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## Measurement of desired family size

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### Summary

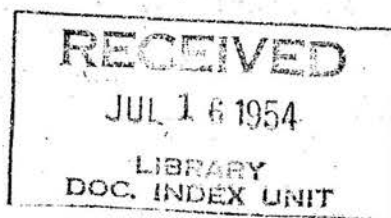
In this paper an attempt is made to separate the physiological and psychological components of fertility. Using statistics of rural Irish marriages as a standard for maximum physiological fertility, and comparing these marriages with marriages taking place in England and Wales between 1920 and 1924, a model is constructed which attempts to show what the distribution of families by size would be, if there were no physiological limitation on fertility, and if contraception were 80 % efficient.

The paper gives preliminary results only; a more detailed account will be published elsewhere.

General distribution of this document is limited to the introductory summary. Participants who have been invited to take part in the meeting referred to above will receive also the full text of the paper. Other participants in the Conference will receive the full text upon request.

Pour la traduction française voir au verso.

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Mesure de la dimension de la famille désirée

par E. Grebenik (Royaume-Uni)

Résumé. On s'efforce, dans le présent document, de séparer les facteurs physiologiques et psychologiques de la fécondité. A l'aide des données statistiques relatives aux mariages ruraux irlandais, pris comme normes de fécondité physiologique maximum, on établit, en comparant ces mariages à ceux qui ont eu lieu en Angleterre et au Pays de Galles entre 1920 et 1924, un modèle à l'aide duquel on s'efforce d'indiquer quelle serait la répartition des familles suivant leur dimension s'il n'y avait pas de limitation d'ordre physiologique à la fécondité, et si les procédés anticonceptionnels étaient efficaces dans la proportion de 80 pour 100.

Cet exposé n'indique que les résultats préliminaires; un exposé plus détaillé fera l'objet d'une publication séparée.

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- Seule, la présente analyse d'introduction fait l'objet d'une distribution générale. Les participants qui ont été invités à assister à la séance mentionnée ci-dessus recevront en outre le texte intégral du document. Les autres participants au Congrès recevront le texte intégral sur leur demande.

JUN 23 1954

ORIGINAL: ENGLISH

Measurement of Desired Family Sizeby E. Grebenik

1. Demographers are generally agreed that the fall in family size which has taken place in the West during the last 75 years is due to the conscious attempts of women to limit the number of children they bear. This belief has been supported by a number of specific investigations into the subject of family limitation. Such enquiries are, however, expensive and answers to them are difficult to interpret. It seemed interesting therefore to attempt to see whether any information regarding family limitation and desired family size could be obtained from statistics of the distribution of women by the total number of children borne to them. This note describes a preliminary calculation; a more detailed report will be published shortly in Population Studies.<sup>(1)</sup>
2. It is known that in a cohort of marriages taking place at a given moment some will be completely sterile from the beginning and that some women will become sterile after having given birth. Thus where no attempt at all is made to limit progeny the distribution of families by size will depend entirely on physiological factors. Thus, if a group of women can be found who take no steps whatever to restrict their fertility, we would have a yardstick by which physiological capacity to bear children can be assessed. One set of indices which would characterize such a distribution is given by the percentage of women with  $n$  children who go on to have  $n+1$ .<sup>(2)</sup>

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<sup>(1)</sup>

An account is also given in D.V. Glass and E. Grebenik: The Trend and Pattern of Fertility in Great Britain.

<sup>(2)</sup>

Cf. also L. Henri, Fécondité des Mariages.

3. In general, however, among any group of women quite a large number will wish to restrict their fertility. Therefore, a woman with  $n$  children must not only be physiologically capable of bearing an  $(n+1)$ 'th child, but must also be willing to bear it, or, if she is unwilling, her attempts to prevent conception must fail.

4. Now consider a group of childless women marrying at given ages in a given year for the first time. Suppose that of them a proportion  $f_0$  are physiologically fertile, that a proportion  $c_0$  do not wish to have any children and take steps to control their fertility and that of the controllers  $s_0$  are successful. If  $n_1$  is the proportion having at least one child

$$n_1 = f_0 (1-c_0) + f_0 c_0 (1-s_0) = f_0 (1-c_0 s_0) \quad (1)$$

or, writing  $\bar{c}_0 = 1-c_0$   $\bar{s}_0 = 1-s_0$ , the number of desired first children will be  $f_0 \bar{c}_0$  and the number of unwanted first children  $f_0 c_0 \bar{s}_0$ .

5. If we now write  $f_1$  for the proportion of women with one child who are physiologically capable of having a second child,  $c_1$  for the proportion wishing to have no more children after the first,  $s_1$  for the proportion of those who attempt to control their fertility and are successful, and  $n_2$  for the number with at least two children, we have

$$n_2 = f_0 f_1 \bar{c}_0 \bar{c}_1 + f_0 f_1 \bar{c}_0 c_1 \bar{s}_1 + f_0 f_1 c_0 \bar{s}_0 \bar{s}_1 \quad (2)$$

The first term on the right hand side contains the proportion of wanted second children, the second and third terms represent the unwanted, the third term relating to women who wished to remain childless but had two unwanted pregnancies on the assumption that all those who had an unwanted first child wished to control their fertility and had the same rate of success as the other women. (This assumption could, of course, be modified).

6. Obviously this process could be continued and further equations set up relating to women with an arbitrary number of children. If it can be assumed that  $f_r$ ,  $s_r$  and  $n_r$  are known,  $c_r$  may, of course, be determined, and the total number

of planned and unplanned children of various birth orders may be obtained on the assumptions made.

7. It is, of course, nearly impossible to obtain modern figures relating to a group of women who take no steps whatever to reduce their fertility. However, as a first approximation we took values of  $f_n$  from a distribution of Irish marriages enumerated in the fertility census of 1911. These marriages related to women who were living outside the Irish county boroughs, had been married for at least 30 and not more than 35 years, were married between the ages of 20 and 24, and still living with their husbands at the time of the Census. Their fertility was high; the average number of children born was 8, the modal number 10, and 36% of them had 10 or more children. It is likely that a fertility of this kind is fairly near the physiological maximum. The following values of  $f_n$  were obtained:

n	0	1	2	3	4	5	6	7	8	9
$f_n$	0.956	0.981	0.979	0.971	0.956	0.934	0.898	0.864	0.798	0.734

This distribution was compared with a group of women enumerated in the British Family Census of 1946 married at ages 20 to 24 between 1920 and 1924, and whose marriages had lasted up to Census date. These women would, of course, only have been married for about 20 years, but the amount of childbearing that takes place after the 20th year of marriage to-day is statistically negligible. The numbers having at least  $s$  children in that cohort ( $n_s$ ) are given below:

s	0	1	2	3	4	5	6	7	8	9	10+
$n_s$	10,000	9,146	6,981	4,358	2,596	1,547	957	578	340	188	105

For the sake of simplicity a constant value  $s_n = 0.8$  was taken for the calculation. This is, of course, an entirely arbitrary value, and it is highly unlikely that it is independent of the total number of children

already born, or of the previous reproductive history of the women concerned. However, the assumption can easily be modified in whatever way is desired. But it may also be shown not to be unreasonable when compared with results of previous ad hoc surveys.

8. When the calculations are actually carried out, we find the following values for  $c_n$

n	0	1	2	3	4	5	6
$c_n$	0.054	0.269	0.411	0.398	0.371	0.320	0.322

Given our assumptions, therefore, it is after the birth of a second child that the proportion wishing to limit fertility is largest.

9. Given the  $c_n$ 's it is, of course, possible to compute the family size that would be desired by women if there was no physiological limitation to childbearing. The proportion who would then have exactly  $n$  children would be given by  $\bar{c}_0 \bar{c}_1 \bar{c}_2 \dots \bar{c}_{n-1} c_n = d_n$

If these are calculated and compared with the distribution actually achieved, the following results are obtained:

No. of children	0	1	2	3	4	5	6	7+	All
% Desiring	5.4	25.5	28.4	16.2	9.1	4.9	3.4	7.2	100.0
% Achieving	8.5	21.7	26.2	17.6	10.5	5.9	3.8	5.8	100.0

This table shows the at first sight paradoxical result that more women desire large families (here classified as 7 or over) than achieve them. But it must be remembered that the word "desiring" ought really to be put



in quotation marks, and that the 7.2% shown as desiring 7 or more children are probably in fact those women who do not in fact plan their families. A certain proportion of them will be sterile or become so before they have actually reached a total of 7, and this accounts for the excess of the "desired" over "achieved" percentage. The table also shows that voluntary childlessness accounts for 63.5% of total childlessness.

10. It has been stated that not all the women who "desire"  $\underline{n}$  children will actually have them. We may in fact divide all the women who "desire"  $\underline{n}$  children into 3 groups: those who have less than  $\underline{n}$  children, those who have exactly  $\underline{n}$ , and those who have more than  $\underline{n}$ . When this is done the following results are obtained:

No. of Children desired ( $\underline{n}$ )	Percentage less than $\underline{n}$ children	Having exactly $\underline{n}$ children	More than $\underline{n}$ children
0	---	80.9	19.1
1	4.4	76.8	18.8
2	6.3	75.4	18.3
3	8.3	73.9	17.8
4	10.8	72.2	17.0
5	14.7	69.3	16.0
6	20.5	65.3	14.2
7	28.5	71.5	---
All	8.7	74.6	16.7

11. It will be seen that the percentage of women who have more children than they desire is still nearly twice as large as the proportion who have fewer children than they want. The position is, however, rather different when the number of children is considered. A more extensive calculation shows that 10,000 women in the 1920-24 cohort would have 26,906 children of whom 24,786 or 92.1% were wanted and 2,120 were not wanted. An additional 2,791 children were desired by women who could

not actually bear them. In this cohort therefore desired family size actually exceeded the family size achieved.

12. If it is assumed that all the women who desire to have  $n$  children and who do have them take steps to limit their fertility, it is found that 89% of all the women in this cohort have at some time or another taken steps to limit their fertility.
13. This communication is contributed merely as an exercise in method, and the rather definite statements about the number of children desired should be qualified. By varying the figures for contraceptive efficiency ( $s_n$ ), and making different assumptions about  $f_n$  or taking different cohorts, different results will be obtained. A more detailed study in which some of these factors are taken into account will be given in the publication referred to at the beginning.