The District of Columbia Department of Public Health's medically indigent population provides a unique source for research in family planning

Use of Matched Pairs in Evaluation of a Birth Control Program

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THE birth control program of the District of Columbia Department of Public Health began in April 1964 at the municipal hospital and six outlying maternal and child health clinics. Because of limited facilities, the program was directed primarily at medically indigent women who had deliveries within the past 3 months at the D.C. General Hospital and a small number of women who were referred by the department of welfare. When additional clinics became available, the program was expanded to include all women who had a previous delivery.

The study reported here concerns the population which used D.C. General Hospital for deliveries from November 1964 through December 1965. During this period, the birth control program was essentially a post partum program. At the time of discharge after delivery, a birth control film was presented, followed by demonstration and discussion of the various types of contraception. For the interim between delivery and post partum examination, a 2-months' supply of foam was distributed. Mothers were told that birth control service would be available when they returned for their post partum examination, and they were given an appointment before they left the hospital.

Two months after they registered in a birth control clinic, mothers were given a return appointment to the clinic, at which time they received identification cards to pick up supplies for 1 year, renewable after a physical examination. No charge was made for supplies or service, and mothers were given 2 to 3 months' supply per pickup visit. A choice of six methods were offered—pill, foam, diaphragm, rhythm, jelly, and IUD; the IUD, however, was not offered by the program until November 1965. The pills were by far the most popular method selected during the period studied.

The Study

This study was made possible by a grant from the Population Council, Inc., for evaluation of a post partum birth control program. Its three main objectives were (*a*) to measure the reduction in pregnancies as a result of participation in the birth control program, (*b*) to determine whether certain demographic characteristics may be related to differential participation in the program, and (*c*) to measure the "use-effectiveness" or continuation rate of the program.

The study population offers unique opportunities for research in family planning. Whereas other studies in family planning in the United States were concerned with white, mid-

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dle-class, and married couples living together, the respondents in this study are low-income, urban Negro women with high indices of social and personal disorganization.

Family instability results not only in illegitimate births among the very young girls, but a repeated history of such births is a common occurrence among a large proportion of these women in the reproductive ages. Data collected from the live birth certificates for D.C. General Hospital deliveries in 1965 showed that 52 percent of the mothers of live-born infants were unmarried, and among first births this proportion was 76 percent.

One-third of the women who delivered live infants at the municipal hospital had had no prenatal care, despite a concerted and well-established program of maternal and child health in the city. This population is characterized by excess fertility resulting from little or no practice of family planning. There is a wide discrepancy between the number of children they would like to have and the number of children they have already borne. Mothers in this study reported that 60 percent of their pregnancies which resulted in live births had been unwanted.

In designing the study, we were faced with the problem of how much the long term fertility decline in the United States was related to the secular trend of the birth rate for our specific population. Rather than a decline, was this population maintaining a stable but high level of fertility? More importantly, how much effect had the recent introduction of birth control pills on the birth rate over time in this population? We felt that the matched-pair design would give us the data needed to answer two of our three study objectives: to measure the reduction in pregnancies and to determine which demographic factors, if any, were related to differential participation in the birth control program.

The study universe consisted of fecund Negro women who had a live-born infant at D.C. General Hospital between November 1964 through December 1965. Excluded from the study were about 130 women who delivered a dead fetus at this hospital during the same period. Also excluded were 640 cases of abortion, because of the difficulty of incorporating these cases into the sampling frame since information on their characteristics was not readily available.

Approximately 6,000 live-birth deliveries were listed in certificate number order and a systematic 20 percent sample was drawn. Among about 1,200 mothers in the 20 percent sample, 680 who had registered in the birth control program within 4 months after the month of delivery were identified as members of the study group.

Each member of the study group was matched by a nonparticipant who also delivered at the same hospital during the same month, and was within the same age, parity, and marital status categories. (Marital status was inferred from the legitimacy item on the certificate.) The matched nonparticipants comprised the control group.

Representativeness of the study group was checked by comparing the sample with the total birth control registrants in the program from January 1965 through February 1966 in terms of age and live-birth order and was found to be fairly representative. On the other hand, because they were matched controls the control group members were not representative of all the nonwhite mothers who had a live-birth delivery at D.C. General Hospital during the same time as the study group members and who were

Table 1. Percent registered in birth control program among nonwhite mothers who had a live-birth delivery at D.C. General Hospital, by age of mother and live-birth order, November 1964 through December 1965

Age of mother (years)	Total	Live-birth order					
		1	2	3	4	5	6+
Total	56.0	57.4	60.0	62.6	54.0	53.5	46.4
19 and under	60.4	58.4	68.5	64.1	----	----	----
20–24	57.5	54.4	50.5	64.4	58.2	62.1	59.1
25–29	51.3	----	66.7	58.8	56.4	50.0	41.6
30 and over	50.0	----	----	57.9	55.0	51.9	47.5

Table 2. Selected demographic characteristics of study and control groups

Demographic characteristics	Study group (N=161)	Control group (N=161)
STATE OF BIRTH		
District of Columbia	88	80
Virginia	14	15
Maryland	9	8
Lower South Atlantic (Florida, Georgia, North Carolina, South Carolina)	45	49
Other southern States	2	3
Other	2	5
Not stated	1	1
FARM RESIDENCE (YEARS)		
None[1]	119	121
1	1	3
2–5	10	5
6–10	8	6
11–15	5	7
More than 15	17	16
Not stated	1	3
RELIGION		
Baptist	91	104
Methodist	13	11
Catholic	27	24
Holiness	10	11
Other	18	6
None	1	4
Not stated	1	1

[1] Includes a small number of women who lived on a farm less than 6 months.

nonparticipants in the program. On the average, the control members were somewhat younger in age and lower in parity than nonparticipants in general.

Questionnaire interviews were conducted in private homes at least 18 months after the study and control group members delivered at the municipal hospital. At first, approximately 20 public health nurses were trained for interviewing on an overtime basis. Subsequently, health aides and social service workers were also trained and used as interviewers.

The overall participation rate in the birth control program for the period studied was 56 percent. In contrast to the usual relationship of increased use of birth control with increase in age and parity, among this population registration in the program increased only through third births and dropped with fourth and higher births; there was a consistent decline in registration with increase in age, but this relationship failed to hold up in each parity group (table 1). Fifty-five percent of the married mothers and 57 percent of the unmarried mothers registered in the program.

Findings

For the purposes of estimating the reduction in births and investigating variables which may be related to differential participation in the program, data from matched pairs are presented here. Since interviewing had not been completed, the findings were based on the tabulation of completed questionnaires among the first 200 pairs out of the total 680 pairs in the study. Of the first 200 pairs, 161 were interviewed and 14 were dropped (10 participants moved from the city, 1 died, and 3 were misclassified). Thus, followup was 87 percent for this segment of the sample.

A comparison of selected demographic characteristics between the study and control groups showed that, having been matched by age and live-birth order, the two groups were similar with respect to certain demographic variables related to differential fertility or fertility control: State of birth, farm residence, and religion (table 2).

Interestingly, the origin of the northward migration to the District was practically confined to the eastern seaboard States and, more specifically, to North Carolina and South Carolina. Roughly half of the study and control group members were native Washingtonians, and 75 percent had never lived on a farm. Thus, much of the high fertility of this population can be attributed to native urban slum dwellers.

There was only a minor difference in educational attainment between the study and control groups as shown in the following table:

Grade completed	*Study group (N=161)*	*Control group (N=161)*
0–7	14	5
8	14	20
9–11	96	99
12	32	33
1 or more years of college	4	4
Not stated	1	0

Some other variables related to fertility behavior are the norms or definitions regarding desired family size and expected family size. Although members of the control group already

had, on the average, more children at the time of interview, there was no difference between the two groups on these variables:

Family size	*Study group (mean)*	*Control group (mean)*
Desired	2. 9	2. 9
Expected	4. 5	4. 6
Additional children wanted	. 7	. 5

The study group had a higher proportion of women who had ever worked and were working at the time of interview:

Employment	*Study group (N=161)*	*Control group (N=161)*
Never worked	28	42
Working full time	52	46
Working part time	12	5
Working, time not stated	1	0
Not working now, worked before	66	66
Not stated	2	2

The chi-square test indicates that the difference between the two groups in the number of women who never worked is significant at the 0.05 level. It may be that because of their participation in the program more women among the study group were freer to take jobs.

The question may be raised as to whether the birth rates between the study and control groups are comparable. Because age, race, and parity are controlled and there was little difference in other population characteristics between the two groups, the reasonableness of such a comparison is strengthened. Furthermore, pregnancy rates for both groups were roughly equal in the 18-month period prior to the specified pregnancy by which members of the study and control groups became part of the sampling frame (hereafter referred to as the "before" period). That is, the study group had an annual pregnancy rate of 49 per 100 women compared to 52 for the control group.

Reduction in births. By use of the matched-pair data, we estimated a reduction in the number of pregnancies by 57 percent due to the study group's participation in the birth control program. In the 12 months following their specified deliveries (hereafter referred to as the "after" period), there were 32 pregnancies among the 161 members of the study group and 75 pregnancies among the 161 control group members.

A comparison of pregnancy rates "before" and "after" their specified deliveries for the control group members revealed that the pregnancy rate had also declined among those who did not participate in the program (table 3). Because of changes in age and marital status composition between these two periods, despite small numbers an attempt was made to adjust for these changes. For the most part, the changes were compensated by the inclusion of 36 younger women of one parity at specified delivery in the "after" period who did not contribute to the birth rate in the "before" period. The "expected" rates for both groups showed that changes in the age-marital status composition could account for only a small decline in rates.

The difference between the "expected" and "after" pregnancy rates for the control group indicates that some decline had occurred which could not be attributed to direct participation in the birth control program. If the pregnancy rate for the study group had also declined by a like amount without the benefit of participation in the program, then the difference in the "before" and "after" rates for the study group slightly exaggerated the actual decline due to direct participation.

This is not to say that the small decline for the control group occurred completely independent of the birth control program. At least part of the decline may be attributed to indirect effects of the program; that is, dissemination of information about birth control and the distribution of foam at time of discharge after delivery. Regarding use of contraceptives between pregnancies, without reference to regularity and

Table 3. Annual pregnancy rates per 100 women

Population	"Before" [1] (N=125)	"Expected" [2]	"After" (N=161)	Percent change "expected" versus "after"
Study group	49. 1	47. 3	19. 9	57. 9
Control group	51. 7	50. 3	46. 6	7. 4

[1] The "before" rates exclude 36 one-parity women at specified delivery.

[2] The age-marital status rates in the "before" period were applied to the age-marital status distribution of 161 women in the "after" period.

Table 4. Continuation rate for 199 women who used pills, by reason for discontinuing use of pills

Months' use	Total	Discomfort	Medical	Harmful	Accidental pregnancies	Planning baby	Separated or sterilized	All other	Not stated	Number women continuing to end of month	Percent continuing	Cumulative exposure (months)
1										199	100	199
2	15	11	2	0	1	0	1	0	0	184	92	383
3	14	7	1	1	1	1	0	3	0	170	85	553
4	14	5	1	1	3	0	0	4	0	156	78	709
5	4	2	0	0	0	0	0	1	1	152	76	861
6	9	3	0	1	1	0	1	3	0	143	72	1,004
7	5	2	1	0	0	0	0	2	0	138	69	1,142
8	8	4	0	1	0	2	1	0	0	130	65	1,272
9	4	2	1	0	0	0	0	1	0	126	63	1,398
10	4	1	0	0	0	0	0	3	0	121	61	1,520
11	2	0	0	1	0	0	0	1	0	120	60	1,640
12	5	0	0	0	1	0	1	3	0	115	58	1,755
13	4	0	1	1	1	1	0	0	0	111	56	1,866
14	3	2	0	1	0	0	0	0	0	108	54	1,974
15	4	0	1	0	0	0	1	2	0	104	52	2,078
16	6	2	0	0	0	0	2	2	0	98	49	2,176
17	1	0	0	0	0	0	0	1	0	97	49	2,273
18	2	0	0	0	0	1	1	0	0	95	48	2,368
Total	104	41	8	7	8	5	8	26	1			

length of use, among the control group members pill users increased from two to 13 before and after their specified deliveries, foam users increased from 16 to 35 during the same time, IUD users increased from none to three, and four were sterilized.

Continuation and accidental pregnancy rates. Although not directly related to the use of matched-pair data, the continuation rate of the participants in the program is presented briefly so that it may be compared with other program evaluations of family planning services among poor urban Negroes. In order to achieve a magnitude of a 57 percent reduction in pregnancies in a 12-month period, what were the continuation and accidental pregnancy rates among the participants in the program?

The monthly continuation rates for women on pills only are shown in table 4. These rates are based on the completed interviews among the first 300 study group members out of the total 680 participants in the study. Interviews were completed for 261 of the 300 study group members and 21 were dropped from the study (16 had moved from the city, 1 died, 3 were misclassified, and 1 was institutionalized). The followup rate was thus 94 percent.

Among the 261 women interviewed, 199 women chose the pill and used it 1 or more months (table 4). The percentages of women remaining on the pill at 6, 12, and 18 months after registration were as follows:

Continuation rate (months)	*Percent using pills (N=199)*
6	72
12	58
18	48

The accidental pregnancy rate at 12 months was almost double for all women participating in the program, 8.7 per 100 women, compared with those who used pills only, 4.8 per 100 women.

The percentages of all women continuing in the program, shown below by age and months of continuation, reveal that the youngest women, 19 years and under, had the highest dropout rates.

Age (years)	*Months*		
	6	*12*	*18*
19 and under (N=80)	59	41	31
20–24 (N=90)	70	63	56
25–29 (N=48)	60	50	38
30+ (N=43)	70	56	54

The relation of continuation in the program to age, however, is irregular.

Conclusions

In the planning stages of this study the question was raised as to whether the nonparticipants in the program would be using sources for contraception other than the birth control program and thereby somewhat comparable pregnancy rates would be seen between those who participated and those who did not. The comparison of the pregnancy rates between the matched study and control groups indicates that the program was responsible for a substantial reduction in the number of pregnancies among the study group members. There were 32 pregnancies among the 161 members in the study group and 75 pregnancies among the 161 members of the control group, a reduction of 57 percent. Comparisons of pregnancy rates "before" and "after" for both groups tend to confirm this conclusion. That is, both groups had comparable rates in the 18 months prior to their specified deliveries—49 per 100 women per year for the study group and 52 for the control group. In the 12 months following their specified deliveries, the pregnancy rates were 20 for the study group and 47 for the control group.

It is unlikely that the majority of successful contraceptors among the study group members would have had a readily accessible source of effective contraceptives without the aid of the program. The results of the study indicate that a carefully operated birth control program which offers the pill will help to reduce considerably the number of unwanted pregnancies among low-income urban Negro women.

Changes in Recommended Immunizations for International Travel

Relatively few changes have been made in quarantine requirements for international travel since the issuance of the 1967–68 edition of "Immunization Information for International Travel" by the Foreign Quarantine Program of the National Communicable Disease Center.

The following are changes in immunizations recommended for Americans abroad.

1. Typhoid vaccine is no longer recommended for Europe, nor for other areas if the traveler stays at usual tourist accommodations.
2. Plague vaccine is recommended only for Vietnam, Laos, and Cambodia, unless the traveler will be occupationally exposed to rodents in areas in which sylvatic plague occurs.
3. Typhus vaccine is recommended only for persons whose work abroad is in areas where the local population is infected.
4. Immune serum globulin is recommended for prophylaxis of infectious hepatitis in Central and South America, Africa, and Asia.
5. Pre-exposure immunization against rabies with duck embryo vaccine is suggested for Americans resident in South America, Africa, and Asia. This vaccination is not recommended for tourists or short term visitors.

A new edition of "Immunization Information for International Travel" is expected to be available by late 1969.