

EFFECTIVENESS OF BIRTH CONTROL  
A STUDY OF CONTRACEPTIVE PRACTICE IN A SELECTED GROUP  
OF NEW YORK WOMEN<sup>1</sup>

REGINE K. STIX, M.D. AND FRANK W. NOTESTEIN

ONE of the questions which constantly arise in discussions of specific conditions which might affect the birth rate is this: To what extent does birth control really affect the pregnancy rates and ultimately the reproduction of various classes of the population? Students of population have indulged for many years in academic and rather futile speculation as to the potency of numerous influences that may be responsible for the declining birth rate and for differences in the birth rates among social groups. Obviously what are needed are factual studies of a scientific nature.

This paper presents the preliminary results of an inquiry which, it is hoped, will throw some light on the effectiveness of contraceptive practice for a selected group of people. It should be emphasized that the group which forms the subject of this inquiry is not a random sample of the population. It is comprised of married women who, for one reason or another, showed sufficient interest in the limitation of their families to attend a birth control clinic. Since most of them practiced some form of contraception at some time before they came to the clinic, the record of their experience affords an opportu-

<sup>1</sup>From the Division of Population Problems, Milbank Memorial Fund. Acknowledgments are gratefully made to Mrs. Margaret Sanger, director, Dr. Hannah M. Stone, medical director, and the staff of the Birth Control Clinical Research Bureau, New York City. Without their cooperation in permitting access to records and assisting in the routine of contact with patients, this study would have been impossible.

We are also greatly indebted to Professor Raymond Pearl, The Johns Hopkins University, for his method of computing pregnancy rates and for advice given us in the course of this study.

ity of studying *for this kind of group* the effectiveness of untutored efforts at birth control. The purpose of this paper is, therefore, to study the extent to which these women used contraceptive measures *before* receiving special instruction at a birth control clinic, and the effectiveness of such measures when used.

#### THE GROUP STUDIED

Our data are derived from the records of 714 women who came to the Birth Control Clinical Research Bureau from the Borough of the Bronx, New York City, in 1931, and were still living in that borough about a year and a half later.<sup>2</sup> The records were secured by a physician (Dr. Stix) who came as an accredited representative of the clinic to interview each woman in her home.

The fact that the women were patients of a birth control clinic sets them apart from the general population as a group especially interested in family limitation. On the whole, they appear to be more fertile than women who do not attend such a clinic. Although they had been married an average of less than ten years, they had had an average of 3.23 pregnancies and 2.26 live births in this time. They are not so fertile as the patients of the Baltimore Bureau for Contraceptive Advice<sup>3</sup> but they differ from both the Baltimore group and from the general population in many ways. Two-thirds of the women are Jewish, one-sixth Catholic, and only one-tenth Protestant. Almost all of them have lived in New York City since their marriage, but more than half are foreign-born and only one-sixteenth native-born of native parents. They represent for the most part middle and working class families whose annual

<sup>2</sup>The period of married life included in this study ends with each woman's first contact with the clinic.

<sup>3</sup>Pearl, Raymond: Statistical Report on the Fifth Year's Operation of the Bureau for Contraceptive Advice. Baltimore, 1933, p. 8.

incomes in 1929 ranged from \$400 to \$20,000, with a median income of \$2,300. In 1932 the median income had dropped to \$1,200, about a fifth of the families were destitute or supported by organized relief, and the highest income was less than \$6,000.

#### TYPES AND EXTENT OF CONTRACEPTIVE PRACTICE

There is further evidence of an expressed interest in birth control in the fact that before they attended the clinic 95 per cent of these women had made some effort to limit their families by the practice of what they believed to be contraception.<sup>4</sup> Forty per cent of the families in the group used contraceptives immediately after marriage and an additional 40 per cent started their use at some time before the beginning of the second pregnancy. Table 1 shows the frequency distribution of the contraceptive methods used, based on the number of times each was reported, regardless of the length of time any one method was practiced. There is an average of 1.8 methods for each couple, since some couples used two methods simultaneously and some used different methods at different times. The two methods most frequently used by the husband comprise about two-thirds of all those reported; the remaining methods were those for which the wife was responsible.

#### METHOD OF COMPUTING PREGNANCY RATES

In order to answer the question: How effective is contraception when and as practiced by this group of women?—it is necessary to compare their experience while using contra-

<sup>4</sup>The term *contraception* includes any method used by husband or wife, with the exceptions of voiding after coitus, regular use of cathartic or abortive drugs before the onset of each menstrual period, or lactation when regarded as safe period. The latter exception was made necessary because if lactation were regarded as a contraceptive only when so specified, the same behavior would have been classified both as contraception and no contraception.

ceptives with their experience while using none. This involves computing the rate at which they became pregnant for each type of experience. The general method first presented by Pearl<sup>5</sup> seems the one best suited to our purpose. Briefly, this method of computing rates consists in relating the number of pregnancies experienced by each woman to the time during which she could have become pregnant,

Table 1. Number of times each contraceptive method was reported.

Type of Contraceptive	Number	Per Cent
Total	1,290	100.0
Type unknown	2	0.2
Coitus interruptus	430	33.3
Douche	301	23.3
Condom	417	32.3
Vaginal suppository	77	6.0
Other (includes safe period, <sup>1</sup> pessary, cervical cap, jelly, sponge, intrauterine device, etc.)	63	4.9

<sup>1</sup>Only specific period within a given menstrual cycle. Lactation not included.

<sup>5</sup>Pearl, Raymond: *Contraception and Fertility in 2,000 Women*. *Human Biology*, Baltimore, Maryland, iv, No. 3, September 1932, p. 400 ff.

Pearl's rates are based on the assumption that: "A woman past puberty but not past the menopause is assumed to be exposed to the risk of becoming pregnant when she is more or less regularly indulging in sexual intercourse as in the married state . . . (and) . . . is not exposed to the risk of becoming pregnant during those periods of time when she is already pregnant." He therefore takes the total elapsed period of married life for each woman in his sample and deducts therefrom a fixed period for each pregnancy. The time remaining he classifies as "exposure to the risk of pregnancy." Adding together in one column the years exposed to pregnancy for all the women in his sample, and in the adjacent column the number of pregnancies experienced by all these women within the related time, he computes from the two totals a rate, which he designates as "pregnancies per person-year of exposure to risk of pregnancy." This rate multiplied by 100 gives his working rate, which is number of pregnancies per 100 person-years of exposure to the risk of pregnancy. We have used this method of computing rates rather than the later one devised by Professor Pearl, which expresses the pregnancy rate as the number of pregnancies per 100 estimated ovulations. (*The Lancet*, September 9, 1933, p. 607.) The frequency of ovulation in lactating women is open to question. Pearl's material is so classified that the proportion of lactation in his two groups of women may be assumed to be approximately the same. In our material, however, the proportion of time spent in lactation varies widely in the three classifications used and ovulation cannot therefore be introduced as a constant.

which he calls "exposure to the risk of pregnancy." This involves the exclusion of time pregnant from exposure. We have therefore deducted from the number of months which had elapsed since each woman's first marriage the actual number of months during which she was pregnant, and an additional month or fraction of a month for each pregnancy<sup>6</sup> to allow for time spent in the puerperium. We have also deducted all periods of separation or abstinence of more than two months' duration, including the period or periods between marriages, when the woman was married more than once. This eliminates the necessity of considering marriages separately.<sup>7</sup>

Since our ultimate goal is to compare the pregnancy rates

<sup>6</sup>Pregnancy in every case refers to all live births, stillbirths and premature deliveries excepting those abortions which were of less than two months' gestation, undiagnosed by a physician, not induced by instrumental interference and not followed by dilatation and curettage. These exceptions are largely the so-called drug abortions. In a few selected cases in which the woman was a known luetic or had previously shown a marked tendency to frequent spontaneous abortion, these questionable abortions were counted as pregnancies.

Ten months were deducted for each full term live or stillbirth; a month or part of a month in addition to known period of gestation for each abortion or premature birth. That is, if a woman reported an abortion at six weeks' gestation, we deducted two months for that pregnancy, if she reported an abortion at three months' gestation, we deducted four months for the pregnancy.

Since our unit of time is one month, all exposures of less than one month have been entered as one month; that is, if a woman bore a child nine months after marriage, one month of exposure was entered in the column related to this pregnancy in spite of the fact that she had obviously been exposed to the risk of pregnancy for less than one month before becoming pregnant.

<sup>7</sup>For purposes of analysis we must assume throughout this study that for this group of women sexual intercourse is confined to marital intercourse, unless we have specific information to the contrary.

Thirty-one women in the group were pregnant at marriage. Since we could not compute the length of time they were exposed to the risk of pregnancy before premarital conception and we did not know whether or not contraceptives were habitually used before these conceptions took place, their entire pregnancy-exposure record is excluded from Table 2.

For twenty-seven women we had a notation for one or more pregnancies that contraceptive practice had been interrupted in order to bring about pregnancy, but no record of the number of months of exposure without contraceptives

(continued on page 62)

exhibited by women while practicing contraception with those when no contraceptive was used, it was necessary to secure details relating to the use or non-use of contraceptives prior to each conception. On the basis of this information, we have classified each woman's exposure to the risk of pregnancy into three categories: first, time when contraception was practiced more or less habitually; second, time following habitual use of contraceptives, during which these practices were temporarily omitted (because the couple desired to have a child), and third, time during which the couple habitually used no contraceptive<sup>8</sup> (usually from marriage until habitual contraceptive practice was started,—after the termination of the first or a later pregnancy).

At first glance, it would appear that we should consolidate the second and third types of experience, since the sum of them is the total exposure during which no contraceptives were used, and compare the pregnancy rates for this total exposure with the rates when contraceptives were used. More careful consideration of the problem, however, makes it clear that this will not measure the true effectiveness of contraception as practiced, since the only type of experience in which lactation cannot be present is that of women who temporarily interrupt contraceptive practice in order to have a baby. To the extent that lactation or associated physiological factors may prevent conception, this experience is limited to

which elapsed before conception took place. Three months of exposure were allowed for each of these pregnancies. This represents the average number of months of non-contraceptive exposure in all similar known cases, computed by duration of marriage groups. As will be seen in Table 3, there is apparently no significant difference between duration of marriage groups in length of time required to produce conception when contraceptive practice is interrupted for that purpose.

<sup>8</sup>The non-contraceptive experience of twelve women who used contraceptives for a very brief time, and then stopped using them, is included in this category. This inclusion, however, does not change the rates significantly.

YEARS SINCE FIRST MARRIAGE	EXPOSURE AND PREGNANCIES					
	Contraceptives Used (1)		No Contraceptive Used (2)			
			Temporarily (a)		Habitually (b)	
	Exposure (Years)	No. of Preg.	Exposure (Years)	No. of Preg.	Exposure (Years)	No. of Preg.
Column No.	1	2	3	4	5	6
All first pregnancies	292.4	116	31.3	139	150.9	410
Second and succeeding pregnancies (total)	3,570.0	998	74.8	243	259.3	264
0- 4	1,342.8	429	38.8	125	149.6	173
5- 9	1,342.2	373	29.8	104	63.5	61
10-14	657.5	160	2.0	11	25.9	17
15-19	194.3	32	4.2	3	14.6	10
20-29	33.3	4	—	—	5.7	3

Table 2. Number of years exposed to risk of pregnancy and number of pregnancies experienced (1) while using contraceptives, (2a) while temporarily omitting the use of contraceptives, and (2b) while habitually using no contraceptive.

time during which conditions are peculiarly favorable for conception. It is important, therefore, that in measuring the effectiveness of contraceptive practice, we limit ourselves to comparing the pregnancy rates exhibited by women while using contraceptives with those exhibited by women who habitually used none.

A similar difficulty arises if we do not separate exposure to the risk of first pregnancy from exposure to the risk of succeeding pregnancies. Lactation cannot be present before the first pregnancy, but may be a factor in exposure to risk of all succeeding pregnancies, both for women habitually using contraceptives and for those using none. In the case of second and succeeding pregnancies exposure was divided into five dura-

tion-of-marriage groups, since we know that pregnancy rates decline after the first years of married life, and we also know that exposure while using contraceptives and exposure while using none are differently distributed throughout the married life of these women.<sup>9</sup>

Our final classification permits us to compare experience when contraceptives were used with each type of non-contraceptive experience for similar periods of married life, and for first pregnancies as well as for second and succeeding pregnancies. Table 2 gives the total exposure falling into each category, designated as person-years exposure to the risk of pregnancy, and the number of pregnancies experienced during this exposure. Table 3 gives the pregnancy rates computed from these data as the number of pregnancies per one hundred person-years exposure to the risk of pregnancy.

#### EFFECTIVENESS OF CONTRACEPTIVE PRACTICE

For first pregnancies the rate for each group of women who did not practice contraception is significantly higher than that for women who practiced it. The rate computed for experience during habitual non-practice is seven times that observed when contraceptives were used. Further, the rate at which women become pregnant with the first child seems to be significantly higher after they have used contraceptives and interrupted that practice in order to become pregnant than is the rate for women who have never used contraceptives. Old wives maintain that women who have used contraceptives conceive less easily than those who have never used them. Our figures not only disprove this point, but seem to indicate the exact reverse of it. We are at a loss to explain this, unless the difference, which in actual time does not exceed two months for each pregnancy, is attributable to the fact that in

<sup>9</sup>This was not done for first pregnancies because less than 1 per cent of first pregnancies occurred after the fifth year of married life.



YEARS SINCE FIRST MARRIAGE	PREGNANCIES PER 100 PERSON-YEARS EXPOSURE		
	Contraceptives Used (1)	No Contraceptive Used (2)	
		Temporarily (a)	Habitually (b)
Column No.	1	2	3
All first pregnancies	40	444	272
Second and succeeding pregnancies (total)	28	325	102
0- 4	32	322	116
5- 9	28	349	96
10-14	24	— <sup>1</sup>	66
15-19	16	— <sup>1</sup>	68
20-20	12	— <sup>1</sup>	53

<sup>1</sup>Less than five years exposure.

Table 3. Comparison of pregnancy rate per 100 person-years exposure to risk of pregnancy for women, (1) while using contraceptives, (2a) while temporarily omitting use of contraceptives, and (2b) while habitually using no contraceptive. (Based on Table 2.)

many marriages a certain amount of time elapses before complete entry takes place. For women who have never used contraceptives, this time is included in exposure while using no contraceptive; but for women who interrupt contraceptive practice it is included in exposure while using contraceptives.

For second and later pregnancies there is only about half the difference between the rate at which women become pregnant while using contraceptives and the rate while habitually using none, that there is between these two types of experience for first pregnancies. Lactation may be present in both these categories at any time after the first pregnancy, but it is present in much higher proportion in the experience of those women who never practiced contraception than in the experience of those women who always used contraceptives. After the first pregnancy, absence of lactation during the exposure of those women who cease using contraceptives in order to be-

come pregnant appears to be sufficient reason for their relatively high pregnancy rate as compared with that of women habitually using no contraceptive. These differences hold for all duration-of-marriage groups. Relative differences change slightly in the later duration groups, but because of the small numbers involved, these changes cannot be regarded as significant. We can therefore conclude that in all durations of married life and for first, as well as for later pregnancies, the pregnancy rate of this group of women is significantly reduced by their use of contraceptives.

Table 3 has answered our question concerning the effectiveness of contraception in terms of reduction of the rate at which women become pregnant under given conditions relating to order of birth and duration of married life. We now need a generalized and more concrete form with which to indicate the effectiveness of contraception. This is given in Table 4, which compares the number of pregnancies actually experienced, during the time when contraception was practiced, with those which would have occurred during an equal length of exposure to pregnancy had no contraceptives been used.

We have assumed for this purpose that if the women habitually using contraceptives had never used any, they would have become pregnant at the same rate as those women who actually never did use them. On the basis of this assumption we have applied the pregnancy rate for women habitually using no contraceptive to the number of person-years exposure to the risk of pregnancy experienced by women while using contraceptives. Our results indicate that the number of pregnancies actually experienced is only about one-fourth the number of those expected.

It must be emphasized that we are comparing the number of pregnancies occurring in equal units of time during which conception is possible and not during equal units of married

YEARS SINCE FIRST MARRIAGE	PREGNANCIES PER 100 YEARS EXPOSURE CONTRA- CEPTIVES NEVER USED (Col. 3, Table 3)	EXPOSURE TO RISK (YEARS) CONTRA- CEPTIVES USED (Col. 1, Table 2)	EXPECTED NUMBER OF PREGNANCIES IF NO CON- TRACEPTIVE WERE USED (Col. 1 x Col. 2)	OBSERVED NUMBER OF PREGNANCIES WHEN CON- TRACEPTIVES WERE USED (Col. 2, Table 2)
			( 100 )	
First pregnancies	272	292.4	795	116
Second and suc- ceeding preg- nancies				
0- 4	116	1,342.8	1,558	429
5- 9	96	1,342.2	1,289	373
10-14	66	657.5	434	160
15-19	68	194.3	132	32
20-29	53	33.3	18	4
TOTAL	—	—	4,226	1,114
Ratio of observed to expected preg- nancies	$1,114 \div 4,226 = 26.4$ per cent			

Table 4. Ratio of observed to expected number of pregnancies for women habitually using contraceptives, had no contraceptive been used.

life. Since it is impossible for a woman to conceive when she is already pregnant, contraception by its very success in preventing pregnancy increases the time during any woman's life when there is a chance for it to fail. Therefore, we cannot conclude from these results that women who habitually use contraceptives throughout their married life would average one-fourth as many pregnancies as those who did not practice contraception. These data simply show that for a given exposure to the risk of conception about one-fourth as many pregnancies were observed when contraceptives were used as would be expected if no contraceptives had been used.

In this limited sense contraception was about 75 per cent

effective in preventing pregnancy. However, since these women as a group exhibited a high fertility, and an expressed interest in limiting their families, they may have practiced contraception with unusual diligence. Such diligence would tend to make the ratio of effectiveness higher than we should expect to find in the general population.

#### SUMMARY

A study of the pre-clinic contraceptive practices of a group composed largely of foreign-born Jewish women who came to a birth control clinic in New York City in 1931 leads to the following conclusions:

(1) More than 95 per cent of these women had practiced some form of contraception before coming to the clinic. Forty per cent of them used contraceptives immediately after marriage, and an additional 40 per cent started using them before their second pregnancy.

(2) Contraception of all types *when* and *as* practiced by these women significantly reduced their pregnancy rate before they came to a birth control clinic for special training in the use of approved contraceptive devices. Over a given period of exposure to the risk of conception such contraceptive practice was about 75 per cent effective in preventing pregnancy. The success of such practice for this selected group of overtly fertile women, who are especially interested in limiting their families, may be greater than we should expect to find in a similar group of women who did not eventually attend a birth control clinic.