SPECIAL ARTICLES

FERTILITY AND CONTRACEPTION IN URBAN WHITES AND NEGROES[1]

IN a series of earlier papers[2] there has been described in detail the manner in which data have been collected regarding the complete reproductive histories to the date of record of 30,949 women overtly fertile in 1931 or 1932, and resident in or near 26 large cities in 14 states[3] and the District of Columbia, east of (or on) the Mississippi River and north of the southernmost tier of states. These details need not be repeated here. It will suffice to say that all the statistical tests that it has so far been possible to apply indicate that the sample is, within the defined limitations, imposed by the plan of collection of data, justly representative of the general population of women from which it was drawn.

After the long and tedious labor necessary to prepare for tabulation and tabulate this mass of material, it is now possible to report upon some of the results. The final definitive report on the whole investigation is now in preparation, and it is hoped may be issued within a year in book form.

The present paper discusses the question of the comparative fertility of whites and Negroes as exhibited in this material. It is plainly impossible to discuss fertility in human groups without taking account of contraception, since this is certainly one of the most important variables influencing individual and group diversities in expressed fertility in man. It can obscure or completely alter the expression of variation in natural, innate fertility. There are two aspects of contraception that must always be separately considered in attempting to appraise quantitatively its effect on group fertility. The first of these is the *extent* to which its practice is attempted in the group; the second is the *degree* to which, *as actually practiced* in the group, it achieves its object of preventing conceptions. No contraceptive technique now in practical use is completely reliable. To be successful, all require a certain minimum of intelligence, self-restraint and knowledge of at least the basic elements of the physiology of reproduction. Human beings vary widely in respect of each of these three attributes. A consequence is that contraception may be, and often is, practiced in such a manner that it prevents few if any conceptions; while more intelligent women so manage it as never throughout their reproductive lives to experience an unwanted or unplanned pregnancy.

Table 1 shows the proportion of the women in the present sample who attempted to practice contraception.

TABLE 1

CONTRACEPTION

Practice of contraception	Whites		Negroes	
	Number	Per cent.	Number	Per cent.
No contraception	13,682	54.0	4,676	83.0
Contraception attempted in some form	10,806	42.7	925	16.4
No contraception stated, but record doubted ...	822	3.2	32	.6
No information	6	.02	....	...
Totals	25,316	99.92	5,633	100.0

Considering first the whites it is seen that 42.7 per cent. of the women had practiced contraception before the time of record, regularly or intermittently, intelligently or stupidly, as the case may have been. Fifty-four per cent. of the women stated that, to the time of record, they had never practiced contraception. The medical cooperators who took and recorded their reproductive life histories for this investigation found no reason in their demeanor, behavior or histories to doubt their statements. Nor did the writer, who went carefully and critically over every detail of each of the 30,949 individual histories with this particular point in mind, find any internal evidence in these 13,682 histories themselves to justify doubt as to their truthfulness on this point.

In addition to this 54 per cent. of the white women 822 or 3.2 per cent. also stated that they had never practiced contraception, but either the medical cooperators or the writer, or both, found reason to doubt their statements on the point. If a woman's record showed too long gaps between pregnancies, unexplained in the history by illness or otherwise, and she affirmed that she had not practiced contraception, her record was forthwith thrown into the doubtful category. Doubtless this was unjust to many women—they probably were in fact telling the truth—but the adoption of the procedure followed had the effect of measurably increasing confidence in the residual 54 per cent. accepted as not practicing contraception.

[1] From the Department of Biology of the School of Hygiene and Public Health, Johns Hopkins University. The substance of this paper was presented at the annual meeting of the American Association of Physical Anthropologists in New Haven on May 2, 1936. The writer desires gratefully to acknowledge his indebtedness to the Milbank Memorial Fund for continuing support of the investigation from which the data here presented have been taken.

[2] R. Pearl, *Human Biology*, Vol. 4, pp. 363–407, 1932; *ibid.*, Vol. 6, pp. 354–401, 1934; *Milbank Mem. Fund Quarterly Bulletin*, Vol. 14, 1936. In press.

[3] These 14 states were Massachusetts, New York, New Jersey, Pennsylvania, Maryland, Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Missouri, Tennessee and Kentucky.

TABLE 2

MEDIAN PREGNANCY RATES PER 100 COMPUTED OVULATIONS IN WOMEN MARRIED ONCE ONLY, AND WITHOUT ANY GYNECOLOGICAL DISEASE

Age period at risk	Not practicing contraception		Attempting contraception in some manner or form		Difference	Diff. / P.E. Diff.	Percentage of contraceptive to non-contraceptive pregnancy rates
	N	Median Rate	N	Median Rate			
			Part A. Whites				
10–14	203	0.60 ± .71	101	0.62 ± .96	+ .02 ± 1.21	0.02	103.3
15–19	5080	8.14 ± .26	3884	3.81 ± .17	− 4.33 ± .31	14.0	46.8
20–24	6605	8.34 ± .20	7476	4.56 ± .11	− 3.78 ± .23	16.4	54.7
25–29	4132	7.16 ± .21	5532	4.51 ± .13	− 2.65 ± .25	10.6	63.0
30–34	2092	6.19 ± .25	2577	4.61 ± .21	− 1.58 ± .33	4.8	74.5
35–39	909	6.84 ± .41	904	4.98 ± .38	− 1.86 ± .56	3.3	72.8
40 and over .	226	7.27 ± 1.01	149	7.65 ± 1.23	+ .38 ± 1.24	0.3	105.2
			Part B. Negroes				
10–14	147	0.69 ± 1.23	37	0.69 ± 1.42	0 ±	0	100.0
15–19	1688	7.97 ± .45	413	6.52 ± .68	− 1.45 ± .82	1.8	81.8
20–24	1608	8.37 ± .38	483	7.57 ± .57	− .80 ± .69	1.2	90.4
25–29	883	7.25 ± .35	293	6.84 ± .75	− .41 ± .83	0.5	94.3
30–34	378	6.89 ± .55	135	7.21 ± .96	+ .32 ± 1.11	0.3	104.6
35–39	122	8.44 ± .97	48	8.83 ± 1.48	+ .39 ± 1.77	0.2	104.6
40 and over .	27	6.50 ± 2.14	9*	.....	.....	..	....

* Too few to give a reliable median.

Among the Negro women only 16.4 per cent. in total had practiced contraception. As for the remainder, 83 per cent. of the total stated that they had never done so, and no reason was found by anybody to doubt their statement. This left 32 women, or 0.6 per cent., whose statements that they had not practiced contraception were doubtful for one reason or another.

It seems probable for reasons discussed in detail elsewhere that the percentage of white women definitely recorded in Table 1 as practicing contraception somewhat underestimates the corresponding percentage for the general population from which the sample was drawn, but not greatly so. Considering the fact that the figures of Table 1 include all ages; all durations of marriage; the whole range of variation in number of pregnancies experienced; and all sorts of social, economic and educational levels, it would seem hazardous to estimate the percentage of white contraceptors among the women in the general population of the 15 states dealt with at more than 55 to 60 per cent. (that is, 42.7 + 3.2 + about 10 to 15).

Table 2 gives, as an index of fertility, the pregnancy rates,[4] by five-year age periods of exposure to risk of becoming pregnant, for two relatively homogeneous groups of white and Negro women respectively. These are (a) women who had never made any attempt to practice contraception during any part of their reproductive life to the date of record, and (b) women who had regularly or intermittently, intelligently or stupidly, attempted to prevent or control the incidence of pregnancy by some method, technique or mode of sexual behavior. The logical contrast is then between

[4] Number of pregnancies per 100 computed ovulations during a defined time period of risk of becoming pregnant. For a discussion of the theoretical basis and mode of computation of these pregnancy rates see R. Pearl, *Lancet*, Vol. II for 1933, pp. 607–611, and *Human Biology*, Vol. 6, pp. 355–401, 1934.

TABLE 2.—(*Continued*)

PART C. DIFFERENCES BETWEEN WHITE AND NEGRO NON-CONTRACEPTORS IN MEDIAN PREGNANCY RATES

Age period	Difference	Diff. / P.E. Diff.
10–14	+ 0.09 ± 1.42	0.06
15–19	− .17 ± .52	0.33
20–24	+ .03 ± .43	0.07
25–29	+ .09 ± .41	0.22
30–34	+ .70 ± .60	1.17
35–39	+ 1.60 ± 1.05	1.52
40 and over ..	− .77 ± 2.36	0.33

"non-contraceptors" as a class, and "contraceptors" of all sorts and degrees as a class. The "contraceptor" class includes without selection the stupid and careless as well as the intelligent and foresighted, together with all those falling in intermediate categories in these respects. Because of the considerable skewness of the pregnancy rate frequency distributions the median rather than the mean is the centering constant of choice, and is here tabled.

In all four classes, white, Negro, contraceptors and non-contraceptors, the only women included are those who were married, had been married once only, and who were free of any form of gynecological disease. These restrictions are imposed to ensure still further homogeneity.

Students of fertility will note that the form of age fertility curve indicated by the data of Table 2 is not the familiar one typified, for example, by Körösi's results. The reasons for the difference can not be discussed in detail here for lack of space,[5] but it arises essentially because in the present material (a) the same individual woman's reproductive performance is followed throughout her entire reproductive life, and (b) in the last age period (40 and over) the only

[5] For a fuller discussion of this point the reader is referred to a forthcoming paper in the *Milbank Mem. Fund Quarterly Bulletin*, Vol. 14, 1936.

women included are those who were pregnant at least once in that period.

The rates upon which Table 2 is based are fundamentally the rates of the type

$$(A) = \frac{\text{Number of pregnancies in an age period}}{\text{Total woman-years exposure to risk of pregnancy in the same age period, of women who actually became pregnant in that or some later period,}}$$

whereas the usual expression of a fertility rate is of the type

$$(B) = \frac{\text{Number of births in an age period}}{\text{Total number of women potentially capable, because married, of becoming mothers in the same period}}$$

Obviously these are different kinds of rates, and will lead to quite different numerical results. But while rates of type (A) can not be directly compared with those of type (B), any two rates of type (A) may as justly be *compared with each other* as may any two rates of type (B) be compared with each other.

From Table 2 the following points emerge:

1. In the absence of contraceptive efforts the pregnancy rates of white and Negro women in this substantial body of material are identical, well within the errors of sampling, as is shown in Part C of the table. This is true for all age classes. No racial difference in fertility in the table, so far as concerns non-contraceptors, even approaches three or still less four times its probable error.

2. Among the white women in this material contraception, *as practiced,* is significantly effective in reducing pregnancy rates below those of corresponding classes of non-contraceptors, as is shown in Part A of the table. This is true for all age classes except the extreme ones (10 to 14 and 40 and over). The percentage reduction in pregnancy rates associated with the practice of contraception is substantial, ranging from roughly 25 to over 50 per cent., except for the extreme age classes mentioned. It should be emphasized that these figures represent the results of contraception as actually practiced in a sample of the general population, and include the inefficient techniques and stupid efforts along with the efficient and the shrewd.

3. Among the Negro women in this material contraception, *as practiced,* is without statistically significant effect in lowering pregnancy rates below those of comparable classes of non-contraceptors. In two age classes (15 to 19 and 20 to 24) there is some lowering of pregnancy rates, but only between about 10 and 18 per cent. The present data confirm and extend the experience of birth control clinics to the effect that the general run of Negroes do not practice contraception effectively, even after they have been instructed.

There is thus presented an interesting picture of two racial elements in the same population with substantially identical normal, innate fertility. In one of these groups something over a half practice birth control effectively enough to reduce their normal fertility from a quarter to a half; in the other only a little over 15 per cent. attempt birth control at all, and do it so inefficiently as to produce no significant effect statistically upon their normal fertility. Plainly if there were no other variables involved, such as mortality, for example, the effect of such a situation in altering the relative proportions of the two elements in the population would be apparent in a comparatively short time. But in this case there are other, and compensating variables at work. Pregnancy rates furnish an index of maximum realized fertility. Live birth rates for the same groups fall below pregnancy rates because of reproductive wastage (abortions, miscarriages, stillbirths). Table 3 shows, for 20 of the 26 cities for which the present data were collected, the number of live births recorded by the Bureau of the Census, per 1,000 population, in 1932. The six cities omitted have so small a colored population as not to warrant computation of separate rates for them as a group.

TABLE 3
LIVE BIRTH RATES PER 1000 POPULATION: 1932

City	White	Colored
Akron	15.0	17.0
Baltimore	16.3	21.7
Boston	22.0	19.8
Buffalo	17.6	22.5
Chicago	13.9	17.7
Cincinnati	16.8	14.6
Cleveland	16.6	16.2
Columbus	15.8	16.9
Detroit	15.8	16.9
Indianapolis	16.0	17.5
Jersey City	20.9	26.5
Louisville	17.0	15.7
Memphis	17.5	18.3
Nashville	22.1	19.7
New York City	15.3	19.4
Philadelphia	15.9	19.5
Pittsburgh	19.3	19.7
St. Louis	15.2	18.0
Toledo	14.9	13.5
Washington, D. C.	19.1	24.6
Unweighted averages	17.15	18.79

From Table 3 it appears that in 1932, in 14 of the 20 cities listed, the crude live birth rates for the colored (all but an insignificant fraction of whom were Negroes in the sense of this paper) were higher than those for the whites, and on an average for the 20 cities were 1.64 points higher. Naturally in a finer analysis the age specific birth rates should be compared. The relatively much less frequent practice of contraception and its lower efficiency when practiced among the Negroes as compared with the whites, on the one hand, and the much higher reproductive wastage rates in the Negroes

than in the whites, partly consequent upon a greater prevalence of venereal diseases among Negroes, on the other hand, act as compensating factors upon the live birth rate. In any final definitive treatment of the problem every possible effort will have to be made to disentangle the relative quantitative influence of these variables.

The analysis of the data is being continued.

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BIOELECTRICAL POTENTIAL IN HEAVY WATER

IN a recent review[1] of the biological effects of heavy water it was suggested that deuterium may modify physiological processes by altering bioelectrical potentials. This hypothesis is now supported by the following experiments on the potential difference across the skin of the frog.

Belly skin from a male frog was tied over the end of a short tube (internal diameter 1.5 cm) supported in a liter jar immersed in a thermostat at 26.2° C. Air at 26.2° C. was passed continuously through the jar. The electrodes consisted of cotton soaked in Ringer's solution fastened to chlorinated Ag wires leading to the usual potentiometer circuit (all readings were corrected for electrode potentials of a few millivolts). Ringer's solution containing 2 grams of glucose per liter and buffered to pH 8.2 was evaporated on a steam bath and redissolved in equivalent amounts of 96 per cent. heavy water or distilled water (controls). The cotton electrodes absorbed 1 cc of solution and 4 drops were placed on each side of the skin.

After a preliminary run in H_2O Ringer to establish the potential of the preparation the skin was carefully blotted and D_2O Ringer was added, including new cottons soaked in D_2O Ringer. Fig. 1 represents a typical experiment showing the striking fall in potential in heavy water (graph indicated by triangles). Control skins treated in the same way but changed to the fresh H_2O Ringer regained their original potential (graph indicated by circles). The falls in peak potential in four skins transferred to heavy water were: 46.6 to 21.2 mv; 90.2 to 34.4 mv; 83.3 to 25.5 mv; 38.2 to 20.8 mv.

The results indicate that the e.m.f. of the skin is produced by a continuous metabolic process,[2] for the reduction brought about by heavy water is too great to be explained by modification of a simple physical property such as electrolytic dissociation. It is clear that many of the physiological effects of heavy water may be essentially electrical. Similar experiments on the electrocardiogram of the frog are in progress.

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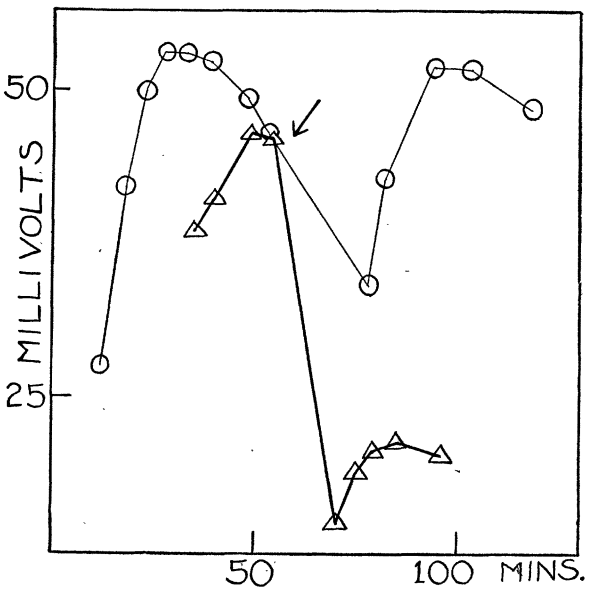

FIG. 1. Reduction of the potential of frog skin in heavy water. Ordinates: e.m.f. in millivolts (outside surface is negative). Abscissae: time in minutes after excision of skin. Circles: Control in H_2O Ringer. Triangles: skin transferred to D_2O Ringer (at arrow).

[1] T. C. Barnes and T. L. Jahn, *Quart. Rev. Biol.*, 9: 292, 1934.

[2] E. J. Lund, *Jour. Exp. Zool.*, 51: 265, 1928. For additional references *cf.* E. J. Boell and A. B. Taylor, *Jour. Cell. and Comp. Physiol.*, 3: 355, 1933; W. L. Francis, *Jour. Exp. Biol.*, 11: 35, 1934.

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