THE USE OF MATCHED PAIRS IN THE EVALUATION OF THE DISTRICT OF COLUMBIA DEPARTMENT OF PUBLIC HEALTH BIRTH CONTROL PROGRAM

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The D. C. Department of Public Health Birth Control Program began 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 three months at the D. C. General Hospital and a very small number of women who were referred by the Department of Welfare. With additional clinics, the Program has expanded to include all women who had a previous delivery.

The time period covered by this study is related to the population utilizing D. C. General Hospital for deliveries between November 1964 through December 1965. During this period, the Birth Control Program was essentially a postpartum program. At the time of discharge after delivery, mothers were invited to attend a session where a birth control film was presented, followed by demonstration and discussion of the various types of contraception. For the interim between delivery and postpartum examination, a two-months supply of foam was distributed. Mothers were told that birth control service is available when they returned for their postpartum examination and were given an appointment prior to leaving the hospital. Two months after registration 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 one year, renewable after a physical examination.

No charge was made for supplies or service and mothers were given two to three months supply per pickup visit. A choice of six methods were offered--pill, foam, diaphragm, rhythm, jelly, and IUD; the use of IUD, however, had barely begun by November 1965. The pills were by far the most popular method used during the period under study.

Description of the population. The population under study offers unique opportunities for research in family planning. Whereas studies in family planning in the United States have been made among white, middle-class, 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 repeated history of illegitimate births is a common occurrence among a large proportion of these women in the reproductive ages. Data collected from the live birth certificates from D. C. General Hospital deliveries showed that in 1965, 52 percent of the live births were reported as illegitimate, and among first births this proportion was 76 percent.

One-third of the women delivering live births at this hospital had no prenatal care despite a concerted and well-established program of maternal and child health in this city. This population is characterized by excess fertility resulting from their inability to practice 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. Women in our study reported that 60 percent of their live births had been unwanted pregnancies.

Purpose of the study. This study was made possible by a grant from the Population Council for evaluating a postpartum birth control program. The three main objectives of this study were: (1) to measure the reduction in pregnancies as a result of participation in the Birth Control Program; (2) to determine whether certain demographic factors may be related to differential participation in the Birth Control Program; and (3) to measure the "use-effectiveness" or continuation rate in the Program.

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

The study universe consisted of fecund Negro women who had a live birth at D. C. General Hospital between November 1964 through December 1965. Excluded from the study were about 130 women who had a fetal death delivery at this hospital during the same period. Excluded also were 640 cases of abortions 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 four 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 a live birth at the same hospital during the same month, and was within the same age, parity and marital status categories. (The latter was inferred from the legitimacy item on the certificate). These matched nonparticipants comprise our Control Group.

Representativeness of the Study Group was checked by comparing this 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, the Control Group members are not representative of the non-white mothers who had a live birth delivery at D. C. General Hospital during the same time as the

Study Group members, but did not choose to participate in the Program since they are matched controls. On the average, they are somewhat younger in age and lower in parity than nonparticipants in general.

Interviews were conducted in private homes using prepared questionnaires. At first, approximately 20 public health nurses were trained for interviewing on an overtime basis. Subsequently health aides and social service workers were trained and used as interviewers.

The 20-percent sample of approximately 6,000 nonwhite mothers indicated that 56 percent of these women who delivered a live birth at the municipal hospital registered in the Birth Control Program. 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, dropping 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:

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	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 years & under	60.4	58.4	68.5	64.1			
20-24 years	57.5	54.4	50.5	64.4	58.2	62.1	59.1
25-29 years	51.3		66.7	58.8	56.4	50.0	41.6
30 years or more	50.0			57.9	55.0	51.9	47.5

Fifty-five and fifty-seven percent of mothers who had legitimate and illegitimate live births, respectively, registered in the Program.

Findings. For the purposes of estimating the reduction in births and investigating variables which may be related to differential participation, this paper will present data from the first segment of the total 680 pairs in the study--the first 200 pairs. The participants among these first 200 pairs represent essentially a random 20-percent sample of the nonwhite women who had a live birth delivery at the municipal hospital during November 1964 through February 1965 and registered in the Birth Control Program in the first four months of 1965. One hundred sixty one matched pairs out of the first 200 pairs have been interviewed and 14 pairs were dropped where 10 participants moved from the city, 1 died, and 3 were misclassified. The percent followup was therefore 87 percent for this segment.

A comparison of some demographic characteristics between the Study and Control Groups showed that, having been matched by age and live-birth order, the two groups were quite similar on certain demographic variables related to differential fertility or fertility control. These variables were State of birth, residence on a farm and religion:

STATE OF BIRTH

	Study Group	Control Group
Total	161	161
District of Columbia	87	80
Virginia	14	15
Maryland	9	9
Lower South Atlantic [1/]	44	48
All other South	1	2
Other	4	6
Not stated	1	1

[1/] Includes Florida, Georgia, North Carolina and South Carolina.

EVER LIVE ON A FARM

	Study Group	Control Group
Total	161	161
None [1/]	120	121
1 year	1	4
2-5 years	10	4
6-10 years	4	5
11-15 years	8	8
More than 15 years	17	16

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

RELIGION

	Study Group	Control Group
Total	161	161
Baptist	91	104
Methodist	13	11
Catholic	27	24
Holiness	10	11
All other	18	6
None	1	4
Not stated	1	1

It is interesting to note that among the migrants, the origin of the northward migration to the District was almost solely confined to the eastern seaboard States and, more specifically, to North Carolina and South Carolina. These tables on State of birth and farm residence also show that roughly half the population we are studying are native Washingtonians and that 75 percent never lived on a farm. Thus, much of the high fertility of this population can be attributed to the native slum dwellers.

There was only a minor difference in educational attainment between the Study and Control Groups:

HIGHEST GRADE COMPLETED

	Study Group	Control Group
Total	161	161
0-7 grades	14	5
8th grade	14	20
9-11 grades	96	99
12th grade	32	33
13th & higher	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. In spite of the fact that 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:

MEAN DESIRED & EXPECTED FAMILY SIZE

	Study Group	Control Group
Desired family size	2.9	2.9
Expected family size	4.5	4.6
Additional number of children wanted	0.7	0.5

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

EMPLOYMENT

	Study Group	Control Group
Total	161	161
Never worked	28	42
Working now full time	52	46
Working now part time	12	5
Working now time not stated	1	0
Not working now worked before	66	66
Not stated	2	2

The chi-square test indicates that the difference in the number of women who never worked between these two groups is significant at the .05 level. It appears that in this population, employment is related to differential fertility. When age is controlled, women who were working at time of interview preferred and achieved a smaller family size than those who had never worked by the time of interview among both Study and Control Group members:

MEAN LIVE-BIRTH ORDER & DESIRED FAMILY SIZE BY EMPLOYMENT STATUS

	Age of Mother at Interview			
	Under 20 yrs	20-24 yrs	25-29 yrs	30+ yrs
Live-Birth Order[1]				
Working now (N=116)	1.7	2.6	4.0	6.0
Never worked (N=70)	1.8	4.8	5.8	6.6
Desired Family Size				
Working now	2.7	2.5	2.8	2.6
Never worked	3.3	2.7	2.3	4.5

[1] Includes pregnancies at time of interview. (Data on women who worked before not shown.)

The employment variable may perhaps be an indicator of some qualitative difference between the Study and Control Groups which help to account for the fact that one group participated in the Birth Control Program and the other group did not. This qualitative difference may be related to a type of attitude makeup which makes one group more employable than another. It may also be related to the fact that the Study Group members have a more positive attitude toward preventive health care as evidenced from their past performance in obtaining prenatal care and postpartum examination for their pregnancies and after their deliveries.

The question may be raised as to whether the birth rates between the Study and Control Groups are comparable and whether the reduction in pregnancies due to participation in the Program can be measured in such a manner. The fact that few differences in characteristics could be found between the two groups strengthens the reasonableness of a comparison. Furthermore, pregnancy rates for both groups were roughly equal in the 18-month period prior to the specified pregnancy by which they became part of the sampling frame (hereafter referred to as the "Before" period). That is, excluding one-parity women, the Study Group had an annual pregnancy rate of 49 per 100 women compared to 52 for the Control Group.

By use of the matched pair data, we estimated a reduction in the pregnancy rate of 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 compared to 75 pregnancies for the same number of Control Group members.

A comparison of pregnancy rates "Before" and "After" their specified deliveries for the Control Group members would indicate whether the pregnancy

rate had also declined among those who did not participate in the Program. Because of changes in age and marital status composition between these two periods, in spite of small numbers an attempt was made to adjust for these changes. For the most part, however, these changes were compensated by the inclusion of the younger one-parity women in the "After" period. The "Expected" rates for both groups showed that changes in the age-marital status composition could account for only a small decline in the rates:

ANNUAL PREGNANCY RATES PER 100 WOMEN[1/]

	"Before" (N=125)	"Expected"	"After" (N=161)	Change "Exp." vs "After"
Study Group	49.1	47.3	19.9	-59%
Control Grp	51.7	50.3	46.6	- 7%

[1/] The "Before" rates exclude 36 one-parity women at specified delivery for each group.

From the difference in the "Expected" and "After" pregnancy rates for the Control Group, it can be seen 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 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 can 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. Interpregnancy use of contraception, without reference to regularity and length of use, showed that among the Control Group members pill users increased from 2 to 13 before and after their specified deliveries; foam users increased from 16 to 35 during the same time; IUD users increased from 0 to 3 and 4 were sterilized.

Although not directly related to the use of matched pair data, the continuation rate of the participants in the Program will be briefly presented for sake of comparison with other program evaluations of family planning services among the poor urban Negroes. In order to achieve a magnitude of a 57 percent reduction in pregnancies in a 12-month period, what kinds of continuation rate and accidental pregnancy rate were found among the participants in the Program?

The monthly continuation rates for all women using any method from the Birth Control Program and the same rates separately for women on pills only are shown in Tables 1 and 2 in the Appendix. These rates are based on the completed interviews among the first 300 Study Group members representing essentially a 20-percent sample of nonwhite women who delivered a live birth at the municipal hospital during November 1964 through April 1965 and registered in the Birth Control Program during the first six months of 1965. Of these 300 Study Group members, 261 interviews had been completed and 21 had been dropped where 10 had moved from the city, 1 died, 3 misclassified, and 1 institutionalized. The followup rate was thus 94 percent.

The continuation rates in Tables 1 and 2 are about the same when adjusted for the fact that Table 2 (pill only) excludes any woman who did not report use of the pill for at least one month. At six, twelve, and eighteen months after registration percents surviving in the Program and on the pill (unadjusted) were as follows:

	PERCENT SURVIVING Birth Control Program (N=261)	Pill (N=199)
6 months	65%	72%
12 months	53	58
18 months	44	48

The accidental pregnancy rate at 12 months is almost double for all women participating in the Program compared with those who used pills only:

ACCIDENTAL PREGNANCY RATE PER 100 WOMEN

Birth Control Program	Pill
8.7	4.8

The survival rate by age over time for all women in the Birth Control Program showed that the youngest women, 19 years and under, had the highest dropout rates:

PERCENT SURVIVING BY MONTH AND AGE

	1-6 months	7-12 months	13-18 months
Under 20 yrs (N=80)	59%	41%	31%
20-24 yrs (N=90)	70	63	56
25-29 yrs (N=48)	60	50	38
30+ yrs (N=43)	70	56	54

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

Summary. In the planning stages of this study the question was raised whether the nonparticipants in the Program would be using sources for contraception other than the Birth Control Program, thereby resulting in somewhat comparable pregnancy rates 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 participation in the Program was highly effective in reducing the number of pregnancies among the Study Group members. Comparisons of pregnancy rates "Before" and "After" for both the Study and Control Groups tend to confirm this conclusion. That is, both groups had comparable rates in the 18 months prior to their specified pregnancies. In the 12 months following their specified deliveries, the pregnancy rates fell 60 and 10 percents for the Study and Control Groups, respectively.

It is unlikely that the majority of successful contraceptors among the Study Group would have had a readily accessible source of effective contraception without the aid of the Program. The results of this study lead us to believe that a carefully operated program using pills or IUD will meet with considerable success in reducing unwanted pregnancies among the low-income, urban Negro women.

Table 1

CONTINUATION RATE FOR 261 WOMEN USING ANY METHOD OBTAINED FROM THE BIRTH CONTROL PROGRAM

Months Use	Reason for Discontinuing Use of Any Method from Birth Control Program[1]										No. of women surviving to end of month	Percent surviving	Cumulative exposure months
	TOTAL	Discomfort (pill)	Medical	Harmful	Accidental pregnancies	Planning baby	No need; separated or sterilization	Getting method elsewhere	All other	Not stated			
1	25				2		1	7	15[2]		236	90%	236
2	17	7	1		3		2	2	2		219	84	455
3	19	7	1	1	1	1		3	5		200	77	655
4	16	4	1	1	4			1	5		184	70	839
5	8	1						2	3	2	176	67	1015
6	7	3			1		1		2		169	65	1184
7	7	1	1		1			1	3		162	62	1346
8	9	4		1		2		1	1		153	59	1499
9	5	1	1		1				2		148	57	1647
10	3								3		145	56	1792
11	2	1			1						143	55	1935
12	5				1		1	1	2		138	53	2073
13	5		1	1	2	1					133	51	2206
14	3	1		1	1						130	50	2336
15	5		1				1		3		125	48	2461
16	5	1					2		2		120	46	2581
17	2	1							1		118	45	2699
18	2					1	1				116	44	2815
	145	32	7	5	18	5	9	18	49	2			

[1] Discontinuation means not using a method from Birth Control Program.

[2] Fifteen women did not use a method within 6 months after registration.

Table 2

CONTINUATION RATE FOR 199 WOMEN WHO USED PILLS

Months Use	Reason for Discontinuing Use of Pills									No. of women surviving to end of month	Percent surviving	Cumulative exposure months
	TOTAL	Discomfort	Medical	Harmful	Accidental pregnancies	Planning baby	No need; separated or sterilization	All other	Not stated			
1										199	100%	199
2	15	11	2	0	1		1			184	92	383
3	14	7	1	1	1	1		3		170	85	553
4	14	5	1	1	3			4		156	78	709
5	4	2						1	1	152	76	861
6	9	3		1	1		1	3		143	72	1004
7	5	2	1					2		138	69	1142
8	8	4		1		2	1			130	65	1272
9	4	2	1					1		126	63	1398
10	4	1						3		121	61	1520
11	2			1				1		120	60	1640
12	5				1		1	3		115	58	1755
13	4		1	1	1	1				111	56	1866
14	3	2		1						108	54	1974
15	4		1				1	2		104	52	2078
16	6	2					2	2		98	49	2176
17	1							1		97	49	2273
18	2					1	1			95	48	2368
	104	41	8	7	8	5	8	26	1			