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STATISTICAL EVALUATION OF CONTRACEPTIVE METHODS: USE-EFFECTIVENESS AND EXTENDED USE-EFFECTIVENESS

This document is intended to serve as an appendix to the article with the same title published by the authors in Demography, vol.5, No 2, 1968. It refers to a follow-up record from which the information required for classification by terminal status and duration of use or exposure can be obtained. It is designed for a retrospective study on women who have accepted contraceptive service from a family planning clinic. It is not appropriate for other types of study, such as those based on samples drawn from the community.

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APPENDIX I
INSTRUCTIONS FOR COMPLETING FOLLOW-UP RECORD
FOR STUDIES OF CONTRACEPTIVE EFFECTIVENESS

1. Read these instructions before filling out records.
2. Use a pencil or ballpoint pen and press firmly. Place numerals and check marks inside the appropriate boxes. Print other entries as legibly as possible.
3. Fill in items 1-10 from clinic record before making follow-up visit. (See paragraph 10 for instructions on follow-up visits).
4. Item 1. This refers to the two-digit code which the investigator may assign to the clinic. An investigator with more than one clinic in the study may wish to assign a different code to each clinic, or he may use one code for all.
5. Item 2. This refers to the number which must be assigned to each case. This is a four-digit number starting with 0001 and continuing in sequence. In studies with more than one clinic and one clinic code, the case numbers assigned may start with 0001 at one clinic, 1001 at another clinic, 2001, at a third clinic, etc.
6. Item 5. Fill in the day, month, and year in that order. For example: Date of first clinic visit is May 7, 1968. The entry is 0/7/0/5/6/8/ This instruction applies also to items 9, 14, 33, 36, and 37. For women for whom an "interim method" is prescribed, the date of first clinic visit is the date on which the method intended for continued use is prescribed.
7. Item 6. This refers to the method intended for continued use and not to an "interim method" prescribed for a short period.

8. Item 9. This is: (1) the date of the last clinic visit, or (2) the latest date on which supplies were purchased, or (3) the date that the first pregnancy following the first visit was confirmed, and the clinic record contained information as to whether contraception was being used and what method, if any, was being used, at the time the women became pregnant.
9. Item 10. This is a two-digit code showing the woman's contraceptive and pregnancy status at the time of the last contact with the clinic. The code is:

	<u>First digit</u>	<u>Second digit</u>
No contraception	0	0
Oral contraceptives	1	1
IUD left in place	2	2
IUD inserted, reinserted, left in place	-	2
Other method	3	3
IUD expelled	4	-
IUD removed	5	-
Sterilization	-	6
Suspected pregnancy	7	-
Confirmed pregnancy	8	-
No entry after admission	9	-
Usage not stated	-	9

Entries in the first column refer to: (1) contraceptive practice in the interval preceding the last contact at the clinic (item 9), or (2) a suspected pregnancy at the time of last clinic visit (item 9), or (3) the first confirmed pregnancy at any time between the first and last clinic visits (item 5 and 9). Entries in the second column refer: (1) to presumed usage after last contact, e.g., continued use of previous method or prescription of a new method or (2) to condition on contraceptive usage at time of suspected or confirmed pregnancy, or (3) a sterilizing operation for the woman or her husband.

Some examples of possible entries are:

Change from oral contraceptive to IUD	12
Sterilized, previously using condoms	36
IUD expelled and reinserted	42
IUD removed, oral contraceptive prescribed	51
Suspected pregnancy while using vaginal foam	73
Confirmed pregnancy, using no contraception	80
Confirmed pregnancy, no information on contraception	89
Oral prescribed at first visit, no further contact	91
Using no contraception, not pregnant	00

The following list includes all possible combinations of first and second digits: 00-03; 06, 10-13, 16, 19, 20-23, 26, 29, 30-33, 36, 37, 40-43, 46, 49, 50-53, 56, 59, 70-73, 79, 80-83, 89, 91-93.

10. Item 11. This refers to the interview situation: (1) interview completed, or (2) interview not completed, or (3) information obtained from clinic record. Reasons for not completing the interview should be specific, e.g., "not at home", or "no such address", or "moved, no new address", or "refused interview". The women may be asked by letter or telephone to return to the clinic for an interview but if they fail to return, they must be visited and interviewed in their homes. At least two or three home visits should be attempted before terminating the case. Women known to have moved out of the study area, as well as women who moved but remained in the study area, should be visited, if possible.

No field visit should be made when the information is obtained from the clinic record. The clinic records contain all of the information needed to complete this form under any one of the following situations: (1) the date of last contact shown in the clinic record (item 9) is later than the cutoff date for the study (item 37) as assigned by the investigator; (2) the woman became pregnant since the date of her first visit and the clinic record shows whether she was using contraception and what method, if any, she was using at the time she became pregnant; (3) either the woman or her husband had been sterilized.

11. Item 12. In the absence of positive information to the contrary, the woman's statement that she has been or is pregnant should be accepted.

12. Item 13. The sole purpose of this question is to focus on the first pregnancy in cases where more than one pregnancy has occurred following the acceptance of contraceptive service. No information after the first pregnancy should be entered.
13. Item 14. If date of LMP is not shown, it must be estimated on the basis of date of confinement or abortion and month of gestation. If the period of gestation is now known, allow 9 months for a birth and 3 months for a miscarriage or abortion. If the day cannot be determined enter month and year only.
14. Item 15. If the woman is not sure whether she used some method or none, assume that she did use a method. If she is not sure whether she used the first method or another method, assume that she used the first method.

Pregnancies thought by the woman to have resulted from an occasional omission of contraception, followed by resumption of use, should be classified as having occurred during use of the method, in question, rather than during nonuse.
15. Item 17. Month and year only are entered here. For example, the entry for a client who discontinued contraception in January, 1968, is 0/1/6/8. If a prescribed method was never used, the month and year of prescription is entered. Enter your best estimate if client is vague as to the month. This item does not apply to temporary interruptions of use, such as removal of an IUD followed by a reinsertion. These instructions also apply to items 19, 23, 26, and 31.
16. Item 18. In reference to the IUD, do not enter "removed"; enter the reason for removing the device. For other methods, entries such as "too much trouble", "forgot to take the pills", or even "don't know" are acceptable. This item does not apply to temporary interruptions of use, such as the expulsion or removal of an IUD, followed by reinsertion. These instructions apply also to items 20, 24, 27, and 32.
17. Item 33. This refers to LMP of women did not become pregnant. It may be left blank if it is not available from the clinic record and no field visit is made.

18. Item 36. The entries in this item may be: (1) the date of interview or (2) the date of last contact (item 9) if this is later than the cutoff date or if there had been pregnancy or a sterilizing operation on the clinic record.
19. Item 37. The entry in this item refers to the cutoff date for the study assigned by the investigator.
20. All other items in this record are self-explanatory.

APPENDIX II

INTERPRETATION OF RECORD FORM

1. This appendix illustrates the interpretation of the Follow-up Record described in appendix I in terms of four types of analysis: (1) use-effectiveness of all contraception, (2) use-effectiveness of the first method, (3) extended use-effectiveness of all contraception, and (4) extended use-effectiveness of the first method.
2. Table II/1 refers to studies with no cutoff date and table II/2, to studies with a cutoff date.
3. Both tables show, for each possible combination of entries on the follow-up form, the corresponding classification in terms of terminal status and the item in the record which contains the appropriate terminal date for each of the four types of analysis.
4. Duration of use or exposure is determined by subtracting the date of first clinic attendance from the terminal date. It is conventionally stated in terms of ordinal months at the time of leaving observation. Each ordinal month corresponds to the number of completed months plus one.
5. The computation is most conveniently, and with sufficient accuracy, carried out in terms of months and years, without regard to the day of the month of either the first clinic attendance or the termination. This procedure states the difference between these two points in time in whole months and, therefore, requires certain adjustments, depending on the type of terminal status.
6. If the terminal status is "discontinuation" (including planning pregnancy, no need for protection, and other), or if it is "change of method", and the terminal date is obtained from items 17, 19, 23, 26 or 31 of the follow-up record, the termination may be assumed to have occurred, on the average, in the middle of the month. The same assumption is applicable if the terminal status is "user" or "at risk" in a study without a cutoff date and the terminal date is obtained from item 36. On the basis of this assumption, individual cases classified as having n months of use may range from $n-1$ to $n+1$ months of use.

7. In order to allocate the correct number of cases to each ordinal month of use or exposure, one-half of the cases should be assigned to the n th month and one-half to the $(n+1)$ th month. A convenient way of doing this is to add one month to the number of months of use determined from monthly data for each woman whose first clinic attendance fell on the 1st-15th day of the month.
8. The situation is different if the terminal status is "user" or "at risk" in a study with a cutoff date at the end of a calendar month and the terminal date is obtained from item 37 of the follow-up record. In this situation the interval between first clinic attendance and termination of n months, as determined from monthly data, always corresponds to the $(n+1)$ th ordinal month and one month should, therefore be added in all cases.
9. The same argument applies if the terminal status is "pregnancy" and the terminal date is obtained from #14 of the follow-up record. Conception may be assumed to have occurred approximately two weeks after the onset of the last menstrual period, i.e., at the end of the calendar month and one month should be added in all cases.
10. If first clinic attendance and terminal date fall into the same calendar month, the interval, in terms of months, equals zero. Add one month in all cases to assign first ordinal month.
11. The following examples illustrate the computation of the ordinal month at termination.
12. Terminal status. Discontinuation--other
First clinic attendance: 7 November 1965
Terminal date: March 1967
Subtract year of first attendance from year of termination: $65 - 63 = 2$
Multiply by twelve: $2 \times 12 = 24$
Add month of termination(March): $24 + 3 = 27$
Subtract month of first attendance (November):
 $27 - 11 = 16$
Add one month because first clinic attendance was in first half of month: $16 + 1 = \underline{17}$ th ordinal month

13. Terminal status: Change of method

First clinic attendance: 20 April 1967

Terminal date: August 1967

Subtract year of first attendance from year of termination: $67 - 67 = 0$

Multiply by twelve: $0 \times 12 = 0$

Add month of termination (August): $0 + 8 = 8$

Subtract month of first attendance (April):
 $8 - 4 = 4$

Add nothing because first clinic attendance was in second half of month: $4 + 0 = \underline{4\text{th}}$ ordinal month

14. Terminal status: User

First clinic attendance: 11 June 1967

Cutoff date: 30 April 1968

$68 - 67 = 1 \times 12 = 12 + 4 = 16 - 6 = 10 + 1 = \underline{11\text{th}}$ ordinal month

15. Terminal status: Pregnancy

First clinic attendance: 27 October 1967

Terminal date: November 1968

$68 - 67 = 1 \times 12 = 12 + 11 = 23 - 10 = 13 + 1 = \underline{14\text{th}}$ ordinal month.

Table II/1 (Continued)

	Use-effectiveness				Extended use-effectiveness			
	All contraception		First Method		All contraception		First method	
	Terminal status	Terminal date	Terminal status	Terminal Date	Terminal status	Terminal date	Terminal status	Terminal date
#12: No #25: No #27: Other reason #28: Yes #30: Yes	User	#36	Change of method	#26	At risk	#36	Change of method	#26
#12: No #25: No #27: Other reason #28: Yes #30: No #32: Wanted to get pregnant	Planning pregnancy	#31	Change of method	#26	Planning pregnancy	#31	Change of method	#26
#12: No #25: No #27: Other reason #28: Yes #30: No #32: Separation, etc.	No need for protection	#31	Change of method	#26	No need for protection	#31	Change of method	#26
#12: No #25: No #27: Other reason #28: Yes #30: No #32: Other reason	Discontin - other	#31	Change of method	#26	At risk	#36	Change of method	#26
#12: No #25: No #27: Other reason #28: No	Discontin, - other	#26	Discontin, - other	#26	At risk	#36	At risk	#36

(6)

Table II/2

	Use-effectiveness				Extended use-effectiveness			
	All contraception		First method		All contraception		First method	
	Terminal status	Terminal date	Terminal status	Terminal date	Terminal status	Terminal date	Terminal status	Terminal date
#12: Yes #14: Before cutoff #15: Using first method	Pregnancy	#14	Pregnancy	#14	Pregnancy	#14	Pregnancy	#14
#12: Yes #14: Before cutoff #15: Using other method	Pregnancy	#14	Change of method	#17	Pregnancy	#14	Change of method	#17
#12: Yes #14: Before cutoff #15: Using no method #20: Wanted to get pregnant	Planning pregnancy	#19	Planning pregnancy	#19	Planning pregnancy	#19	Planning pregnancy	#19
#12: Yes #14: Before cutoff #15: Using no method #20: Other reason #21: Yes #24: Wanted to get pregnant	Planning pregnancy	#23	Change of method	#19	Planning pregnancy	#23	Change of method	#19
#12: Yes #14: Before cutoff #15: Using no method #20: Other reason #21: Yes #24: Other reason	Discontin - other	#23	Change of method	#19	Pregnancy	#14	Change of method	#19
#12: Yes #14: Before cutoff #15: No method #20: Other reason #21: No	Discontin - other	#19	Discontin. - other	#19	Pregnancy	#14	Pregnancy	#14
#12: Yes #14: After cutoff #15: Using first method	User	#37	User	#37	At risk	#37	At risk	#37

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Table II/2 (continued)

	Use-effectiveness				Extended use-effectiveness			
	All contraception		First method		All contraception		First method	
	Terminal status	Terminal date	Terminal status	Terminal date	Terminal status	Terminal date	Terminal status	Terminal date
#12: Yes #14: After cutoff #15: Using other method #17: Before cutoff	User	#37	Change of method	#17	At risk	#37	Change of method	#17
#12: Yes #14: After cutoff #15: Using other method #17: After cutoff	User	#37	User	#37	At risk	#37	At risk	#37
#12: Yes #14: After cutoff #15: Using no method #19: Before cutoff #20: Wanted to get pregnant	Planning pregnancy	#19	Planning pregnancy	#19	Planning pregnancy	#19	Planning pregnancy	#19
#12: Yes #14: After cutoff #15: Using no method #19: Before cutoff #20: Other reason #21: Yes #23: Before cutoff #24: Wanted to get pregnant	Planning pregnancy	#23	Change of method	#19	Planning pregnancy	#23	Change of method	#19
#12: Yes #14: After cutoff #15: Using no method #19: Before cutoff #20: Other reason #21: Yes #23: Before cutoff #24: Other reason	Discontin - other	#23	Change of method	#19	At risk	#37	Change of method	#19

Table II/2 (continued)

	Use-effectiveness				Extended use-effectiveness			
	All contraception		First method		All contraception		First method	
	Terminal status	Terminal date	Terminal status	Terminal date	Terminal status	Terminal date	Terminal status	Terminal date
#12: Yes #14: After cutoff #15: Using no method #19: Before cutoff #20: Other reason #21: Yes #23: After cutoff	User	#37	Change of method	#19	At risk	#37	Change of method	#19
#12: Yes #14: After cutoff #15: Using no method #19: Before cutoff #20: Other reason #21: No	Discontin. - other	#19	Discontin. - other	#19	At risk	#37	At risk	#37
#12: Yes #14: After cutoff #15: Using no method #19: After cutoff	User	#37	User	#37	At risk	#37	At risk	#37
#12: No #25: Yes	User	#37	User	#37	At risk	#37	At risk	#37
#12: No #25: No #26: Before cutoff #27: Wanted to get pregnant	Planning pregnancy	#26	Planning pregnancy	#26	Planning pregnancy	#26	Planning pregnancy	#26
#12: No #25: No #26: Before cutoff #27: Separation, etc.	No need for protection	#26	No need for protection	#26	No need for protection	#26	No need for protection	#26

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Table II/2 (continued)

	Use-effectiveness				Extended use-effectiveness			
	All contraception		First method		All contraception		First method	
	Terminal status	Terminal date	Terminal status	Terminal date	Terminal status	Terminal date	Terminal status	Terminal date
#12: No #25: No #26: Before cutoff #27: Other reason #28: Yes #30: Yes	User	#37	Change of method	#26	At risk	#37	Change of method	#26
#12: No #25: No #26: Before cutoff #27: Other reason #28: Yes #30: No #31: Before cutoff #32: Wanted to get pregnant	Planning pregnancy	#31	Change of method	#26	Planning pregnancy	#31	Change of method	#26
#12: No #25: No #26: Before cutoff #27: Other reason #28: Yes #30: No #31: Before cutoff #32: Separation, etc.	No need for protection	#31	Change of method	#26	No need for protection	#31	Change of method	#26
#12: No #25: No #26: Before cutoff #27: Other reason #28: Yes #30: No #31: Before cutoff #32: Other reason	Discontin. - other	#31	Change of method	#26	At risk	#37	Change of method	#26

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Table II/2 (continued)

	Use-effectiveness				Extended use-effectiveness			
	<u>All contraception</u>		<u>First method</u>		<u>All contraception</u>		<u>First Method</u>	
	Terminal Status	Terminal date	Terminal Status	Terminal date	Terminal Status	Terminal date	Terminal status	Terminal date
#12: No	User	#37	Change of	#26	At risk	#37	Change of	#26
#25: No			method				method	
#26: Before cutoff								
#27: Other reason								
#28: Yes								
#30: No								
#31: After cutoff								
#12: No	Discontin.	#26	Discontin.	#26	At risk	#37	At risk	#37
#25: No	- other		- other					
#26: Before cutoff								
#27: Other reason								
#28: No								
#12: No	User	#37	User	#37	At risk	#37	At risk	#37
#25: No								
#26: After cutoff								

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APPENDIX III

COMPUTATION OF GROSS AND NET CUMULATIVE RATES

1. This appendix presents illustrative examples of the computation of the gross cumulative rate of pregnancy and of the net cumulative rates of pregnancy and other types of terminations.

Table III/1 (paragraphs 2, 3)

2. Table III/1, Columns A-H, shows the distribution of all acceptors by terminal status and ordinal months of use at the time of leaving observation. The terminal statuses are defined in terms of the use-effectiveness of the first method.

3. Each ordinal month corresponds to the number of completed months plus one. For example, a woman entering a study in January of a given year and remaining a user at the cutoff date at the end of October of the same year has completed nine months of use and is, therefore, in her tenth ordinal month.

Table III/2 (paragraphs 4-16)

4. Table III/2 illustrates the computation of the gross cumulative pregnancy rate.

5. Column I. Enter ordinal months corresponding to the longest possible duration of use in the study.

6. Column J. Enter number of all acceptors leaving observation during each ordinal month from col. H of table III/1.

7. Column K. Enter number of pregnancies from each ordinal month in Col. C of Table III/1.

8. Column L. Enter the number of women leaving observation during each month in a status other than pregnancy, obtained by subtracting the number of pregnancies (col. K) from the number of acceptors (col. J.).

9. Column M. Enter the number of women entering each month, obtained by cumulating the numbers of acceptors (col. J), starting with the longest duration and cumulating up to the shortest duration. The number of women entering the first ordinal month must equal the total of col. J.

10. Column N. Enter one-half of the number of nonpregnant women from each line of col. L.

11. Column O. Enter the adjusted number of women entering each month, obtained by subtracting one-half the number of nonpregnant women (col. N) from the number entering each month (col. M). This adjustment is necessary because women who leave observation during a given ordinal month in a status other than pregnancy are not subject to the risk of pregnancy for a full month. The adjustment is based on the assumption that each of these women remains at risk to the middle of the month during which her period of use ends.

12. Column P. Enter the adjusted number of women continuing to the end of the month without becoming pregnant, obtained by subtracting the number of pregnancies each month (col. K) from the adjusted number of women entering each month (col. O).

13. Column Q. Enter the monthly rate of continuation per woman entering the current ordinal month, obtained by dividing the number of women continuing to the end of each month without becoming pregnant (col. P) by the adjusted number of women entering the same month (col. O). In this example, computations are not carried out beyond the twelfth month because the cumulative rates beyond that month would be based on fewer than 100 women, as may be seen in table III/2, and would, therefore, tend to be unstable.

14. Column R. Enter the cumulative rate of continuation to the end of each ordinal month per woman entering the first ordinal month, obtained by:
(1) entering in the first line the first monthly rate of continuation from col. Q and (2) multiplying each subsequent monthly rate of continuation (col. Q) by the entry on the preceding line of col. R (e.g., in table III/2, $.99663 \times .99548 = .99213$).

15. Column S. Enter the cumulative pregnancy rate to the end of each ordinal month per woman entering the first month, i.e., per acceptor, obtained by subtracting the cumulative rate of continuation (col. R) from unity (1.00000).

16. Gross cumulative pregnancy rates are usually shown per 100 women to one decimal place, for selected periods of use. In table III/2, the gross cumulative pregnancy rate at the end of the first year is 4.4 per 100 women.

Table III/3 (paragraphs 17-28)

17. Table III/3 illustrates the computation of the gross cumulative rate of all terminations combined. The cumulative rate of continuation, which is the next to the last step in this computation (col. CC), serves as the basis for the computation of net cumulative termination rates (table III/5).
18. Column T. Enter ordinal months corresponding to the longest possible duration of use.
19. Column U. Enter numbers of all acceptors leaving observation from col. H of table III/1.
20. Column V. Enter numbers of users from col. B of table III/1.
21. Column W. Enter the number of terminations each month, obtained by subtracting the number of users each month (col. V) from the number of acceptors leaving observation during each month (col. U).
22. Column X. Enter the number of women entering each ordinal month, obtained by cumulating the numbers of acceptors (col. U), starting with the longest duration and cumulating up to the shortest duration.
23. Column Y. Enter one-half of the number of users from each line of col. V.
24. Column Z. Enter the adjusted number of women entering each month, obtained by subtracting one-half of the users each month (col. Y) from the number of women entering each month (col. X). The adjustment is based on the assumption that users leaving observation during a given ordinal month are subject to the risk of termination to the middle of that month.
25. Column AA. Enter the adjusted number of women continuing as users to the end of the ordinal month, obtained by subtracting the number of terminations each month (col. W) from the adjusted number of women entering each month (col. Z).
26. Column BB. Enter the monthly rate of continuation per woman entering the current ordinal month, obtained by dividing the adjusted number of women continuing as users to the end of the ordinal month (col. AA) by the adjusted number of women entering each month (col. Z).

27. Column CC. Enter the cumulative rate of continuation to the end of each month per woman entering the first month, obtained by: (1) entering in the first line the first monthly rate of continuation from col. BB and (2) multiplying each subsequent monthly rate of continuation (col. BB) by the entry on the preceding line of col. CC (e.g., in table III/3, $.97338 \times .96145 = .93586$),
28. Column DD. Enter the cumulative rate of termination to the end of each ordinal month per woman, obtained by subtracting the cumulative rate of continuation (col. CC) from unity (1.00000).

Table III/4 (paragraphs 29-33)

29. Table III/4 illustrates the computation of net monthly termination rates per woman entering each month.
30. Column EE. Enter ordinal months.
31. Columns FF-JJ. Enter numbers of terminations from cols. C-G of Table III/1.
32. Column KK. Enter the adjusted number of women entering each ordinal month from col. Z of table III/3.
33. Columns LL-PP. Enter the monthly rate of termination per woman entering the current month, obtained by dividing the terminations in each ordinal month (cols. FF-JJ) by the adjusted number of women entering the corresponding month (col. KK).

Table III/5 (paragraphs 34-40)

34. Table III/5 illustrates the computation of net cumulative termination rates for each type of termination.
35. Column QQ. Enter ordinal months.
36. Column RR. Enter the cumulative rate of continuation at the beginning of each ordinal month, obtained by entering: (1) unity (1.00000) on the first line and (2) on each subsequent line, the cumulative continuation rate for the preceding month from col. CC of table III/3.
37. Columns SS-WW. Enter the monthly rates of termination per woman entering the first month, obtained by multiplying the monthly rates of continuation at the beginning of each month (col. RR) by the monthly rates of termination per woman entering each month (cols. LL-PP of table III/4).

38. Columns XX-BBB. Enter cumulative rates of termination to the end of each ordinal month per woman entering the first month, i.e., per acceptor, obtained by cumulating the monthly rates of termination from cols. SS-WW, starting with the shortest duration and cumulating down to the longest duration.

39. Net cumulative rates are usually published per 100 acceptors to one decimal place, for selected periods of use. In table III/5 termination rates at the end of the first year are:

Pregnancies	3,6
Planning pregnancy	3,1
Contraception not needed	1,5
Discontinuation -other	13,6
Change of method	12,3
<hr/>	
Total terminations	34,1

40. Subtraction of the rate of total terminations (34,1) from 100.0 yields a continuation rate of 65.9 per 100 acceptors.

Table III/1

NUMBERS OF CONTINUING USERS AND NONUSERS, BY TYPE OF TERMINATION, BY MONTHS OF USE

Ordinal month	Users	Pregnancies	Planning pregnancy	Protection not needed	Discontin. -- other	Change of method	All acceptors
<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>
1st	51	3	-	-	8	15	77
2nd	44	2	-	-	5	9	60
3rd	46	2	-	1	12	6	67
4th	43	-	-	-	4	6	53
5th	23	2	-	2	5	8	40
6th	27	1	1	-	4	5	38
7th	43	1	-	-	4	4	52
8th	38	-	-	1	6	2	47
9th	51	1	2	-	3	-	57
10th	35	-	2	-	5	1	43
11th	38	-	3	-	-	1	42
12th	34	2	-	1	2	2	41
13th	25	1	2	1	-	-	29
14th	29	-	-	1	-	2	32
15th	19	-	2	-	-	1	22
Total	546	15	12	7	58	62	700

Table III/2

GROSS CUMULATIVE PREGNANCY RATE PER WOMAN ENTERING FIRST MONTH

Ordinal month	All acceptors	Pregnancies	Nonpregnant acceptors	Number Entering month	0.5 x nonpregnant acceptors	Adjusted Number		Continuation rate per woman		Cumulative pregnancy rate per woman
						Entering month	Completing month without pregnancy	Monthly	Cumulative	
<u>I</u>	<u>J</u>	<u>K</u>	<u>L</u>	<u>M</u>	<u>N</u>	<u>O</u>	<u>P</u>	<u>Q</u>	<u>R</u>	<u>S</u>
1st	77	3	74	700	37.0	663.0	660.0	.99548	.99548	.00452
2nd	60	2	58	623	29.0	594.0	592.0	.99663	.99213	.00787
3rd	67	2	65	563	32.5	530.5	528.5	.99623	.98839	.01161
4th	53	-	53	496	26.5	469.5	469.5	1.00000	.98839	.01161
5th	40	2	38	443	19.0	424.0	422.0	.99528	.98372	.01628
6th	38	1	37	403	18.5	384.5	383.5	.99740	.98116	.01884
7th	52	1	51	365	25.5	339.5	338.5	.99705	.97827	.02173
8th	47	-	47	313	23.5	289.5	289.5	1.00000	.97827	.02173
9th	57	1	56	266	28.0	238.0	237.0	.99580	.97416	.02584
10th	43	-	43	209	21.5	187.5	187.5	1.00000	.97416	.02584
11th	42	-	42	166	21.0	145.0	145.0	1.00000	.97416	.02584
12th	41	2	39	124	19.5	104.5	102.5	.98086	.95551	.04449
13th	29	1	28	83	14.0	69.0	68.0			
14th	32	-	32	54	16.0	38.0	38.0			
15th	22	-	22	22	11.0	11.0	11.0			
Total	700	15	685	(4 830)	(342.5)	(4 487.5)	(4 472.5)		(11.76380)	(.23620)

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Table III/3

GROSS CUMULATIVE TERMINATION RATE PER WOMAN

Ordinal month	All acceptors	Users	Total terminations	Number entering month	0.5 x users	Adjustment number		Continuation rate per woman		Cumulative termination rate per woman
						Enter- ing month	Continuing to end of month	Monthly	Cumulative	
<u>T</u>	<u>U</u>	<u>V</u>	<u>W</u>	<u>X</u>	<u>Y</u>	<u>Z</u>	<u>AA</u>	<u>BB</u>	<u>CC</u>	<u>DD</u>
1st	77	51	26	700	25.5	674.5	648.5	.96145	.96145	.03855
2nd	60	44	16	623	22.0	601.0	585.0	.97338	.93586	.06414
3rd	67	46	21	563	23.0	540.0	519.0	.96111	.89946	.10054
4th	53	43	10	496	21.5	474.5	464.5	.97893	.88051	.11949
5th	40	23	17	443	11.5	431.5	414.5	.96060	.84582	.15418
6th	38	27	11	403	13.5	389.5	378.5	.97176	.82193	.17807
7th	52	43	9	365	21.5	343.5	334.5	.97380	.80040	.17960
8th	47	38	9	313	19.0	294.0	285.0	.96939	.77590	.22410
9th	57	51	6	266	25.5	240.5	234.5	.97505	.75654	.24346
10th	43	35	8	209	17.5	191.5	183.5	.95822	.72493	.27507
11th	42	38	4	166	19.0	147.0	143.0	.97279	.70520	.29480
12th	41	34	7	124	17.0	107.0	100.0	.93458	.65707	.34093
13th	29	25	4	83	12.5	70.5	66.5			
14th	32	29	3	54	14.5	39.5	36.5			
15th	22	19	3	22	9.5	12.5	9.5			
Total	700	546	154	(4 830)	(273.0)	(4 557.0)	(4 403.0)		(9.76707)	(2.23293)

Table III/4

NET MONTHLY TERMINATION RATES PER WOMAN ENTERING EACH MONTH, BY TYPE OF TERMINATION

Ordinal month	Preg-nancies	Plan. preg.	Protection not needed	Discontin. --other	Change of method	Adjusted number entering month	Monthly termination rates per woman entering month				
							Preg-nancies	Plan. preg.	Protection not needed	Discontin. --other	Change of method
<u>EE</u>	<u>FF</u>	<u>GG</u>	<u>HH</u>	<u>II</u>	<u>JJ</u>	<u>KK</u>	<u>LL</u>	<u>MM</u>	<u>NN</u>	<u>OO</u>	<u>PP</u>
1st	3	-	-	8	15	674.5	.00445	-	-	.01186	.02224
2nd	2	-	-	5	9	601.0	.00333	-	-	.00832	.01498
3rd	2	-	1	12	6	540.0	.00370	-	.00185	.02222	.01111
4th	-	-	-	4	6	474.5	-	-	-	.00843	.01264
5th	2	-	2	5	8	431.5	.00463	-	.00463	.01159	.01854
6th	1	1	-	4	5	389.5	.00257	.00257	-	.01027	.01284
7th	1	-	-	4	4	343.5	.00291	-	-	.01164	.01164
8th	-	-	1	6	2	294.0	-	-	.00340	.02041	.00680
9th	1	2	-	3	-	240.5	.00416	.00832	-	.01247	-
0th	-	2	-	5	1	191.5	-	.01044	-	.02611	.00522
1th	-	3	-	-	1	147.0	-	.02041	-	-	.00680
2th	2	-	1	2	2	107.0	.01869	-	.00934	.01869	.01869
3th	1	2	1	-	-	70.5	-	-	-	-	-
4th	-	-	1	-	2	39.5	-	-	-	-	-
5th	-	2	-	-	1	12.5	-	-	-	-	-

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Table III/5

Net Monthly and Cumulative Termination Rates per
Woman Entering First Month, by Type of Termination

Ordinal month	Cumulative contin. rate at beginning of month	Monthly termination rates per woman entering first month					Cumulative termination rates per per woman entering first month				
		Preg. nancies	Plan preg.	Protection not needed	Discontin- -other	Change of method	Preg. nancy	Plan preg.	Protection not needed	Discontin. -other	Change of method
<u>QQ</u>	<u>RR</u>	<u>SS</u>	<u>TT</u>	<u>UU</u>	<u>VV</u>	<u>WW</u>	<u>XX</u>	<u>YY</u>	<u>ZZ</u>	<u>AAA</u>	<u>BBB</u>
1st	1.00000	.00445	-	-	.01186	.02224	.00445	-	-	.01186	.02224
2nd	.96145	.00320	-	-	.00800	.01440	.00765	-	-	.01986	.03664
3rd	.93586	.00346	-	.00173	.02079	.01040	.01111	-	.00173	.04065	.04704
4th	.89946	-	-	-	.00758	.01137	.01111	-	.00173	.04823	.05841
5th	.88051	.00408	-	.00408	.01021	.01632	.01519	-	.00581	.05844	.7473
6th	.84582	.00217	.00217	-	.00869	.01086	.01736	.00217	.00581	.06713	.08559
7th	.82193	.00239	-	-	.00957	.00957	.01975	.00217	.00581	.07670	.09516
8th	.80040	-	-	.00272	.01634	.00544	.01975	.00217	.00853	.09304	.12060
9th	.77590	.00323	.00646	-	.00968	-	.02298	.00863	.00853	.10272	.10060
10th	.75654	-	.00790	-	.01975	.00395	.02298	.01653	.00853	.12247	.10455
11th	.72493	-	.01480	-	-	.00493	.02298	.03133	.00853	.12247	.10948
12th	.70520	.01318	-	.00659	.01318	.01318	.03616	.03133	.01512	.13565	.12266

APPENDIX IV

CONFIDENCE LIMITS FOR CUMULATIVE RATES

1. The statistical assessment of cumulative termination and continuation rates requires the estimation of confidence limits, usually on the basis of the standard error (SE).
2. An exact method of computing the standard error of a cumulative rate has been described by Potter.^{1/} The procedures set forth in the following paragraphs are much simpler to apply and yield reasonable approximations so long as the number of couples at risk does not drop below about 100.
3. For the estimation of the standard error of a cumulative pregnancy rate or other termination rate the following formula may be used:

$$SE = \sqrt{\frac{R^2(100 - R)}{100T}}$$

R = Cumulative termination rate per 100 women at the end of a given period.

T = Number of terminations of the same type during the same period.

4. The above formula is derived from the well-known computation of the standard error of a percentage, in which N is the total number of observations.

$$SE = \sqrt{\frac{R(100-R)}{N}}$$

In order to make allowance for the declining numbers of users entering each successive ordinal month of use, 100T/R has been substituted for N.

5. Lower and upper confidence limits (95 per cent) are estimated as follows:

$$LL = R - 2SE$$

$$UL = R + 2SE$$

6. Application of these formulae to the net cumulative pregnancy rate at the end of the twelfth month in the illustrative example is shown below:

$$R \quad (\text{from table III/5}) = 3.616$$

$$T \quad (\text{from table III/1}) = 14$$

$$\begin{aligned} SE &= \sqrt{\frac{3.616^2 \times (100 - 3.616)}{100 \times 14}} = \sqrt{\frac{13.075 \times 96.384}{1,400}} \\ &= \sqrt{\frac{1260.221}{1,400}} = \sqrt{0.900158} = 0.949 \end{aligned}$$

$$LL = 3.616 - 2 \times 0.949 = 3.616 - 1.898 = 1.718$$

$$UL = 3.616 + 2 \times 0.949 = 3.616 + 1.898 = 5.514$$

For purposes of presentation, the figures should be rounded to 1.7 and 5.5, respectively.

7. The SE of the continuation rate equals the SE of the corresponding total termination rate.

8. If a cumulative rate is low and is based on a very small number of terminations ($T = 10$ or less), the procedures described above generate estimates of both the lower and upper confidence limits which are substantially too low; the lower limit assumes a negative value if T is less than four.

9. In such cases the 95 per cent confidence limits may be estimated by multiplying the cumulative rate with the constants shown below for the corresponding value to T . These constants are derived from Mainland's table V, $n = 1000$.^{2/}

<u>T</u>	<u>LL</u>	<u>UL</u>
1	.025	5.60
2	.12	3.60
3	.21	2.90
4	.27	2.55
5	.32	2.32
6	.37	2.17
7	.40	2.06
8	.44	1.96
9	.46	1.89
10	.48	1.83

10. Application of this procedure to the net cumulative rate of discontinuation because of "no need for protection" at the end of the twelfth month in the illustrative example is shown below:

$$\begin{aligned} R &= 1.512 & T &= 5 \\ LL &= 1.512 \times 0.32 & &= 0.484 = 0.5 \\ UL &= 1.512 \times 2.32 & &= 3.508 = 3.5 \end{aligned}$$

11. If T and, therefore R for a particular category of terminations equal zero, a rough estimate of the upper confidence limit (97.5 per cent) can be obtained by means of the following formula in which T' represents all terminations and R', the total termination rate.^{3/}

$$UL = \frac{3.7 \times R'}{T'}$$

The lower confidence limit is, of course, zero.

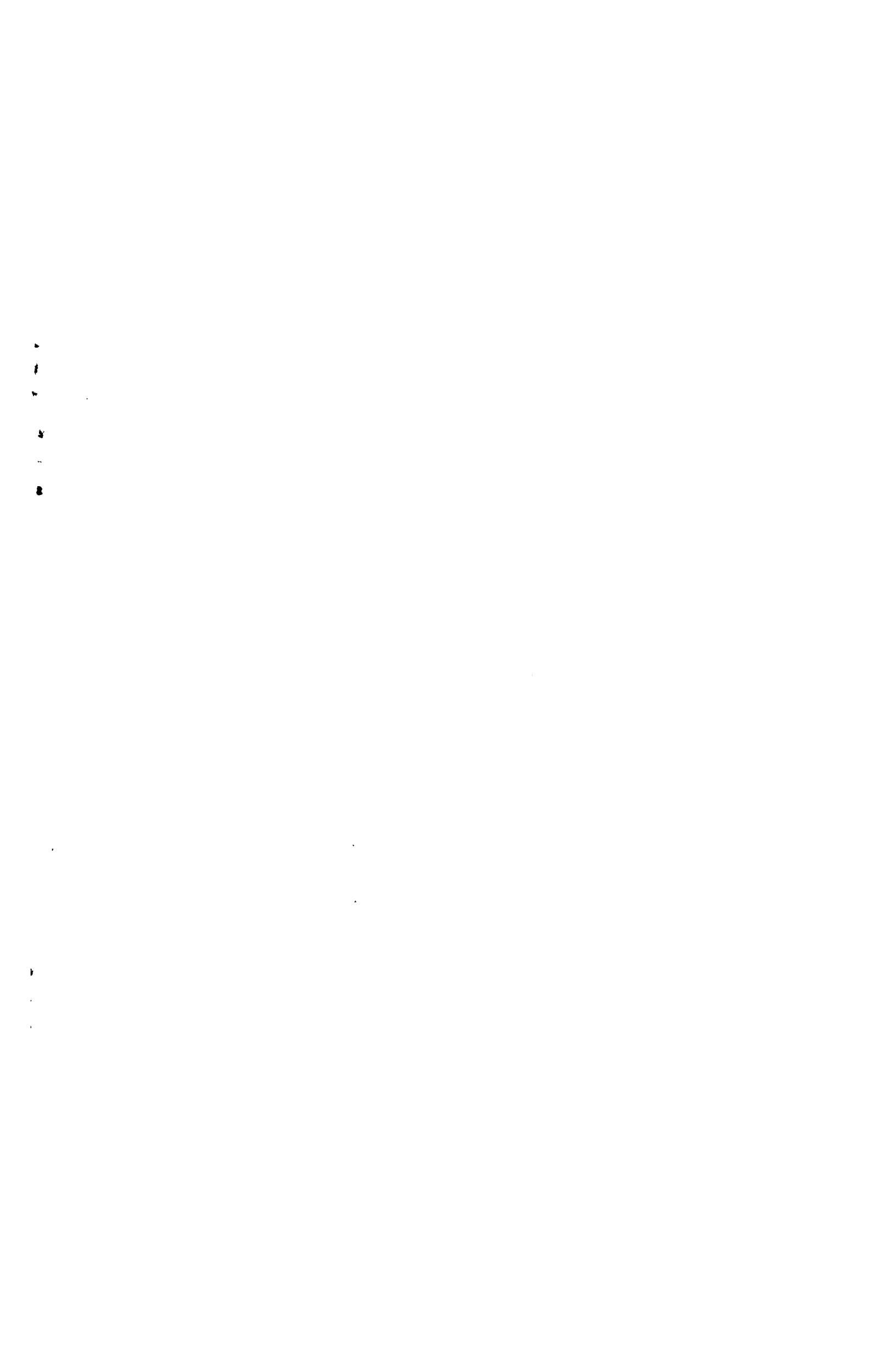
12. If, for example, there had been in the illustrative example no discontinuations for planning pregnancy prior to the 13th month, the corresponding termination rate at 12 months would be zero. The upper confidence limit would be 0.9 per 100 women, based on 144 terminations of all types and a total termination rate of 34.09 per 100 women.

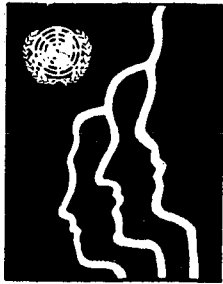
$$UL = \frac{3.7 \times 34.09}{144} = \frac{126.13}{144} = 0.88$$

13. If the proportion of LFU cases is more than negligible, say more than 5 per cent, the T's obtained from tabulations after the substitution of interviewed clients should be reduced by the same percentage prior to estimation of standard errors of confidence limits.

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1. Potter, R.G. "Application of life table technique to measurement of contraceptive effectiveness". Demography, 3:297-304, 1966. A fuller discussion of standard errors will appear in Family Planning in Taiwan: Tradition and Change by Ronald Freedman and John Y. Takeshita, to be published by the Princeton University Press in 1969.
2. Mainland, D.; Herrera, L.; and Sutcliffe, M.I. Tables for Use with Binomial Samples. Department of Medical Statistics, New York University College of Medicine, 1956.
3. Ibid. Table IX





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