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WHEN IS OPINION "SAMPLING" BIASED?

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WE can hardly open a newspaper or magazine — or could until recently—without finding the results of some public opinion poll stating the attitude of the population toward certain controversial internal or foreign policies, the variance of behavior under certain circumstances, or the preference for a presidential candidate during election campaigns. Only occasionally we are able to check the accuracy of such statistical "facts" and find them either coinciding with or more or less deviating from later experience. The failure of the famous pre-election poll of 1936, undertaken by the *Literary Digest*, which predicted popular votes for the two main presidential candidates almost in reverse ratio from the final election returns caused a controversy concerning the validity of public opinion polls generally.

Since then, the methods and techniques of such polls have been improved considerably; yet we still are far away from a fool-proof opinion poll. At present, the pollsters are thoroughly discredited as a result of their gross miscalculation of the 1948 election results. Yet, a public opinion poll can err, even to a large degree, without these surveys losing their merits. Unfortunately, opinion pollers often show an attitude of infallibility which is not at all warranted.

WHAT MAKES POLLS RELIABLE?

The deciding factors of the general reliability of opinion polls are the non-existence of personal interest in the outcome of the poll, and the professional skill of those conducting a poll.

We are, at the present, confronted with the statement that more than 96 per cent of all physicians in the United States are in favor of birth control and are told that this percentage was compiled from the data of an unbiased and testproof opinion poll among physicians. In practical terms, this means that among the medical staff of a small hospital of *e.g.* 50 members, we might find three who are against birth control and 47 who prescribe it in their private practice or hospital clinic more or less frequently. This is a little hard to believe, but what can be done if statistical data are presented in an apparently scientific manner? We are

driven to remember, under such circumstances, the popular saying of the three different kinds of lies: (1) the common lie, (2) the barefaced lie and (3) the worst one, statistics.

If an opinion poll would have revealed for instance, that 60 or 65 per cent of the physicians declared themselves in favor of birth control for the sake of child spacing, I would have been impressed by the large number and would, probably, have believed it. But a percentage of 90 per cent for economic and social reasons alone proved just a little too big to be easily swallowed.

The statistical study in question, was published in the journal *Human Fertility*, March, 1947, entitled: "Conception Control and the Medical Profession, the attitude of 3,381 physicians toward contraception and the contraceptives they prescribe," by Dr. Stan F. Guttmacher, Associate Professor of Obstetrics at Johns Hopkins University.

TECHNIQUE AND RESULTS OF GUTTMACHER POLL.

Dr. Guttmacher thought it important to obtain and study dispassionately the views of a wide cross-section of physicians toward conception control. This is what he did, what he got, and what he concluded from his survey. I quote largely verbatim from Dr. Guttmacher's paper:

"A carefully worded questionnaire was mailed with an accompanying letter to 15,000 physicians in October, 1944. The list was supplied by a professional mailing house. The list included all the obstetricians and gynecologists of this country, numbering 5,906. The remainder were sent to general practitioners distributed as follows: 37 per cent in the Northeast, 21 per cent in the South, 30 per cent in the Central States, and 12 per cent in the West. Fifty per cent were mailed to general practitioners residing in cities with a population of over 50,000; 30 per cent to those in communities of 5,000 to 50,000; and 20 per cent to rural districts with the largest town less than 5,000 inhabitants. This distribution of areas and community size approximates the spread of physicians throughout the whole country. The number of completed questionnaires upon which the study is based is 3,381. There were 3,782 replies, but 401 were returned not filled out because of absence in the armed forces, not in practice, deceased, etc. *Any conclusion drawn from this study of 3,381 completed questionnaires is validated or invalidated by whether the sample is selective and therefore biased, or representative and therefore unbiased.*"

This is the 64-dollar question which we also have to ask, because with it stands and falls the entire value of the study as Dr. Guttmacher himself pointed out. In statistics we have two ways of collecting the necessary data, (I) complete enumeration which tries to get information from each individual concerned, examples of which are the census and the compilation of vital statistics; (II) incomplete enumeration or sampling,

which takes place when it is impossible for administrative or financial reasons to get information from each individual concerned. It is impossible to ask every one of the almost one hundred million qualified voters in the United States in a pre-election inquiry about their preferred candidate.

The possibility of getting a complete enumeration is even smaller if the question is concerned with controversial attitudes and opinions. In such instances we use the method of sampling and enumerate the opinion (or characteristics) of a smaller part of the total, but have to take care that sample is representative of the total with regard to the distribution of the sample among the total. An inquiry concerning the attitude of the United States population on the Negro question would be invalid if it would contain answers predominantly from the South or the North, and an inquiry about the justification of farm subsidies would not give true results if we were to question mainly people living in either rural or urban districts.

ANALYZING THE RESULTS

It is a general rule of sampling to divide the total population into a large number of groups (called strata, which are divisions according to geographic region, urban and rural location, sex, age, social and professional status), and then try to have the sample represented equally in each strata. Dr. Guttmacher obviously tried to make his sample representative. He divided the 15,000 physicians to whom he sent the questionnaire into nine groups (or strata), four of them according to the geographic region: Northeast, Central, South, West; three according to the size of the community: 50,000 population and over, 5,000 to 50,000 population, and less than 5,000 population; and finally two according to professional specialization: obstetricians and gynecologists, and general practitioners.

This is fair enough and would have given valid information if no other selection were involved. The percentages of mailed questionnaires and completed replies by geographic regions shows no essential differences between the four groups as can readily be seen from Table I:

TABLE I. *Percentual Distribution of Questionnaires and Replies by Geographic Areas*

| <i>Geographic Area</i> | <i>Original 15,000 Questionnaires</i> | <i>3,381 Completed Replies</i> |
|------------------------|---|------------------------------------|
| Northeast | 37 | 41 |
| West | 12 | 13 |
| South | 21 | 17 |
| Central | 30 | 29 |
| Total | 100 | 100 |

There is, however, some selection evident in the second division of the sample, referring to the size of the community, and in this respect the opinion poll cannot be wholly representative, as seen in Table II.

TABLE II. *Percentual Distribution of Questionnaires by Size of Community*

| <i>No. of Inhabitants in Community</i> | <i>Original 15,000 Questionnaires</i> | <i>3,381 Completed Replies</i> |
|--|---|------------------------------------|
| Less than 5,000 | 20 | 12 |
| 5,000 to 50,000 | 30 | 19 |
| 50,000 and over | 50 | 62 |
| Unknown | — | 7 |
| Total | 100 | 100 |

Dr. Guttmacher explains that "the effect of this selection is to exaggerate the percentage approval of conception control, since physicians in the larger cities are more affirmative in their attitude toward this question."

The difference between the attitude of physicians in rural and urban places would certainly be more pronounced if the group of communities with 50,000 and more inhabitants would have been subdivided into two groups: 50,000 to 500,000 and 500,000 and more. Unfortunately, Dr. Guttmacher's article does not indicate to which degree the physicians in rural areas were less in favor of birth control than their colleagues in metropolitan centers, and for that reason, a recalculation using the method of a standard population, in this case that of all mailed questionnaires, is impossible.

PROFESSIONAL SPECIALIZATION STRATA

The third group of strata refers to the professional specialization. Of the 5,906 obstetricians and gynecologists to whom questionnaires were sent, 1,291 or 21.9 per cent replied, and of the 9,094 general practitioners, 2,032 or 22.5 per cent answered. From these figures it is obvious that there was no selection in respect to the percentage of answers from general practitioners and specialists, although there is a strange lack of information about the difference in the attitude of these two branches of the medical profession, which is a weak point in Dr. Guttmacher's paper.

One serious selection has to be noted in this respect, and that is the factor that *100 per cent of all obstetricians and gynecologists* and only about *10 per cent of the general practitioners* were asked about their opinion. If there is a marked difference in the attitude toward birth control between these two groups, this difference would be magnified almost tenfold if the total number of physicians and surgeons were considered.

The third objection which we make pertains to the selection and bias of persons who answered the questionnaire compared with the attitude of those who did not answer. Dr. Guttmacher takes a position on this point, too. He declares that "In a survey of opinion conducted by mail it is always uncertain whether those who answer differ fundamentally in attitude from those who do not reply. We can make no absolute statement

regarding this point. However, we have data suggesting that the responses were not specially weighted by protagonists or antagonists of conception control." That is what he thinks.

Now to the real figures: The total number of questionnaires originally sent was 15,000 of which 401 were not returned or filled out because of absence in the armed forces, not in practice, deceased, etc. This leaves a total of 14,599 questionnaires to which answers could have been expected. Only 3,381 answers were collected, 2,949 after the initial mailing and 432 in response to a follow-up letter mailed to a random sample of 2,000 physicians who failed to reply to the original communication. Even if we assume that such a follow-up letter would have been sent to all 11,650 physicians who did not respond to the original communication, and if we assume, furthermore, that final answers would have been received from all 11,650 physicians according to the same ratio as from the 2,000 random sample, namely 21.6 per cent, the maximum number of expected replies, including the 2,949 replies to the original request would have been only 5,465. It means, therefore, that from all 14,599 physicians asked about their attitude, 9,134 or two-thirds did not reply even after they received (or would have received) a follow-up letter with a second request.

ANOTHER CAUSE FOR BIASED SELECTION

And this is very important. Not to recognize that such a relation of one-third of answers to two-thirds of refused answers in a hotly disputed matter does involve a definitely biased selection, means either a lack of understanding or an abuse of statistics and justifies the joke of the three types of lies.

To explain this statement, let us assume that the Planned Parenthood Federation sends an inquiry about the justification and advisability of birth control to 100 clinics for birth control and the same inquiry to 100 Catholic hospitals. The result would be that the Planned Parenthood Federation would receive affirmative replies from almost all of the 100 birth control clinics; let us estimate their number as 90. A few vehemently negative replies would be received from the Catholic hospitals, probably not more than ten—most of them would not respond to the questionnaire at all. The result would be an overwhelming 90-10 majority in favor of birth control.

Now let us assume that the same inquiry, perhaps slightly differently phrased, would be sent to the same 100 birth control clinics and 100 Catholic hospitals not by the Planned Parenthood Federation but by the Catholic Hospital Association. The replies the Catholic Hospital Association would receive would be completely different. Almost all of the 100 Catholic hospitals (let us estimate their number again as 90) would report to the Catholic Hospital Association that their stand is against birth control. On the other hand many of the birth control clinics

would not answer at all, perhaps being suspicious of the intentions of the Catholic Hospital Association, and some others would make their stand clear. We might take the latter as numbering 30, three times as many as the Catholic hospitals in the first example, because in matters with a conservative and a revolutionary standpoint, the persons advocating the revolutionary change are always more ready to advocate their cause than the conservatives. It means that the Catholic Hospital Association would compile statistics showing an overwhelming 90-30 majority against birth control.

This brings to light that the same inquiry made to the same group of institutions yields completely reversed results, *depending on who sends the questionnaire and accompanying letter*. This thought is, of course, completely absent in Dr. Guttmacher's paper. The Planned Parenthood Federation bases its propaganda on figures supposed to be statistical and scientific. The true percentage of physicians advocating birth control cannot be deduced from the figures given. One thing is certain, the true percentage is much smaller, not by a few points but by a considerable margin.

This example of biased statistics is not intended to discredit public opinion polls generally; rather, it points to the conclusion that it is wise to be very careful in reading and interpreting any kind of statistical sampling which contains highly controversial questions from whatever source they come, and especially if the compiling agency itself is interested in either a high or low affirmative answer.

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