the

4/ Jain A. K. and J. Bongeaerts, Breast-feeding: Patterns, Correlates, and Fertility Effects, *Studies in Family Planning*, Vol. 12, No.3, March 1981, pp.98-99.

time of the survey, $N(t)$ is the number of births that occurred between t and $(t+1)$ months before the survey, and m is the longest occurring breast-feeding duration [in months] recorded in the survey.

The above formula takes into account the age distribution [in months] of babies who are being breast-fed. Although for other factors the age-distribution of women is very important, researchers have discovered that this is not the case with breast-feeding. Bongaerts and Potter have suggested that the duration of postpartum infecundability can be assumed to be age-invariant which is another way of saying that b can be assumed to be age-invariant:

Although postpartum infecundability in reality rises slightly with age, the other components of birth intervals increase also, so that the fertility-inhibiting impact of postpartum infecundability changes very little with age. It is, therefore, simpler and more convenient to use the same equation for C_1 in all age groups and to assume the duration of postpartum infecundability to be age invariant.

5/

Data provided by the contraceptive prevalence surveys can help in checking whether this assumption generally holds good in Bangladesh.

5/ Bongaerts, J. and R. U. Potter, op.cit., pp.116-7

Regarding the relationship between b and i , several alternatives have been explored by researchers of which we give below two results:-

$$i = 1.753 \exp (0.1396 b - 0.001872 b^2)$$

where the terms i and b are already defined above, and R^2 for this fit is 0.96. This relationship was derived from the data obtained from many countries including Guatemala, Taiwan, Senegal, the Philippines, and the USA. 8/

The second result, derived from an eight-country study (including Bangladesh), has been summarized by the authors of that study (namely, Jain and Bongaerts) as follows:-

"On average, one month of breast-feeding adds about 0.3 months to the birth interval in Guyana, Jordan and Panama; 0.4 months in Bangladesh, Peru and Colombia; 0.5 months in Indonesia; and 0.7 months in Sri Lanka". 7/

Since this is a very important field of applied research, connected with natural fertility and population planning, the CPS's in Bangladesh can make a useful contribution by providing detailed tabulations of the data on breast-feeding.

8/ Bongaerts, J. and R. G. Potter, op. cit. p.25

7/ Jain, A.K. and J. Bongaerts, op. cit. p.98

XIII. POSSIBILITIES OF DERIVING INDIRECT INFORMATION
ABOUT STERILITY AND INDUCED ABORTION

Before describing how the contraceptive prevalence surveys can provide indirect information about sterility and induced abortion, we want to indicate the role of these two factors in the Population Council's fertility model.

First, we observe that an index of pathological sterility (C_p) has been defined by the formula:

$$C_p = \frac{7.63 - 0.11 \times s}{7.3}$$

where s denotes the percentage of currently married women who are childless at the end of their productive years. 1/

To apply this formula, we need the distribution of currently married women by age and children ever born. The CPS-reports do not so far give such a joint distribution, they only give two separate one-way distributions, namely by age, and by children ever born, respectively. We have mentioned in section VII that a joint distribution by age and parity will be useful. If such a distribution becomes available in future, then

$$\frac{\text{currently married women aged 45-49 for whom children ever born is zero}}{\text{Total currently married women}} \times 100$$

1/ Bongaerts, J. and J. Stover, op. cit., p.91.

and this will enable an estimation of C_p from the formula given above.

There is another possibility of obtaining indirect information about sterility from the CPS. For example, in CPS-83, out of all women who were not using contraception, as many as 12.1 per cent indicated as the main reason "the belief that they are unable to have children". An age-distribution of those who gave such a reply would be useful. This is not so far given in the CPS-report.

Next we consider induced abortion. In the Population Council's model, the index of induced abortion (C_a) is defined by the formula:

$$C_a = \frac{\text{TFR}}{\text{TFR} + 0.4 \times [1 + \text{CPR}] \times \text{Total induced abortion rate}}$$

where the total induced abortion rate is the average number of induced abortions per woman at the end of the reproductive period. 2/

This formula for C_a needs prior knowledge of overall CPR, but the formula for CPR also needs prior knowledge of C_a . To bypass the circularity problem, the overall CPR can be approximately calculated by assuming that $C_a(t) = C_a(0)$, where 0 refers to base year and t is the target year. This is justified because changes in CPR in Bangladesh are linked primarily with changes in TFR, and C_a has no major role.

2/ Bongaarts, J. and L. R. Potter, op. cit., p.86

In a traditional society like Bangladesh, the index C_b is difficult to measure or even estimate with confidence because induced abortion is believed to be negligible (which implies C_b to be close to one). Bongaarts and Potter (1983) assumed C_b to be one for Bangladesh for 1975. 3/ However, to be realistic, we can assume that some cases of induced abortion do take place, particularly in the younger age groups, although they often remain un-reported or under-reported.

In the CPS-questionnaire, the method - specific "ever use" question in the form of a table mentions induced abortion/M.R." as a separate method by itself, although other questions do not make such a provision. Accordingly, some information about "induced abortion/M.R" has been shown in the "ever use" tables. 4/ Although this information is not enough to give us "total induced abortion rate" to be used in the formula for C_b , the point to be stressed is that no possibility of obtaining useful information from the CPS should be ignored.

3/ Bongaarts, J. and R. G. Potter, op. cit, p.90

4/ CPS-83 report, op. cit., pp.140-144.

XIV. POSSIBILITIES OF OBTAINING MORE DETAILED
AND INTER-LINKED DISTRIBUTIONS

The main thrust of our suggestions, as given in sections IV to XIII, would be felt in regard to the tabulation plan which will have to accommodate many more two-way and three-way tables, in addition to the ones already included in CPS-reports. We have made it clear that our proposals imply new tables, not the cancellation of those already being prepared, which are very useful.

Although our suggestions go a long way towards utilizing the CPS-information effectively, they do not exhaust such possibilities. In fact, there are at least two more items of useful information which have not been adequately included in our suggestions. One of these additional items is on the "fertility" side, while the other relates to "contraceptive use".

On the fertility side, "son preference" is believed to be an important element in Bangladesh. Couples who have sons among their living children, are more likely to go in for contraceptive use, than those who have only daughters. To take care of this, we can introduce sex-composition of living children as an additional variable. To keep tabulation within manageable limits, we need at least three categories:

- no living son;
- one living son;
- two or more living sons.

The CPS-83 questionnaire provides for such information, although tables in the report do not go into details of this type.

Secondly, on the contraceptive-use-front, method-specific details are important for many tables. The CPS-83 report shows data for each method while giving current use rates, and these are accompanied by their standard errors and confidence limits. Where full details cannot be accommodated in a table, they show three groups, namely,

- Modern permanent methods;
- Modern temporary methods;
- Traditional methods.

Such variations from table to table are inevitable in practice. For example, if we take those who desire more children, it will be useful to distribute them into three sub-groups, namely,

- Users of modern temporary methods;
- Users of traditional methods;
- Non-users.

But when we want to analyze data on "unwanted pregnancies", we would like to have a method-wise distribution of recent users, in order to obtain estimates of use-effectiveness of individual methods. This is a good example where new results, not yet given in CPS-reports, can be obtained by means of detailed, inter-

linked distributions. We believe the concepts have been clarified, and the reader can think of many examples which we need not specifically mention.

XV. POSSIBILITIES OF MODIFYING THE SAMPLING CRITERIA

The principal respondents in the contraceptive prevalence surveys are ever-married women below fifty years of age. This implies two criteria of eligibility, namely,

- a) marital status as "ever-married;
- b) age below fifty.

We feel that possibilities of modifying these criteria should be considered. Of course, making no change in the criteria helps in maintaining continuity, which is a desirable feature for sample surveys. But modifications in sampling might give a larger number of meaningful respondents for key questions, without additional costs. So it is better to examine the pros and cons in a scientific manner. We first consider the criterion (a) listed above.

The main practical uses of contraceptive prevalence surveys (CPS) in Bangladesh are visualised in the 1983-report to be:

"to provide rapid feedback to improve family planning program performance by collecting information on contraceptive use that is of immediate value to family planning program implementors and policy makers. Usually, a CPS collects information to measure knowledge, use, and preference for methods; to identify women who may need services; to reveal obstacles to the use of services; and uncover opportunities to make services available. 1/

 1/ CP8-83 report, op. cit., p.1

Obviously, the major interest is in the present and the future rather than in the past. Although the questionnaire provides for information on:

- i) ever use;
- ii) current use, and
- iii) future use,

items [ii] and [iii] are relatively more important. What we want to emphasize is that the surveys have a forward-looking approach. With the growing awareness and knowledge of contraceptive methods, the initial questions as to how many have "heard" of such and such method and whether the respondents can "show" the method to the interviewer, can give way to other questions which are more appropriate now or will become so in future. Suggestions about such "new" questions are given in sections IV, V and VI. However, the point to be stressed here is that, simultaneously with the changes in the questionnaire, the criterion of "currently married" will become more relevant than "ever married".

According to CPS-83, nearly 10.1 per cent of the "ever-married" women were widows, divorcees or separated. Under Bangladesh conditions, questions about current or future use of contraception are not put to them. Therefore, in practice, these respondents are excluded when the most important forward-looking questions are asked. The net result is that the number of meaningful replies available for understanding key issues is automatically reduced by 10.1 per cent.

If the criterion of eligibility is changed in favor of "currently married", the survey would yield nearly 10 per cent additional replies, with no extra costs.

Why then was the "ever married" criterion adopted in the first place? In fact, this dates back to the World Fertility Survey of which the Bangladesh Fertility Survey of 1975 was a part. The main emphasis in that survey was "life time fertility" and a "complete maternity history". For these purposes, the "ever married" criterion was considered appropriate.

When the first CPS was organized in Bangladesh in 1979, the sampling procedure had strong links with what was done in the Fertility Survey of 1975:

"In the urban area, the units selected in the first two stages for the Fertility Survey were adopted for the CPS. But in the rural area, half of the units chosen were selected from the units included in the Fertility Survey, while the others were selected from among the remaining units". 2/

The CPS-79 questionnaire retained the "pregnancy history" approach as well as the criterion of "ever married" which was adopted in the Fertility Survey of 1975.

The CPS-81 questionnaire dropped the "pregnancy history" approach and provided instead for the number of children ever born and still living. However,

"The sample of the 1981 CPS was linked to both the Fertility Survey of 1975 and the CPS of 1979..... Information in the 1981 CPS, like the Fertility Survey of 1975 and the CPS of 1979, was collected from a nationally representative sample of ever-married women under 50 years of age." 3/

Scientifically speaking, the dropping of the "pregnancy history" approach should have led to a fresh examination in 1981 as to whether the "ever-married" criterion was still relevant. Probably, the close linkage of the sample with the earlier surveys overshadowed the organisers' thinking at that time, and the desirability or otherwise of choosing between the two criteria was not seriously considered.

The CPS-83 had the advantage of a new sampling frame based on the 1981 population census. This was considered more appropriate than the one linked to the Fertility Survey of 1975, the CPS-79 and the CPS-81. The "pregnancy history" approach was already dropped in CPS-81, and the new approach based on limited fertility data was continued in CPS-83 with some modifications. In this way, the linkage with the Fertility Survey of 1975 was

practically finished. Surprisingly, however, the "ever-married" criterion, which was initially adopted in the Fertility Survey '1975 in conjunction with the "pregnancy history" approach, was maintained in CPS-83 also.

The CPS-83 introduced two more samples in addition to the eligible woman sample, namely, the husband sample, and the couple sample. Obviously, these additional samples were restricted to those who were "currently married".

In this way, the CPS-83 had a mixture of the two criteria, the "ever-married" criterion for the eligible woman sample and the "currently married" criterion for the other two samples.

The CPS-85 had two samples, the eligible woman sample and the couple sample. Again a mixture of the two criteria was continued, the "ever-married" criterion for the eligible woman sample and the "currently married" criterion for the couple sample.

The review covering the period 1975-85 can be summed up by saying that the contraceptive prevalence surveys have slowly moved away from the "pregnancy history" approach and the sampling frame of the Fertility survey, and a partial retention of the "ever married" criterion is almost like a hangover of the past. Future CPS-surveys will find it more relevant and cost-effective to switch over to the "currently married" criterion. In any

case, the desirability of doing so should be examined in a scientific manner. It is worth mentioning in this connection that there is no existing fertility model in which "ever-married" women and the related "truncated marital fertility rates" appear as distinct variables. Because of this, full and systematic use cannot be made of the data and fertility rates which refer to "ever-married" women. No such problem exists for "currently married" women. This consideration provides strong support to the "currently married" criterion from a methodological viewpoint.

This completes our consideration of criterion [a] listed in the beginning of this section.

The criterion [b] is "age below fifty". Because of this, the eligible woman sample in CPS-83 had included 8353 ever married women in the age-group 15-49, as well as 170 ever-married women less than 15 years of age. From the viewpoint of contraception, the age-group below fifteen is obviously unimportant. With the rising age at marriage, the percentage share of this age-group among the total respondents has automatically gone down, from 4.2 per cent in 1975 to 2.0 per cent in 1983. In future, this age-group will become negligible.

Therefore, our suggestion is that the age criterion in future CPS's should preferably "be age below fifty but fifteen and over". However, when a delimitation of the age at both ends

is introduced, care will need to be taken that enumerators do not push some of the respondents who are "fifteen and over" to the category of "below fifteen", in the false hope that this might reduce their workload. In fact, our argument is that, by omitting currently married women below fifteen, we shall obtain about two per cent more of respondents "fifteen and over" at no extra cost, and this will make the sample more efficient.

The combined effect of modifying both the criteria in future CPS's can be expected to be a 12 per cent increase in the number of meaningful replies to key questions, without additional cost or time. This will fit into the whole scheme of bringing about significant improvements in these surveys, in all directions, and the contribution of increase in sampling efficiency will be significant in its own right.

XVI. CONCLUSION

The substantive part of this monograph starts with a review of what the contraceptive prevalence surveys (CPS) in Bangladesh have accomplished in the field of providing data on linkages between fertility variables and contraceptive use. It is largely a success story. What has contributed to this success is the fact that these surveys have introduced modifications in the questionnaire, tabulation scheme, as well as sampling, in the light of the experience gained and the general advancement of knowledge in all these fields with the passage of time.

The review has revealed, however, that the process of modification is a never-ending one. In our opinion, these surveys can continue giving better and better results if they are linked with the improvements which are continuously being made in the underlying fertility model. From this consideration, the present time is most appropriate to examine the role of the fertility-related component of these surveys, because important contributions connected with the fertility model have become available recently.

A basic assumption of the model-related contributions is that, although the non-users of contraceptive methods have the major share in the fertility experience of the country, some of the live births can also occur to those who use temporary or traditional methods of contraception. A clear understanding of

the relationship between fertility and contraceptive use is possible only if separate information is collected and tabulated on the fertility experience of contraceptive and non-contraceptors.

This seemingly simple signal from the model has far-reaching consequences for the survey data collection, tabulation and analysis. For one thing, the total fertility rate (TFR) no longer remains the most important fertility variable, because its components, namely the age-specific fertility rates (ASFR) are calculated without allocating births separately to contraceptive and non-contraceptors. Direct linkage between the non-contraceptors and the live births that occur to them yields estimates of age specific natural fertility rates (ASNFR), and the total natural fertility rate (TNFR), and these become more prominent than ASFR and TFR. Similarly, direct linkage between the contraceptive and the live births that occur to them yields estimates of use-effectiveness of methods and unplanned parenthood.

But how realistic is it to collect separate information on the fertility experience of contraceptive and non-contraceptors? The questionnaire for CPS-1985 has already introduced new questions to record the duration and timing of contraceptive use during 1983-1985. This can establish linkage between the live births that occurred during the last twelve months and the use or non-use of contraception during nine months prior to that.

This linkage can be strengthened by adding a probing question, but it is clear that the CPS has already moved in the direction of being able to collect separate data for users and non-users, which will bring the survey and the model conceptually closer to each other.

The main impact of collecting separate data on live births that occurred to contraceptors and non-contraceptors will be felt on tabulation. It will be almost like "turning the table". For example, the existing CPS-reports show contraceptive use by [cumulative] fertility variables like the number of children ever born or the number of living children. In these tables, the fertility variable is the classificatory variable, and entries in the tables show contraceptive use. In the new tables which are supposed to keep contraceptors and non-contraceptors separate, the contraceptive use becomes the classificatory variable, and entries in the tables show the number of live births (that is current fertility data). -

Apart from the necessity of allocating live births separately to contraceptors and non-contraceptors, we have raised another basic question which has been found to be relevant for this type of data collected through sample surveys in most developing countries. The question relates to incompleteness of the live birth data. Careful checks made by us reveal that the total marital fertility rate (TMFR) calculated on the basis of the CPS-data suffers from under-estimation to the extent of

nearly 16 per cent. Much of it can be attributed to omission of those live births where the infants had died before the survey was conducted. Such omission can be described as "non-sampling error" which includes inaccurate responses, interviewers' errors and incorrect data processing. This type of error cannot be estimated from within the survey data itself, and has to be identified on the basis of comparison and consistency check with other sources of information. We have suggested that the TFR estimate given in CPS-reports should be accompanied with an estimate of "sampling error" which can be worked out from the survey data. So far, the CPS-reports in Bangladesh have provided sampling error estimates of only the contraceptive prevalence rates.

Although future contraceptive prevalence surveys will undoubtedly try to minimize or eliminate both sampling and non-sampling errors, we have suggested that possibilities of making the best possible use of incomplete data on live births should also be explored at the same time. We have put forward two such possibilities:

- i) involving the estimation and use of the underlying natural fertility pattern, expressed in relative terms;
- ii) involving the estimation and use of the birth order distribution, expressed in terms of percentages.

Of course, any successful implementation of either of these possibilities rests upon certain assumptions and calls for additional tabulations not so far contained in CPS-reports. In the hope that such tabulations will be available in future, we have provided illustrations of the procedures by using hypothetical data. These are examples involving new tabulations as well as new methods of analysis.

Another important fertility variable is "desire for additional children". Those who do not want additional children but are still not using contraception are often referred to as constituting "unmet need for contraceptive services", although there are several other technical issues which need to be sorted out in this connection. We have indicated that the types of two-way or cross-tabulations needed for estimating unmet need are essentially different from what is now available in CPS-reports, namely "two separate one-way tables without proper linkage". We have made a strong plea against making an unscientific use of the available tables; rather the necessary cross-tabulations should be planned in advance.

The CPS-reports are so far unable to identify sub-categories of contraceptors commonly known as spacers and limiters, because this also calls for two-way or three-way tables which are not included in the tabulation plan currently in use. In fact, this is the main thrust of our suggestions which envisage a big increase in two-way and three-way tables, in addition to the

ones already included in CPS-reports. Our proposals imply new tables, not the cancellation of those already being prepared, which are very useful.

The fertility variables involved in the issues referred to above can be called "core variables", but we have not confined our attention only to these. Other fertility-related variables which are also relevant for studying linkages with contraceptive practices are the following:-

- current pregnancies
- breast-feeding and its duration
- sterility
- induced abortion.

For each of these variables, we have suggested possibilities of utilizing the information that can be obtained, either directly or indirectly, from the contraceptive prevalence surveys. With regard to current pregnancies, we have noted that the CPS-reports of 1981 and 1983 have retreated or gone backward in the sense that they do not give the age-distribution of currently pregnant women which was shown in CPS-78. Regarding breast-feeding, we have pointed out, in the light of researches made by several demographers, that the most important details needed for analysis include the age-distribution (in months) of babies who are being breast-fed (and not the age-distribution of mothers who are breast-feeding). This shows that fertility models and formulas

can help a lot by indicating in advance the type of detailed data which are needed as inputs to make the models and formulas fully operational.

Finally, we have examined whether the CPS's should continue to draw their main sample from "ever-married women below fifty years of age". Making no change in the sampling criteria helps in maintaining continuity, which is a desirable feature for sample surveys. However, if we modify the criteria in favor of "currently married women in the age-group 15-49", we can hope to get a 12 per cent increase in the number of meaningful replies to key questions, without additional cost or time, and this will make the sample more efficient. The various technical issues are scientifically examined before suggesting such a modification.

Throughout the monograph, we have adopted an innovative and penetrating approach so that the contraceptive prevalence surveys in future can achieve their full potential in terms of collecting and tabulating fertility-related information, closely inter-linked with that on contraceptive use. In the process of advancing in that direction, the objectives of CPS should be modified so as to include a specific mention of "fertility", because otherwise there is a partial inconsistency between the objectives on the one hand, and the CPS-questionnaires and reports, on the other.