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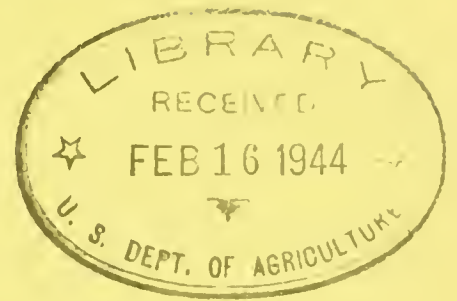
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UNITED STATES DEPARTMENT OF AGRICULTURE
Bureau of Agricultural Economics



Agricultural Economics Bibliography No. 90

THE SAMPLING METHOD IN SOCIAL AND ECONOMIC RESEARCH

A Partial List of References

Compiled by Nellie G. Larson
Under the Direction of Mary G. Lacy, Librarian
Bureau of Agricultural Economics

Washington, D. C.
January 1941



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REPUBLICAN PARTY, NATIONAL COMMITTEE
WASHINGTON, D. C.

MEMORANDUM FOR THE RECORD

RE: [Illegible]

[Illegible]

[Illegible]

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FOREWORD

This is a partial list of references to books, pamphlets and periodical articles in the English language, published between January 1928 and June 1940, which deal with the theory, technique and application of the sampling method in social and economic research, with particular reference to human populations.

The bibliography is in two main parts. The first contains references on the theory and technique of sampling, and the second, references to studies using the sampling method. A section of the second part contains references to material on straw votes and polls of public opinion.

Many research studies are based on sample data rather than on complete enumeration. It is not the purpose of this bibliography to list all studies using the sampling technique, and no systematic search for them was made. References to those included were obtained from citations in the bibliographies and footnotes of publications examined.

Sampling in the field of crop estimating has been omitted, except in cases where the discussion related to sampling theory or technique. Likewise, material relating to sampling in field trials and yields, biological and actuarial data, and quality characteristics of industrial and agricultural products has generally been omitted. Only a limited number of references to textbooks on statistical methods have been included. Studies in the field of psychological research were included when found, but no attempt was made to check systematically for such references.

An author and subject index is appended.

Call numbers following the citations are those of the United States Department of Agriculture Library, unless otherwise noted. "Libr. Cong." preceding a call number indicates that the publication is in the Library of Congress.

Acknowledgment is made of many helpful suggestions received from Mr. Bela Gold, Senior Social Science Analyst of the Bureau of Agricultural Economics.

Mary G. Lacy, Librarian,
Bureau of Agricultural Economics,
U. S. Department of Agriculture

January 1941.

SOURCES CONSULTED

Card catalogues of the following libraries:

- U. S. Department of Agriculture
- U. S. Department of Agriculture, Bureau of Agricultural Economics

Miscellaneous:

- Frankel, Lester R., and Stock, J. Stevens. Bibliography on sampling procedure. 4pp., typewritten. [Washington, D. C., U. S. Federal Works Agency, Work Projects Administration?] May 15, 1940.
- Industrial Arts Index, v. 17, 1928 to v. 28, no. 7, June 1940. Published by the H. W. Wilson Co., New York, N. Y.
- Social Science Abstracts, v. 1, Mar. 1929 to v. 4, Dec. 1932. Published by the Social Science Research Council, New York, N. Y.

Periodicals:

- American Statistical Association Journal, v. 23, 1928 to v. 35, part 1, June 1940. Published in Menasha, Wisconsin.
- Annals of Mathematical Statistics, v. 1, 1930 to v. 11, no. 2, June 1940. Published by the Institute of Mathematical Statistics, P. R. Rider, Secretary, Washington University, St. Louis, Missouri.
- Biometrika, v. 20, 1928 to v. 31, no. 4, Mar. 1940; v. 1, 1930 to v. 11, no. 2, June 1940. Published by the Biometrika Office, University College, London, England.
- Econometrika, v. 1, 1933 to v. 8, no. 2, Apr. 1940. Published by the Econometric Society, University of Chicago, Chicago, Illinois.
- Indian Journal of Statistics (Sankhyā), v. 1, 1933 to v. 4, no. 4, Mar. 1940. Published by the Indian Statistical Institute, Calcutta, India.
- Journal of Farm Economics, v. 10, 1928 to v. 22, no. 2, May 1940. Published by the American Farm Economic Association, Menasha, Wisconsin.
- Metron, v. 7, 1927 to v. 13, no. 4, 1939. Published by Istituto di Statistica della R. Università di Roma, Rome, Italy.
- Public Opinion Quarterly, v. 1, 1937 to v. 4, no. 3, Sept. 1940. Published by the School of Public Affairs, Princeton University, Princeton, New Jersey.
- Royal Statistical Society. Journal, v. 91, 1928 to v. 102, 1939. Also Supplements, v. 1, 1934 to v. 6, 1939. Published in London, England.
- Rural Sociology, v. 1, 1936 to v. 5, no. 2, June 1940. Published by the Rural Sociological Society, Louisiana State University, University, Louisiana.
- Sociometry, v. 1, 1937 to v. 3, no. 2, Apr. 1940. Published by J. L. Moreno, Beacon, New York.

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THEORY AND TECHNIQUE OF SAMPLING

1. Anderson, Oskar N. Statistical method. In Encyclopaedia of the Social Sciences, v. 14, pp. 366-371. New York, The Macmillan co., [1934] 280 En1
Bibliography for this article and others preceding it, pp. 372-373.
Includes some discussion of sampling theory.
2. Arkin, Herbert, and Colton, Raymond R. An outline of statistical methods as applied to economics, business, education, social and physical sciences, etc....with a preface by Justin H. Moore. Ed. 4, 177pp. New York, Barnes & Noble, inc. [1939] (College outline series) 251 Ar4A Ed. 4
Bibliography at end of each chapter.
With this is bound the authors' Tables of Squares, Square Roots, Cubes, and Cuberoots. New York [1934]
Ch. XIII, Theory of Sampling, pp. 113-128, is a condensed treatment of the subject, with formulas and examples and a minimum of text. A bibliography on sampling with special reference to educational measurements is appended at the end of the chapter, p. 128.
3. Baker, George A. Comparison of Pearsonian approximations with exact sampling distributions of means and variances in samples from populations composed of the sums of normal populations. Ann. Math. Statis. 11(2): 219-224. June 1940. 251.8 An7
The purpose of this article, as stated in the writer's Introduction, is "to extend the results given in [a previous paper on the distributions of the means and standard deviations of samples from certain non-homogeneous populations,] and to compare the moment approach of the Pearsonian school with the true distributions."
4. Baker, George A. Distribution of the means divided by the standard deviations of samples from non-homogeneous populations. Ann. Math. Statis. 3(1): 1-9. Feb. 1932. 251.8 An7
"It is the purpose of this paper to discuss similarly the

distribution of the means of samples of two measured from the mean of the population divided by the standard deviations of the samples for such parent populations and to present experimental results for samples of four." - p. 1.

5. Baker, George A. Distribution of the means of samples of n drawn at random from a population represented by a Gram-Charlier series. *Ann. Math. Statist.* 1(3): 199-204. Aug. 1930. 251.8 An7
The formulas and computations in determining the distribution are given.
For a discussion on this paper, See Craig, Cecil Calvert. Note on the Distribution of Means of Samples of N Drawn from a Type A Population.
6. Baker, George A. Note on the distributions of the standard deviations and second moments of samples from a Gram-Charlier population. *Ann. Math. Statist.* 6(3): 127-130. Sept. 1935. 251.8 An7
"The purpose of this paper is to shed some light on the distribution of u_2 and to give the distribution of second moments about a fixed point when the sampled population can be represented by a Gram-Charlier series." - p. 127.
7. Baker, George A. The probability that the mean of a second sample will differ from the mean of a first sample by less than a certain multiple of the standard deviation of the first sample. *Ann. Math. Statist.* 6(4): 197-201. Dec. 1935. 251.8 An7
"This paper gives the probability function of a deviation in the mean of a future sample measured from the mean of a first sample and measured in terms of the standard deviation of a first sample, that is, in terms of quantities known from the first sample." - Summary
8. Baker, George A. The probability that the standard deviation of a second sample will differ from the standard deviation of a first sample by a certain multiple of the standard deviation of the first sample. *Metron* 13(3): 49-54. Dec. 31, 1938. 251.8 M56
"The results of this paper indicate definitely the probability of the standard deviations of future samples deviating a certain multiple of the standard deviation of the first sample from the standard deviation of the first sample." - p. 49.
9. Baker, George A. Random sampling from non-homogeneous populations. *Metron* 8(3): 67-87. Feb. 28, 1930. 251.8 M56
Bibliography, p. 87.
"It is the purpose of this paper to develop the theory of the distributions of estimates of statistical constants by means of random samples from non-homogeneous populations of one variate to a basis that is comparable to that already developed for homogeneous populations." - p. 67.

10. Baker, George A. The relation between the means and variances, means squared and variances in samples from combinations of normal populations. *Ann. Math. Statis.* 2(3): 333-354. Aug. 1931. 251.8 An7

The writer concludes as follows: "From the results of the case of samples of two and from the results of empirical sampling, it seems clear that the simplest regression relation that is generally applicable to the means and variances, means squared and variances, of samples from populations which are the combinations of normal populations is parabolic."

11. Bartlett, M. S. The vector representation of a sample. Cambridge. *Phil. Soc. Proc.* 30(3): 327-340. July 1934. 501 C142
References, p. 340.

Discusses vector notation, analysis of a sample of one dependent variate, vector condition for the normal law of error, independence of the vector components, and correlated variates; and presents the equations and formulas employed.

12. Baten, William Dowell. Correlation and sampling. 57pp., processed. Ann Arbor, Michigan, Edwards bros., inc., 1934. Libr. Cong. HA33.B3

"This small book was written primarily for students interested in statistics who have not studied differential and integral calculus. It attempts to present some of the basic ideas concerning linear correlation, non-linear regression and random sampling. The mathematical derivations of all formulas are given together with representative problems.

"The chapter on random sampling [pp. 31-42], from a parent population gives only developments for the mean, standard deviation and skewness of the distribution of the means of the samples, as this distribution is so often used in practice." - Preface.

13. Baten, William Dowell. Elementary mathematical statistics. 338pp. New York, J. Wiley & sons, inc., 1938. Libr. Cong. QA276.B3

This book is intended for students who have not studied differential and integral calculus. Formulas and fundamental relations are developed by the use of algebra, trigonometry, and analytical geometry.

Ch. 11, pp. 201-222, is on sampling, and studies the procedure from a known parent population and later from an unknown parent.

14. Baten, William Dowell. Formula for finding the skewness of the combination of two or more samples. *Amer. Statis. Assoc. Jour.* 30(189): 95-98. Mar. 1935. 251.8 An3

The formulae are developed and some computations given.

15. Borden, Neil H. Some problems in sampling for consumer surveys. Amer. Mktg. Jour. 3(1): 19-24. Jan. 1936. Libr. Cong. HF5415.A2A6
Written in non-technical language; this article deals primarily with the problem of selecting representative samples in investigations of consumers' habits in use and attitudes toward given products. The distribution of a random sample would be dependent on the following class differences according to this author: 1. Geographical location; 2. Size of locality of residence; 3. Income; 4. Racial extraction.
16. Bose, Raj Chandra. A note on the distribution of differences in mean values of two samples drawn from two multivariate normally distributed populations, and the definition of the D^2 -statistic. Indian Jour. Statis. (Sankhyā) 2(4): 379-384. Dec. 1936. 251.8 In2
Contains numerous formulas and equations.
17. Bose, Raj Chandra. On the distribution of the means of samples drawn from a Bessel function population. Indian Jour. Statis. (Sankhyā) 3(3): 262-264. May 1938. 251.8 In2
Equations, formulas and calculations make up the major share of the paper.
18. Bose, Subhendu Sekhar. On the distribution of the ratio of variances of two samples drawn from a given normal bivariate correlated population. Indian Jour. Statis. (Sankhyā) 2(1): 65-72. Aug. 1935. 251.8 In2
References, p. 72.
The discussion is arranged under the following sub-headings: 1. The distribution of the ratio of variances obtained from two independent samples; 2. Distribution of the ratio of variances from a correlated population; 3. Results of a sampling experiment; 4. Discussion.
19. Bose, Subhendu Sekhar. Tables for testing the significance of linear regression in the case of time-series and other single-valued samples. Indian Jour. Statis. (Sankhyā) 1(2-3): 277-288. Aug. 1934. 251.8 In2
Formulas are given and their applications are discussed and illustrated. Four pages of tables giving 1 percent and 5 percent values of the regression coefficient are included.
20. Bowley, Arthur Lyon. The application of sampling to economic and sociological problems. Amer. Statis. Assoc. Jour. 31(195): 474-480. Sept. 1936. 251 Am3
Paper read to the Study Group of the Royal Statistical Society, Jan. 1935.
Brings out some illustrations of the use of sampling in describing populations, as for instance the Japanese sample census

of 1923, taken after the earthquake destroyed earlier records. These results were published in 1924, whereas the English census of 1931 was not yet published in Jan. 1935. There is some discussion of probability and variance and fairness of samples, with illustrative formulas and examples of application.

21. Bowley, Arthur Lyon. Elements of statistics. Ed. 6, 503pp. London, P. S. King & son, ltd.; New York, C. Scribner's sons, 1937. 251 B68 Ed. 6

In this well known text are several chapters that contain material on the mathematical and statistical phases of sampling. Note particularly the following: Ch. VIII, of Part I, Accuracy, pp. 178-195; and in Part II, Ch. II, Algebraic Probability and the Normal Curve of Error, pp. 259-286; Ch. IV, Application of the Law of Error, pp. 312-342.

22. Brandner, Fred A. A test of the significance of the difference of the correlation coefficients in normal bivariate samples. Biometrika 25(1-2): 102-109. May 1933. 442.8 B522

"The problem discussed is that of testing the hypothesis that two samples have been drawn from populations in which the coefficient of correlation has some common but unspecified value." - Conclusion.

23. Brandt, A. E. A test for significance in a unique sample. Amer. Statis. Assoc. Jour. 28(184): 434-437. Dec. 1933. 251 Am3

This is a brief article in the Notes section of the Journal. Illustrated with a one-page diagram and some mathematical formulas.

24. Brown, George Middleton. On sampling from compound populations. Ann. Math. Statis. 4(4): 288-342. Nov. 1933. 251.3 An7

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Science in the University of Michigan, June, 1933.

Part I deals with sampling from a single parent population, and Part II deals with sampling from multiple populations. The paper is composed largely of formulas and tables.

25. Burks, Barbara S. A statistical method for estimating the distribution of sizes of completed fraternities in a population represented by a random sampling of individuals. Amer. Statis. Assoc. Jour. 28(184): 388-394. Dec. 1933. 251 Am3

"In studies of birth trends and differential fertility it is often desirable but difficult to secure data upon the distribution of sizes or upon the average size of completed families. A method is herewith presented for estimating this distribution and average size for the total population from which a sample of individuals belonging to fraternities of varying completeness is

drawn. Formulae are presented for the standard errors of estimate; several illustrations of application to data are given; and a check of the method against fact is provided through material involving 1,800 fraternities complete or approximately so." - p. 388.

26. Camp, Burton Howard. The mathematical part of elementary statistics; a textbook for college students. 409pp. Boston, [etc.] D. C. Heath and co. [1931] 325 C152
Ch. 4, Sampling, pp. 240-285, contains the following sections:
1. Nature of the problem; 2. Mean of a sample; 3. Applications; 4. Moments of a sample; 5. Coefficient of correlation; 6. Chi test; 7. Significance of a difference; 8. Difference between proportions; 9. Application to physical observations.
27. Carlson, John L. A study of the distribution of means estimated from small samples by the method of maximum likelihood for Pearson's type II curve. Ann. Math. Statis. 3(2): 86-107. May 1932. 251.8 An7
"The object of this paper is to study the distribution of estimates of the parameter of location for Pearson's Type II Curve, estimated by the method of maximum likelihood from small samples."
28. [Carver, H. C.] Fundamentals of the theory of sampling. Editorial. Ann. Math. Statis. 1(1, 3): 101-121, 260-274. Feb., Aug. 1930. 251.8 An7
These papers, which are largely composed of mathematical formulas and algebraic methods, were published in the following parts:
I. Sampling from a limited supply. II. Sampling from an unlimited supply. III. Distribution of sample n th moments about the origin of the parent population.
29. Carver, H. C. The interdependence of sampling and frequency distribution theory. Ann. Math. Statis. 2(1): 82-98. Feb. 1931. 251.8 An7
The writer's conclusion is as follows: "I. Answers to problems of statistical sampling are usually expressed as finite or infinitesimal integrals under a function whose moments only are known. If known, the function is generally of but little value. II. It is necessary to approximate the desired integrals by employing frequency functions. III. Present methods are unsatisfactory from the point of view that remainder or limit of error terms are not available. The X^2 test, though helpful, does not meet the issue in question."
30. Chesire, Leone, Oldis, Elena, and Pearson, Egon S. Further experiments on the sampling distribution of the correlation coefficient. Amer. Statis. Assoc. Jour. 27(178): 121-128. June 1932. 251 An3

"The theoretical law for the sampling distribution of the product-moment coefficient of correlation, r , has been established only in the case where the two variables are normally correlated in the population sampled... It is clear that each additional piece of experimental evidence will contribute its part toward a final picture of the situation, and therefore it has seemed of value to record and analyze briefly the following series of sampling results." - p. 121. Two illustrative cases are given.

31. Clawson, Marion. Suggestions for a sample census of agriculture in the West. Jour. Farm Econ. 22(3): 633-637. Aug. 1940.
280.8 J822

"The purpose of this note is to suggest that in the West there exist institutions, which would facilitate taking an annual census of agriculture (if the time ever comes when this can be undertaken) or that could be used in a limited way under existing procedures for estimating agricultural production. These institutions are found in the irrigated-crop areas and in the ranch-livestock areas." - p. 633. The Bureau of Reclamation is one of the agencies considered.

32. Cochran, W. G. The use of the analysis of variance in enumeration by sampling. Amer. Statis. Assoc. Jour. 34(207): 492-510.
Sept. 1939. 251 Am3

References for further reading, p. 510.

Revision of a paper presented at the 100th annual meeting of the American Statistical Association in Detroit, December, 1938.

The author's summary and concluding paragraph follows: "The results of a properly planned sampling investigation, in addition to providing an estimate of the accuracy of the sample, often provide estimates of the accuracy of various alternative methods of sampling which might have been used. These estimates are helpful in increasing the efficiency of sampling in future studies on similar material. The use of the analysis of variance of the sampling results for this purpose is discussed and illustrated by a numerical example. The case in which an appreciable fraction, say more than 10%, of the total population is sampled is discussed briefly. The estimate of the relative accuracy of two methods of sampling is shown to be in most cases a simple function of the variance-ratio, so that its sampling limits are easily obtainable. Some advice is given on the problem of analysing the results of large samples without excessive labour."

33. Coggins, Paul P. Some general results of elementary sampling theory for engineering use. Bell System Tech. Jour. 7: 26-69. Jan. 1928. Libr. Cong. TK1.B45

The theory and mathematics of the sampling of attributes and of variables are set forth, and a series of illustrative charts are appended on pp. 48-69.

34. Conference on statistical methods of sampling agricultural data, Ames, Iowa, July 14-17, 1936. Proceedings...July 14-17, 1936, Iowa State college, Ames, Iowa. 82pp., processed. Washington, D. C., U. S. Dept. of agriculture, Bureau of agricultural economics, 1936. 1.9 Ec7Conf

"The Bureau of Agricultural Economics, U. S. Department of Agriculture, and the Department of Agricultural Economics, the Department of Mathematics, and Statistical Laboratory of Iowa State College cooperating."

Contents: (Papers or summaries of papers given) Need for an annual sample census of American agriculture and type of data desired by the Farm Credit Administration. Summary of remarks made by O. A. Day, pp. 3-4; Sample census of American agriculture: Type and need from census standpoint, by Z. R. Pettet, pp. 4-7; Sample census of American agriculture, by W. W. Wilcox, pp. 7-9; Sample census of American agriculture. The type of data required and the need for an annual sample census, by J. A. Becker, pp. 9-11; Problem of selecting the sample. Experience of Iowa State College in selecting farms, sampling used, and results obtained, by T. W. Schultz, pp. 11-14; Statistical problems of an annual sample census of American agriculture, by C. F. Sarle, pp. 14-21; A sample farm census in Alabama, by H. H. Schutz, pp. 21-27; Rural carrier acreage survey in Ohio, by C. F. Sarle, pp. 28-31; Assessors' and rural-carrier acreage data in Iowa, by L. M. Carl, pp. 32-33; Summarization of experience of Division of Crop and Livestock Estimates with individual farm data, by J. A. Becker, pp. 33-34; Sample census of American agriculture, by W. H. Ebling, pp. 34-36; Sample census of American agriculture, by M. M. Justin, pp. 36-37; Problems of a sample census, by G. W. Snedecor, p. 38; Problems of assessor enumerations - Iowa experience, by C. D. Reed, pp. 39-43; Wisconsin's experience with assessors' enumerations, by W. H. Ebling, pp. 43-46; Kansas assessors' enumeration, by H. L. Collins, pp. 46-48; Indiana assessors' enumerations, by M. M. Justin, pp. 49-50; Problems of assessors' enumerations, by Z. R. Pettet, pp. 51-53; Air photographs, by Z. R. Pettet, pp. 53-54; Objective measurements in crop and livestock estimation. Crop meter, cotton boll count, measurement of size of cotton boll, etc., by J. A. Becker, pp. 54-60; Problems arising in connection with taking an annual sample census of American agriculture, by C. F. Sarle, pp. 61-80; Report and recommendations of the statistical conference, p. 81.

The last paper, by Mr. Sarle "was prepared after the close of the Conference and is an attempt to summarize some of the more important problems that came up for discussion and to bring together the meagre experience of the Bureau of Agricultural Economics in analyzing individual farm data. Alternative means for attaining desired ends are presented and specific research needs pointed out."

35. Cover, John H. Some investigations in the sampling and distribution of retail prices. *Econometrica* 5(3): 263-279. July 1937.
280.8 Ec78
The discussion is in four parts: 1. Sampling problems; 2. Stratification; 3. Standard errors of average prices; 4. Standard errors of retail price indexes.
36. Craig, Allen T. On the correlation between certain averages from small samples. *Ann. Math. Statis.* 4(2): 137-142. May 1933.
251.8 An7
"In the present paper, a few simple theorems are established which make possible the determination of the type of regression of the median on the arithmetic mean, of the range on the median, and of the range on the arithmetic mean. In case the regression is linear, the coefficient of correlation may be computed." - Introduction.
37. Craig, Allen T. On the mathematics of the representative method of sampling. *Ann. Math. Statis.* 10(1): 26-34. Mar. 1939.
251.8 An7
Bibliography, p. 34.
Paper presented to a joint session of the Institute of Mathematical Statistics and the American Statistical Association on Dec. 29, 1938.
Some of the theorems and methods of mathematical statistics that serve useful purposes in the method of stratified random sampling are enumerated and discussed.
38. Craig, Allen T. The simultaneous distribution of mean and standard deviation in small samples. *Ann. Math. Statis.* 3(2): 126-140. May 1932. 251.8 An7
The author proposes "to determine the simultaneous frequency function of the arithmetic mean and standard deviation in samples of small numbers of items selected at random from a rather arbitrary universe." - p. 126.
39. Craig, Cecil Calvert. An application of Thiele's semi-invariants to the sampling problem. *Metron* 7(4): 3-74. Dec. 31, 1928.
251.3 M56
Bibliography, pp. 71-74.
This extensive paper is divided into the following chapters: Introduction. 1. Semi-invariants and moments; 2. Semi-invariants of moments about a fixed point; 3. Semi-invariants of moments about the mean; 4. Semi-invariants of the correlation function of two moments about the mean; 5. The correlation function for powers of moments; 6. On obtaining results to given degrees of approximation; 7. The semi-invariants of a_3 and a_4 ; 8. Results thus far obtained; 9. Some empirically obtained results compared with those from the theory; 10. Conclusions.

40. Craig, Cecil Calvert. Note on the distribution of means of samples of N drawn from a type A population. *Ann. Math. Statis.* 2(1): 99-101. Feb. 1931. 251.8 An7

This article calls attention to a shorter method for obtaining the results shown in an article by Dr. George A. Baker on the same subject in this Journal for Aug. 1930, pp. 199-204.

41. Craig, Cecil Calvert. The product semi-invariants of the mean and a central moment in samples. *Ann. Math. Statis.* 11(2): 177-185. June 1940. 251.8 An7

"The method developed by the author for calculating the semi-invariants and product semi-invariants of moments in samples from any infinite population is not immediately applicable to the calculation of product semi-invariants of the mean and a central moment in such samples. In the present paper this method is adapted for this purpose so that the calculation of these product semi-invariants becomes routine. As it will be seen, the computing is a little heavier than in the case of central moments alone for results of equal weight. A table of results up to weight ten for the mean and the second, third and fourth central moments is given. The author plans to apply these to a further study of the sampling characteristics of the coefficient of variation and Fisher's t in samples from non-normal populations." - p. 177.

42. Craig, Cecil Calvert. Sampling in the case of correlated observations. *Ann. Math. Statis.* 2(3): 324-332. Aug. 1931. 251.8 An7

This paper explains "a method based on the semi-invariants of Thiele for the calculation of the characteristics of the sought distributions in this case which is especially to be preferred to the method based on moments when it is supposed that the observations are normally correlated." - p. 324.

43. Craig, Cecil Calvert. Sampling when the parent population is of Pearson's type III. *Biometrika* 21(1-4, sect. B): 287-293. Dec. 1929. 442.8 B522

Discusses the application of methods to sampling studies in cases in which the parent distribution is skew.

Note on Dr. Craig's paper, by Egon S. Pearson, pp. 296-302.

44. Crossley, Archibald M. Size and distribution of the research sample. *Advertising and Selling* 29(1): 32, 77-78. May 6, 1937. Libr. Cong. HF5801.A29

The writer finds that 20 years of experience has demonstrated two things about sample setting: "1. The smallest figure we are going to use in computing a percentage usually should not be much less than 25. 2. Our total sample should be about 0.1 per cent of the total field." - p. 77

45. Croxton, Frederick E., and Cowden, Dudley J. Applied general statistics. 944pp. New York, Prentice-Hall, inc., 1939. 251 C882A
Selected references at ends of chapters.
In Ch. 2, Statistical Data, there is a section (pp. 26-33) on the selection of a sample, which defines and discusses random, stratified, and purposive samples.
Chapters 12 and 13, pp. 305-362, deal with Reliability and Significance of Statistical Measures. Reliability of sample means is discussed for large and small samples, as are percentages, standard deviations, variances, and the criterion of likelihood.
46. Crum, William Leonard, Patton, Alson Currie, and Tebbutt, Arthur Rothwell. Introduction to economic statistics. 423pp. New York and London, McGraw-Hill book co., inc., 1938. 251 C88 1938
A complete revision of Crum and Patton's Introduction to the Methods of Economic Statistics. cf. Preface.
On pp. 216-218, is a brief description of the theory of the selection of a random sample. The mathematics involved in sampling studies are found in various chapters throughout the book.
47. Davenport, Charles Benedict, and Elzas, Perle P. Statistical methods in biology, medicine and psychology. Ed. 4, completely rev., 216pp. New York, J. Wiley & sons, inc.; London, Chapman & Hall, ltd., 1936. 442 D27S Ed. 4
References, pp. 140-148.
Ch. II contains a section, Sampling and its Errors, pp. 35-40, which includes formulas and some discussion.
48. David, F. N. Limiting distributions connected with certain methods of sampling human populations. London. Univ. Univ. Col. Dept. Statis. Statis. Res. Mem. 2: 69-90. Dec. 1938. 251 L84
References, p. 90.
In his summary the writer states: "it has been shown that the distribution of the means of samples drawn without replacement from a finite population tends to be normal as the sizes of the sample and the population are indefinitely increased. This result is applied to find the limiting distribution of the weighted mean of a sample drawn from a finite population with random weights."
49. Davies, O. L., and Pearson, E. S. Methods of estimating from samples the population standard deviation. Roy. Statis. Soc. Jour. Sup. 1(1): 76-93. 1934. 251 R81Js.
The calculations and formulas used in measuring variations in the tensile strength of a sample of six cement-mortar briquettes formed from a single mixing of a given material are discussed

under the following headings: 1. Introductory; 2. The sampling distribution of an estimate; 3. Estimates from a single sample or group; 4. Estimates from a number of sub-samples or groups; 5. Illustration on cement-mortar data; 6. Summary of theory and tables underlying the results; 7. The approach to normality of the sampling distributions of the estimates; 8. Conclusion.

50. Davis, Harold T., and Nelson, W. F. C. Elements of statistics, with applications to economic data. 424pp. Bloomington, Indiana, The Principia press, inc. [1935] 251 D29

In Ch. VIII, The Normal Frequency Curve - Problems in Sampling, pp. 187-210, is a section called "Probable error applied to sampling," pp. 191-195, which states the problem involved and gives two examples of its application.

51. Dawson, Shepherd. An introduction to the computation of statistics... with forty-two diagrams. 192pp. London, University of London press, ltd., 1933. 251 D32

Bibliography, pp. 184-187.

Ch. IV, Sampling, pp. 71-128, contains discussion and illustrative calculations and formulas on probability, frequency distributions, probable and standard error, significance of a mean, standard deviations, and χ^2 test of goodness of fit.

52. Deming, William Edwards, and Birge, Raymond T. On the statistical theory of errors. pp. 119-161. Washington, D. C., U. S. Dept. of agriculture, Graduate school, 1937. 1 Ag8540

"Reprinted from Reviews of Modern Physics, vol. 6, 119-161, July 1934. With additional notes dated 1937."

In their Introduction, the writers state: "The branch of statistics that concerns the theory of errors is called 'sampling' or 'the theory of small samples.' The object of sampling is to make an estimation of the magnitude and variability of some measureable property of a very large number of items by testing only a portion of them... The confidence that one may place in such an estimate depends on the size of the sample and on previous experience with similar items, when such experience is available... The theory of sampling furnishes both the methods of estimation and the odds." - p. 122.

The greater portion of the discussion is devoted to The Distribution of Certain Properties of Samples Drawn from a Normal Parent Population, pp. 125-143, and to The Estimation of the Probable Error, pp. 144-160.

53. Dixon, W. J. A criterion for testing the hypothesis that two samples are from the same population. Ann. Math. Statis. 11(2): 199-204. June 1940. 251.8 An7

The author states that the "purpose of this paper is to consider a criterion for testing the hypothesis that two samples

have been drawn from populations with the same distribution function, assuming only that the cumulative distribution function to the two populations is continuous." - p. 199.

54. Dodd, Stuart C. The standard error of a "social force." *Ann. Math. Statist.* 7(4): 203-209. Dec. 1936. 251.8 An7

Contents: I. Definitions; II. The sampling error of one case (momentum); III. The generalized standard error; IV. Some special cases.

The writer concludes as follows: "A minimum of three measurements of one population is necessary to determine a social force. To determine its standard error all the correlations must be secured between every pair of measurements, each correlation derived from the part of the total population that is common to that pair of measurements. Obviously the data as currently reported from surveys and censuses and statistical bureaus do not meet these specifications."

55. Dunlap, Hilda Frost. An empirical determination of the distribution of means, standard deviations and correlation coefficients drawn from rectangular populations. *Ann. Math. Statist.* 2(1): 66-81. Feb. 1931. 251.8 An7

"This paper presents empirical evidence of their applicability [formulae for the standard errors of means, standard deviations and correlation coefficients] in the case of means and standard deviations of samples of ten from a rectangular discontinuous population, and of correlation coefficients of samples of fifty-two from a rank distribution." - p. 66.

56. Durand, David. Risk elements in consumer instalment financing. *Econometrica* 8(2): 177-178. Apr. 1940. 280.8 Ec78

A brief report of a paper read at the Philadelphia meeting of the Econometric Society in Dec. 1939.

"Dr. Durand discussed in general the feasibility of applying statistical methods to the problems of credit analysis and in particular the use of statistical sampling techniques."

57. Dwyer, Paul S. Combined expansions of products of symmetric power sums and of sums of symmetric power products with application to sampling. *Ann. Math. Statist.* 9(1-2): 1-47, 97-132. Mar.-June 1938. 251.8 An7

Bibliography, pp. 46-47, 131-132.

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the University of Michigan.

The paper is in two parts. Part II, Fundamentals of Sampling, contains the following sections: Introduction; Ch. I. A brief history of previous contributions; Ch. II. Notation and definition; Ch. III. The application of the double expansion theorem;

Ch. IV. The moments of the mean; Ch. V. The mean and variance of the variance; Ch. VI. Tabular presentation of formulas; Conclusion.

In his Conclusion the writer states that "the aim of this dissertation is not primarily to provide a list of sampling formulas, but rather to provide a method by which the desired sampling formula may be derived without too much algebraic work."

58. Dwyer, Paul S. Moments of any rational integral isobaric sample moment function. *Ann. Math. Statis.* 8(1): 21-65. Mar. 1937.
251.8 An7

Bibliography, p. 65.

"It is thus the purpose of this paper to determine the moments of a general moment function of the sample. This is done by keeping the multipliers of the various partitions of power sums indefinite until all manipulation is complete. It is then possible to assign the definite values of these multipliers which are associated with the desired sample function and to obtain the moment of the desired moment function in this way." - p. 22.

59. Elmer, Manuel Conrad. *Social research.* 522pp. New York, Prentice-Hall, inc., 1939. Libr. Cong. HM24.E44

Ch. 16, *The Sample in Social Research*, pp. 323-344, contains a discussion of sampling method with illustrations of its application in the measurement of social trends. A list of references is appended, pp. 343-344.

60. Ezekiel, Mordecai. *Methods of correlation analysis.* 427pp. New York, J. Wiley & sons, inc.; London, Chapman & Hall, ltd., 1930.
325 Ez3

References, pp. 337-340, 406.

The chapters of particular interest are: Ch. II, *Judging the Reliability of Statistical Results*, pp. 13-26, which discusses the reliability, variation and size in samples, and the computation and interpretation of the standard error; Ch. 19, *Influence of Selection of Sample and Accuracy of Observations on Correlation Results*, pp. 265-276, which discusses selection of sample with respect to values of variables and errors of observation.

61. Ezekiel, Mordecai. *The sampling variability of linear and curvilinear regressions.* A first approximation to the reliability of the results secured by the graphic "successive approximation" method. *Ann. Math. Statis.* 1(4): 275-333. Nov. 1930.
251.8 An7

"This paper reports an attempt to determine the sampling error of multiple regression curves and indexes of correlation obtained by the successive approximation process, under conditions of simple sampling. The experimental method has been used to investigate the variability of results from successive samples drawn

from the same universe under specified conditions and to establish error formulae inductively." - p. 276.

The paper is divided into two parts with an additional section of graphs and tables. Part I, Coefficients and Indexes of Correlation, contains the following sections: 1. The reduction of the "degrees of freedom" by free-hand smoothing; 2. Bias in coefficients of correlation; 3. Correcting for bias with indexes of (curvilinear) correlation; 4. Sampling accuracy in coefficients of correlation. Part II, Linear and Curvilinear Regressions, contains the following sections: 1. Sampling variability of linear regressions; 2. Outline and summary of experimental study of sampling variability of multiple curvilinear correlation results; 3. Construction of synthetic universes; 4. Drawing random samples; 5. Curvilinear regressions determined from the samples; 6. Errors in regression curves from the samples; 7. Derivation of tentative error formula; 8. Testing tentative formula by samples drawn from the original universe; 9. Testing tentative formula by samples drawn from a new universe; 10. Free-hand versus mathematical net regression curves.

62. Feldman, H. M. The distributions of the precision constant and its square in samples of n from a normal population. *Ann. Math. Statis.* 3(1): 20-31. Feb. 1932. 251.8 An7

The writer's introductory paragraph follows:

"The following paper is a study of the properties of the distributions of the precision constant and its square in samples of n from a normal population. The properties studied are (1) modes and optimum values, (2) the first four moments, (3) skewness and flatness, and (4) medians and quartiles."

63. Feldman, H. M. Mathematical expectation of product moments of samples drawn from a set of infinite populations. *Ann. Math. Statis.* 6(1): 30-52. Mar. 1935. 251.8 An7

A dissertation presented to the Board of Graduate Studies of Washington University in partial fulfilment of the requirements for the degree of Doctor of Philosophy, June 1933.

"In the present study generalized formulae for both the first moment and the variance of product moments of any order are obtained." - p. 30.

The paper is composed of five chapters whose titles are:

I. Notations and definitions; II. The mathematical expectation of p_{ab} ; III. The mathematical expectation of the variance of p_{ab} ; IV. The mathematical expectation of the third moment of p_{11} ; V. Product moments of trivariate and quadrivariate populations.

64. Fertig, John W., and Leary, Margaret V. On a method of testing the hypothesis that an observed sample of n variables and of size N has been drawn from a specified population of the same number of variables. *Ann. Math. Statis.* 7(3): 113-121. Sept. 1936. 251.8 An7

65. Fertig, John W., and Proehl, Elizabeth A. A test of a sample variance based on both tail ends of the distribution. *Ann. Math. Statis.* 8(4): 193-205. Dec. 1937. 251.8 An7

Contains equations, graphs, and tables.

66. Fieller, E. C. The distribution of the index in a normal bivariate population. *Biometrika* 24(3-4): 423-440. Nov. 1932. 442.8 B522
The discussion is arranged under the following headings:
The Probability integral of the index distribution; Frequency distribution of the index; Distribution of the index in a curtailed normal population; Application to anthropometric data; Illustration.
67. Finney, D. J. The distribution of the ratio of estimates of the two variances in a sample from a normal bi-variate population. *Biometrika* 30(1-2): 190-192. June 1938. 442.8 B522
68. Fisher, Ronald A. The comparison of samples with possibly unequal variances. *Ann. Eugenics* 9(2): 174-180. June 1939. Libr. Cong. HQ750.A1A5
References, p. 180.
"The advances of statistical science have consisted largely in the provision of exact tests of significance appropriate to an increasing variety of useful hypotheses...some interest attaches to hypotheses implying that the means of two populations are equal, while their variances are unequal... Useful tables of the solution have recently been published (Sukhatme, 1938), and it is the purpose of the present note to clarify the hypotheses of which they furnish the exact test." - p. 175.
69. Fisher, Ronald A. The design of experiments. 252pp. Edinburgh and London, Oliver and Boyd, 1935. 251 F53D
This discussion relates primarily to field trials and agricultural experiments, but the material on randomisation (see index for pages) is of interest to students of sampling theory.
70. Fisher, Ronald A. The general sampling distribution of the multiple correlation coefficient. *Roy. Soc. London. Proc. (ser. A)* 121(788): 654-673. Dec. 3, 1928. 501 L84A
"By an appropriate linear transformation of the independent variates it may be shown that the sampling distribution of the multiple correlation coefficient does not depend on the whole matrix of correlations between these variates, but solely upon the multiple correlation in the population sampled." - p. 672.
Summarized by H. E. Soper in *Roy. Statis. Soc. Jour.* 92(3): 445-447. 1929. (251 R31J).
71. Fisher, Ronald A., and Tippett, L. H. C. Limiting forms of the frequency-distribution of the largest or smallest member of a sample. *Cambridge Phil. Soc. Proc.* 24(2): 180-190. 1928. 501 C142
"The limiting distribution, when n is large, of the greatest or least of a sample of n , must satisfy a functional equation which limits its form to one of two main types." - summary.

72. Fisher, Ronald A. Moments and product moments of sampling distributions. London. Math. Soc. Proc. (ser. 2) 30(3): 199-238. Oct. 31, 1929. Libr. Cong. QA1.L5
This extensive paper is arranged under the following topics: 1. Introductory; 2. Cumulative moment functions; 3. Appropriate moment statistics; 4. Aggregate of moment sampling formulae; 5. Partitions involving unit parts; 6. Calculation of formulae; 7. Univariate formulae; 8. Bivariate and multivariate distributions; 9. Empirical statement of the rules for the direct evaluation of the coefficients; 10. Demonstration of the combinatorial method; 11. Measures of departure from normality; 12. Significance of the fourth moment; and Summary.
73. Fisher, Ronald A. The moments of the distribution for normal samples of measures of departure from normality. Roy. Soc. London. Proc. (ser. A.) 130(812): 16-28. Dec. 2, 1930. 501 L84A
"Two methods are given for discussing the distribution of the ratios of the symmetric functions k_3, k_4, \dots , obtained from samples from a normal distribution to the powers of k_2 of the same degree." - p. 28.
74. Fisher, Ronald A. The sampling distribution of some statistics obtained from non-linear equations. Ann. Eugenics 9(3): 238-249. Aug. 1939. 442.8 An73
References, p. 249.
"In the present paper the solution is given of the simultaneous distribution of the roots of certain quantic equations which arise in discriminant analysis."
75. Fisher, Ronald A. Statistical methods for research workers. Ed. 7, rev. and enl., 356pp. Edinburgh, London, Oliver and Boyd, 1938. (Half-title: Biological monographs and manuals, no. V) 251 F53 Ed. 7
Sources used for data and methods, pp. 341-344.
Bibliography (works by the author), pp. 345-352.
Although there is no separate discussion of the theory and technique of sampling, the formulas involved in calculating results of sampling procedures are brought out in several places in the text. Ch. III, Distributions, Chs. VII and VIII, both of which deal with the analysis of variance, and Ch. IX, Principles of Statistical Estimation, are of particular interest.
76. Florence, Philip Sargant. The statistical method in economics and political science. A treatise on the quantitative and institutional approach to social and industrial problems. 521pp. London, Kegan Paul, Trench, Trubner & co., ltd.; New York, Harcourt, Brace & co., 1929. (Half-title: International library of psychology, philosophy and scientific method) 251 F66

Two short sections, Description by Sample, pp. 162-164, and Tests of the Descriptiveness of Indices and Samples, pp. 164-167, contain material on the theory of sampling and its applications.

77. Fry, Charles Luther. The technique of social investigation. 315pp. New York and London, Harper and brothers, 1934. 280 F94
Bibliography, pp. 244-305.
Ch. VIII, Carrying Forward the Study, contains a section on Sampling, pp. 144-150, which gives information on the selection and reliability of the sample.
78. Garwood, F. The probability integral of the correlation coefficient in samples from a normal bi-variate population. Biometrika 25(1-2): 71-78. May 1933. 442.8 B522
Contains formulas and computations, but without much descriptive text.
79. Geary, R. C. The distribution of "Student's" ratio for non-normal samples. Roy. Statis. Soc. Jour. Sup. 3(2): 178-184. 1936. 251 B21Js
The discussion is arranged under the following sub-headings: 1. Essential role of ratio in normal theory; 2. Asymptotic formulae for moments of t for any universe; 3. The distribution of "Student's" ratio in samples of any size drawn from a slightly asymmetrical universe.
80. Geary, R. C. Moments of the ratio of the mean deviation to the standard deviation for normal samples. Biometrika 28(3-4): 295-305. Dec. 1936. 442.8 B522
This paper is a continuation of the discussion by the same author in Biometrika 27(3-4): 466-471, Dec. 1935. There is supplementary discussion by E. S. Pearson, pp. 306-307.
81. Geary, R. C. The ratio of the mean deviation to the standard deviation as a test of normality. Biometrika 27(3-4): 310-332. Dec. 1935. 442.8 B522
The discussion applies to samples drawn at random from a universe which is presumed to be continuous. The problem is to determine from the sample whether the universe may be regarded as normal.
In his Conclusion, the writer states: "It is a simple matter to devise theoretical universes which random samples will identify as probably non-normal by the w_n test and to determine roughly from Table F the sizes of the samples required."
The discussion is continued by E. S. Pearson, under the title, A Comparison of B_2 and Mr. Geary's w_n Criteria, pp. 333-352. Pages 346-352 of this article is an appendix, giving "full details of the populations sampled and the method of sampling, and also..."

the complete data of the samples themselves."

Further discussion by R. C. Geary, with the title, Note on the Correlation between B_2 and w' , appears on pp. 353-355.

82. Girshick, M. A. On the sampling theory of roots of determinantal equations. *Ann. Math. Statist.* 10(3): 203-224. Sept. 1939. 251.8 An7
Contains theorems, formulas, and mathematical calculations.
83. Haldane, J. B. S. The approximate normalization of a class of frequency distributions. *Biometrika* 29(3-4): 392-404. Feb. 1938. 442.8 B522
References, p. 404.
The sub-sections of the paper are: Wilson and Hilferty's transformation of X^2 ; Generalization of Wilson and Hilferty's theorem; Adjustment of the fourth moment; Application to the X^2 distribution; Application to the binomial distribution; Discussion.
84. Haldane, J. B. S. The exact value of the moments of the distribution of X^2 , used as a test of goodness of fit, when expectations are small. *Biometrika* 29(1-2): 133-143. June 1937. 442.8 B522
References, p. 143.
In his summary, the author states that "Information has therefore been obtained which will make it possible to apply the X^2 test without restriction on the size of the samples on the numbers expected. The results do not apply where X^2 is used as a test of homogeneity, the expectations being deduced from observed totals."
85. Harper, F. H., and Goudy, Norma L. Analysis of variability in replicate observations. 13pp., processed. Washington, D. C., U. S. Dept. of agriculture, Agricultural marketing service, 1939. 1.942 C22An1
"The authors have 2 principal purposes in presenting this paper. One of these is to furnish some indication of the value and importance in certain instances of replicated observations in the elimination or reduction of error. The other purpose of the paper is to emphasize the desirability of evaluating the different parts of total variability contributed from various sources and to show how the magnitude of their differences may be interpreted." - p. 2.
86. Hartley, H. O. Studentization and large-sample theory. *Roy. Statist. Soc. Jour. Sup.* 5(1): 80-88. 1938. 251 R81Js.
The purpose of this paper is "to estimate the accuracy with which a studentized distribution function may be approximated to by the corresponding large-sample distribution... In addition, a method will be developed with the help of which approximate numerical results may be obtained for studentized distribution functions based on samples of moderate size." - p. 80.

87. Hays, Samuel. An outline of statistics. 215pp. London, New York, Toronto, Longmans, Green & co. [1937] 251 H33
There is a brief section on sampling in Appendix I, pp. 177-179.
88. Hendricks, Walter A., and Robey, Kate W. The sampling distribution of the coefficient of variation. Ann. Math. Statis. 7(3): 129-132. Sept. 1936. 251.8 An7
Contains equations and frequency distribution charts.
89. Hey, G. B. A new method of experimental sampling illustrated on certain non-normal populations. Biometrika 30(1-2): 68-80. June 1938. 442.8 B522
Bibliography, pp. 79-80.
"I have therefore carried out an experimental sampling from four non-normal populations of which three occurred in the course of an agricultural trial. The statistics which I have considered are the correlation and regression coefficients and the ratio of two independent estimates of variance... The three populations which occurred in practice did not appear to follow any mathematical law of the type usually considered, although many attempts at curve fitting were made." - p. 69.
90. Hirschfeld, H. O. The distribution of the ratio of covariance estimates in two samples drawn from normal bivariate populations. Biometrika 29(1-2): 65-79. June 1937. 442.8 B522
References, p. 79.
The writer's introductory paragraph is as follows: "It is well known that the analysis of variance of a single variable necessitates a test of significance, for which Fisher's z-test is the appropriate solution. However, when problems in more than one variable arise, we must consider in addition to the separate variances the question of correlation and covariation. For every kind of analysis the subdivision of the sum of products of the deviations from the respective means into its different components may be performed in exactly the same way as the subdivision of the sum of squares, and what is generally known as an 'analysis of variance and covariance,' can be worked out easily."
Contains 4 tables and an appendix.
91. Hoel, Paul G. On the chi-square distribution for small samples. Ann. Math. Statis. 9(3): 158-165. Sept. 1938. 251.8 An7
The author states that his purpose is "to investigate the nature of this first type of error by finding a better approximation than the customary one to what might be called the exact continuous X^2 distribution function."
92. Hojo, Tokishige. Distribution of the median, quartiles and inter-quartile distance in samples from a normal population. Biometrika 23(3-4): 315-360. Dec. 1931. 442.8 B522
The author examines the sampling variation of the median,

quartiles and interquartile distance in samples from a normal population, and shows how their distributions in the case of very small samples tends towards the limiting forms. His concluding paragraph follows: "The position of the median and the quartiles can be found in small samples with such rapidity, that in certain cases the time saved may be felt to compensate for the accuracy lost. The results of this paper have served to indicate the nature of this loss in accuracy."

An appendix by Karl Pearson appears on pp. 361-363.

93. Hojo, Tokishige. A further note on the relation between the median and the quartiles in small samples from a normal population. *Biometrika* 25(1-2): 79-90. May 1933. 442.8 B522

The writer adds further calculations to the results published in an earlier paper (*Biometrika* 23(3-4): 315-360. Dec. 1931) q.v.

This paper is divided into the following sections: 1. Introductory; 2. The standard error of the mid-quartile point; 3. The correlation between the quartile and median points; 4. Limiting values for r_{mq} ; 5. Empirical formulae to bridge the gap between limiting and small sample values; 6. The standard error of the distance between the median and quartile points; 7. Comparison of interpolated values with those found by K. Pearson's method; 8. Some experimental sampling results.

94. [Holmes, Irvin.] Research in sample farm census methodology. Part I. Comparative statistical efficiency of sampling units smaller than the minor civil division for estimating year-to-year change. (Analysis based on state farm census data) 27pp. [New York] U. S. Dept. of agriculture, Agricultural marketing service, 1939. 1 M341R

Prepared with the assistance of the Works Projects Administration for the City of New York, August 1939.

This study was made by the Bureau of Agricultural Economics in 1937-38. The work was transferred to Agricultural Marketing Service upon its establishment, July 1, 1939.

The object of the study was to find the correct sampling procedure for a sample census of agriculture by: 1. Determining the type of sampling unit that would give greatest accuracy with least cost and difficulty, 2. Determining the size of sample needed for accuracy of a given standard.

The samples were drawn from the five states of Indiana, Wisconsin, Minnesota, Iowa, and Kansas.

"Four types of sampling units were selected for study: the Random Individual Farm, the Judgment Route, the Random Single-Section Block, and the Random Four-Section Block." - p. 3.

A fifth type of unit, called "Purposive Single-Section Block" was added in studying units smaller than the Minor Civil Division. Methods employed and conclusions reached are set forth in detail.

95. Holmes, Irvin. Results of four methods of sampling individual farms. Jour. Farm Econ. 21(1): 365-374. Feb. 1939. 280.8 J822

The study was based on 19 counties representing divergent types of farming in the five corn-belt states of Indiana, Wisconsin, Minnesota, Iowa, and Kansas. The four types of sampling units selected for study were: the Random Individual Farm, the Judgment Route, the Random Single Section Block, and the Random Four Section Block. The conclusions based upon this research are set forth in detail on pp. 373-374. No significant differences in accuracy between the four types of sampling units were found.

96. Holzinger, K. S., and Church, A. E. R. On the means of samples from a U-shaped population. Biometrika 20A(3-4): 361-388. Dec. 1928. 442.8 B522

The writers summarize their findings thus: "(1) When distributions of means in samples of N are obtained by actual sampling from a U-shaped population their representation by a simple continuous curve seems to be quite unsatisfactory until the size of the sample N is at least of the order of 50. This is not due to any extent to the irregularities arising from the grouping of the sampled population, but mainly to the fact that when N is quite small, these distributions are essentially composite in form, because the sampled population is limited of range.

"(2) In obtaining sets of samples of N by use of Tippett's Random Sampling Numbers it is advisable, in order that the sets may be as random as possible, to make a fresh allocation of the numbers for each set of samples obtained. The regrouping of the samples in any one set to form a set corresponding to a larger value of N tends to produce a bias in the set so formed.

"(3) When such a distribution of means of samples of N begins to be representable by a Pearson Curve derived from the theoretical betas corresponding to it, the goodness of the fit appears to depend more on the way the actual distribution of discontinuous means is grouped into frequency groups than on the actual number of samples taken."

97. Hotelling, Harold. Analysis of a complex of statistical variables into principal components. 48pp. Baltimore, Warwick & York, inc., 1933. Reprint Coll.

Reprinted from Sept. and Oct. 1933, issues of the Journal of Educational Psychology.

Consult especially Section 6, Sampling Errors, pp. 18-21, and Section 10, Tests as Samples of a Larger Aggregate of Tests, pp. 32-37.

98. Hotelling, Harold. Recent improvements in statistical inference. Amer. Statis. Assoc. Jour. 26(173A): 79-89. Mar. 1931 Sup. 251 Am3

This is the text of a paper read at the ninety-second annual

meeting of the American Statistical Association, Cleveland, Ohio, Dec. 1930.

Discussion, by Walter A. Shewhart, follows the text, pp. 87-89.

"A new era in the theory of statistics began in 1915 with the publication in *Biometrika* by R. A. Fisher of a mathematical study of the distribution in random samples of the correlation coefficient. For the practical use of a correlation coefficient, or any other function of observations, it is absolutely essential to have some idea of the sampling distribution in order to judge whether an observed apparent relation is real or is due only to chance." - p. 80.

"At least two new measures of belief are available, both related to mathematical probability, but not identical with it. One of these is called by Fisher 'likelihood,' and is appropriate for comparing any two specific hypotheses as to the nature of the population - that is, of the causal matrix - from which the observed sample arose... The other new measure of credibility arises in connection with the question whether an estimate, such as a mean or correlation coefficient derived from a sample, deviates significantly from a theoretical value, for example from zero, or from a similar estimate derived from another sample." - p. 85.

99. Hsu, C. T., and Lawley, D. N. The derivations of the fifth and sixth moments of the distribution of b_2 in samples from a normal population. *Biometrika* 31(3-4): 238-248. Mar. 1940. 442.8 B522
References, p. 248.

The sections of the paper are: 1. Introduction; 2. The derivation of $k(4^5)$; 3. The derivation of $k(4^6)$; 4. The moments of the distribution of b_2 ; 5. Check with McKay's results in the case $n = 4$.

100. Hsu, P. L. Contribution to the theory of "Student's" t-test as applied to the problem of two samples. London. Univ. Univ. Col. Dept. Statis. Statis. Res. Mem. 2: 1-24. Dec. 1938. 251 L84
References, p. 24.

The article is composed chiefly of equations and formulas and illustrative diagrams with very little text.

101. Huffaker, C. L.; and Douglas, Harl R. On the standard errors of the mean due to sampling and to measurement. *Jour. Ed. Psychol.* 19(9): 643-649. Dec. 1928.
Not examined.

"The writers show that the chance errors of measurement are included in the ordinary formula for the standard error of the mean, but not constant errors of measurement. Distinctions are drawn for three problems concerning reliability of the mean, and the corresponding formulas are noted." - *Social Sci. Abs.*, v. 1, June 1929, item no. 2482.

102. Irwin, J. O. On the frequency distribution of any number of deviates from the mean of a sample from a normal population and the partial correlations between them. Roy. Statis. Soc. Jour. '92(4): 580-584. 1929. 251 R81J
Composed of mathematical formulas and calculations.
103. Irwin, J. O. On the frequency-distribution of the means of samples from populations of certain of Pearson's types. Metron 8(4): 51-105. June 15, 1930. 251.8 M56
Bibliography, pp. 104-105.
The paper consists of 2 parts: I. Distribution of the means of samples from populations of Pearson's type I; II. Distribution of the means of samples from populations of Pearson's type VII.
104. Jackson, Dunham. Mathematical principles in the theory of small samples. Amer. Math. Monthly 42(6): 344-364. June-July 1935. Libr. Cong. QA1.A515
Paper presented at the session of the American Mathematical Society, Berkeley, Calif., June 30, 1934.
"The purpose of this paper is to facilitate an appreciation of the fundamental memoirs in the field of small sample analysis on the basis of ordinary courses and text books in mathematics."
105. Jensen, Adolph. Purposive selection. Roy. Statis. Soc. Jour. 91(4): 541-547. 1928. 251 R81J
The writer comments on Professor A. L. Bowley's statements made in 1925, on the measurement of precision attained in sampling, when the method known as "purposive selection" was used. He cites as an example the Danish Agricultural Census of 1923, in which purposive selection was extensively used, and explains some of the procedures and methods used in that census.
106. Johnson, Neil M. Sorting and sampling forms for soil conservation research. 11pp., processed. Washington, D. C., U. S. Dept. of agriculture, Bur. of agricultural economics, 1939. 1.941 L6So3
Contains some material on the kind of data needed, sampling procedures, and size of sample.
107. Kendall, M. G., Kendall, Sheila F. H., and Smith, B. Babington. The distribution of Spearman's coefficient of rank correlation in a universe in which all rankings occur an equal number of times. Biometrika 30(3-4): 251-273. Jan. 1939. 442.8 B522
References, p. 271.
Contents: Part I. Theoretical determination of the sampling distribution of Spearman's coefficient of rank correlation; Part II. Experimental distributions of p ; Part III. Relationship between Spearman's coefficient and another coefficient of rank correlation; Appendix. The randomness of the experimental samples.

108. Kendall, M. G., and Babington-Smith, B. Randomness and random sampling numbers. Roy. Statis. Soc. Jour. 101(1): 147-166. 1938. 251 R81J

The subject is developed under the following sub-headings: Randomness and probability; Randomness and purpose not antithetical; Types of universe; Random aggregates; Random selection from hypothetical universes; Human bias; Definition of a random method of selection in terms of independence; Use of digits in random sampling; Random sampling numbers; Four tests for local randomness; Production of locally random series; The randomising machine; Tests of results; Test of Tippett's numbers; and Necessity for more extended tables of random numbers.

109. Kendall, M. G., and Babington-Smith, B. Second paper on random sampling numbers. Roy. Statis. Soc. Jour. Sup. 6(1): 51-61. 1939. 251 R81Js

Bibliography, p. 61.

"The main purpose of the present paper is to describe in more detail the technique used in obtaining the numbers [a machine-produced series of digits which could be used as Random Sampling Numbers,] and to give some of the results of applying the four tests to them. We also discuss an interesting by-product of the investigation in the shape of some data relative to the nature of subjective bias in working with sets of digits; and finally we give the results of tests applied to tables recently published by Fisher and Yates (1938)." - p. 51.

110. King, Arnold J., and Simpson, Glenn D. New developments in agricultural sampling. Jour. Farm Econ. 22(1): 341-349. Feb. 1940. 280.8 J822

The Bureau of Agricultural Economics Library has a reprint of this article.

Since the advent of crop adjustment programs, more nearly accurate estimates of acreage and production were needed for both states and counties, particularly for counties, since they became the administrative units under the program. Data on crop acreage has been collected by means of aerial photographs by the U. S. Department of Agriculture. A research program to test the reliability of the sampling data and the validity of the new methods of sampling based on aerial mapping was started in 1937, and the results obtained are set forth in this article. It is concluded that this type of sampling will increase the accuracy of the estimates of crop acreage.

111. Kondo, T. A theory of the sampling distribution of standard deviations. Biometrika 22(1-2): 36-64. July 1930. 442.8 B522

The paper is in three sections as follows: I. Moment coefficients of the standard deviations obtained in sampling in terms of those of variance; II. Moment coefficients of s in terms of the constants of the sampled population; III. Degree of approximation. Numerical verification.

112. Kullback, Solomon. On samples from a multivariate normal population. Ann. Math. Statist. 6(4): 202-213. Dec. 1935. 251.8 An7
"In this paper we shall discuss the distribution of certain functions calculated for samples drawn from a multivariate normal population. The method of solution is based on the theory of characteristic functions and presents further application of that theory to the distribution problem of statistics." - p. 202.
113. Kullback, Solomon, and Frankel, A. A simple sampling experiment on confidence intervals. Ann. Math. Statist. 11(2): 209-213. June 1940. 251.8 An7
References, p. 213.
Describes a sampling experiment performed by a class in statistical inference.
"The length of the confidence interval obtained by each of the three procedures was obtained and the observed mean and standard deviation of the distribution of the average length of the confidence interval per set of 100 samples computed." - p. 212.
114. Laderman, Jack. The distribution of "Student's" ratio for samples of two items drawn from non-normal universes. Ann. Math. Statist. 10(4): 376-379. Dec. 1939. 251.8 An7
"In this paper, the formal expression for the distribution of t will be derived for samples of two items drawn from non-normal universes." - p. 376.
115. Ledermann, Walter. Sampling distribution and selection in a normal population. Biometrika 30(3-4): 295-304. Jan. 1939. 442.8 B522
References, p. 304.
Contents: Introduction; 2. Moment generating function for an array; 3. Some lemmas on matrices and determinants; 4. Ingham's integral; 5. Sampling distribution of variances and covariances; 6. Moment generating function for an array $Z_{pp} = V_{pp}$; 7. The linear terms of the moment generating function.
116. Lengyel, B. A. On testing the hypothesis that two samples have been drawn from a common normal population. Ann. Math. Statist. 10(4): 365-375. Dec. 1939. 251.8 An7
References, p. 375.
"This paper is devoted to the problem of testing the hypothesis that two samples of 2, 3 and 4 variables, and of equal size, have been drawn from a common unspecified normal population." - Introduction.
117. Le Roux, J. M. A study of the distribution of variance in small samples. Biometrika 23(1-2): 134-190. Nov. 1931. 442.8 B522
The paper is in two parts, each of which is divided into seven sections. The text contains many diagrams, tables, and formulae.

"The main object of this investigation has been to study the first four moments of $D (s^2)$ with a view to obtaining suitable Pearson curves to represent the sampling distribution in the case of populations which can themselves be represented by Pearson curves. In Part I the manner in which the variance distribution alters as the population and the sample size alter has been traced out." - p. 189.

118. Lindquist, Everet Franklin. A first course in statistics: their use and interpretation in education and psychology. 226pp. Boston, Houghton Mifflin co., 1938. Libr. Cong. HA29.L8

Ch. 8, pp. 102-128, Sampling Error Theory, contains a section on the selection of the sample and on randomness and bias, in addition to the statistical discussion on errors.

119. Lindquist, Everet Franklin. The significance of a difference between "matched" groups. Jour. Ed. Psychol. 22(5): 197-204. Mar. 1931. Libr. Cong. LB1051.A2J6

"A type of experimentation very frequently employed in education and psychology is that which makes use of what are commonly known as 'matched groups,' or as 'matched control groups.' It is the purpose of this article to draw attention to an important error in statistical analysis that has been almost universally characteristic of the reports of such experiments, and to suggest an improved statistical procedure and discuss its possibilities." - p. 197.

120. Lloyd, Edward L. Sampling problems in current trade statistics. Jour. Mktg. 3(5): 373-379. Apr. 1939. 280.38 J82

Paper read before a joint meeting of the American Statistical Association and the American Marketing Association in Detroit in December 1938.

This paper is designed "to emphasize the necessity for using sampling methods in the collection of current trade data, to discuss the criteria we have adopted, and to illustrate certain techniques used by the Bureau of Foreign and Domestic Commerce for evaluating the stability and significance of our sample and for determining the adequacy of the current data."

121. Lockley, Lawrence C., and Watson, Alfred N. Some fundamental considerations in the conduct of polls. Jour. Mktg. 5(2): 113-115. Oct. 1940. 280.38 J82

Stresses the need for limiting the objectives of the survey, phrasing the questions clearly, and selecting the sample of proper composition and size.

122. Love, Harry Houser. Application of statistical methods to agricultural research. 501pp. Shanghai, Commercial press, ltd., 1937. 251 1942

Published under the auspices of the National Agricultural Research Bureau and the China Foundation for the Promotion of Education and Culture.

Publications referred to in the text, pp. 494-496.

Ch. XII, pp. 297-339, Analysis of Small Samples and Application of Probability, contains a discussion of a number of formulae or methods, including Bessel's and Peter's, for the calculation of probable errors for small samples. Chs. XIII and XIV, pp. 340-397, are devoted to Analysis of Variance.

123. Lundberg, George A. Social research; a study in methods of gathering data. 380pp. New York, London, Toronto, Longmans, Green and co., 1929. (Longmans' social science series, General editor, Ernest R. Groves) 280 L972

Appendix A, Selected References, pp. 325-350.

Ch. V, The Sample in Social Research, pp. 96-112, is discussed under the following sub-heads: The general use of sampling; Conditions governing the validity of a sample; Mechanical methods of sampling; Size and reliability of the sample; Practical tests of the adequacy of the sample; and General cautions in sampling. A bibliography of selected references to accompany this discussion on sampling appears on pp. 334-335.

Ch. IX, The Measurement of Attitudes, pp. 197-242, is also of interest in this connection.

124. McCormick, Thomas C. Sampling theory in sociological research. Social Forces 16(1): 67-74. Oct. 1937. 280.8 J823

The writer defines and explains the application of various types of sampling, such as simple, stratified, and random, and discusses sampling for variables and attributes. "Perhaps the chief reason for the infrequency in sociological research of cases of sampling a dynamic or causal universe which seriously attempt to meet the requirements of the mathematical theory of simple or Poisson sampling is the complexity and unknown nature of the situations with which sociologists commonly deal." - p. 74.

125. McEwen, George Francis. Methods of estimating the significance of differences in or probabilities of fluctuations due to random sampling. Scripps Inst. Oceanography Bul. Tech. Ser. 2(1): 1-137. La Jolla, Calif., 1929. 442.9 C12T

Bibliography, pp. 135-137.

A major portion of the article is given over to statistical tables.

126. McKay, A. T. The distribution of the difference between the extreme observation and the sample mean in samples of n from a normal universe. Biometrika 27(3-4): 466-471. Dec. 1935. 442.8 B522

"The purpose of the present paper is to discuss certain points relating to statistics formed by arranging the observations of a

random sample from a normal universe in order of magnitude and constructing linear functions thereof. In particular, a method of determining the significance of the difference between the highest observation and the sample mean is developed." - p. 466.

127. McKay, A. T. The distribution of the estimated coefficient of variation. Roy. Statis. Soc. Jour. 94(4): 564-567. 1931.
251 R81J

"Since, in general, the parameters of an infinite population are unknown, we have to be content with estimates made from sampling, so that it becomes necessary to find the distribution of the estimated proportional coefficient of variation."

The formulas and calculations involved are given.

128. Mackie, John. The probable value of the tetrad difference on the sampling theory. Brit. Jour. Psychol. 19(1): 65-76. July 1928.
Not examined.

"Carrying on Thomson's analysis, the writer finds the mean value of the tetrad difference of 4 correlated variables to be zero, and calculates its standard deviation, giving both the full formula and the approximations. The standard deviation thus calculated is inversely proportional to the square root of the number of elementary factors, and is small when the number of such factors is moderately large." - Social Sci. Abs., v. 1, Apr. 1929, item no. 797.

129. Mackie, John. The sampling theory as a variant of the two factor theory. Jour. Ed. Psychol. 19(9): 614-621. Dec. 1928.
Not examined.

"The writer takes up what he considers the most serious criticisms of the Sampling Theory of Ability, namely, that it is a mere mathematical variant of the Two Factor Theory... He therefore concludes that the abandonment of either theory cannot be justified on the ground of their equivalence, which is merely of a formal, mathematical sort." - Social Sci. Abs., v. 1, June 1929, item no. 2483.

130. McNemar, Quinn. Sampling in psychological research. Psychol. Bul. 37(6): 331-365. June 1940. 140.8 P952
Bibliography, pp. 363-365.

In his introduction to this extensive paper, the writer sets forth his purpose as follows: "to consider available sampling techniques and possible checks on representativeness, and to evaluate the ways by which greater precision in statistical results in either field or experimental work can be attained. More specifically, it is the object of this paper to discuss some of the difficulties of sampling and to consider the applicability in psychological research of the so-called stratified method of sampling. Examples of investigations involving selective factors

and investigations typifying adequate sampling will be cited from recent psychological literature. Considerable space will be given to the statistical and sampling aspect of research planning, especially the simple situation involving the use of experimental and control groups. It is not our purpose to discuss sampling as involved in individual measurement, such as time sampling in behavior situations and repeated measures on the same quantity, nor shall we consider the allied problem of sampling of items for a test or tests for a battery. Neither is it our purpose to include an exposition of the technical mathematics used in the deduction of sampling error formulas." - pp. 332-333.

131. Madhava, K. B. Technique of random sampling. Indian Jour. Statis. (Sankhyā) 4(4): 532-534. Mar. 1940. 251.8 In2

Bibliography, p. 534.

General discussion of the problem, which is "the determination of the value of an average, though sampling is also being used to ascertain the distribution of any parameter and to describe fully the nature and extent of heterogeneity in the population." - p. 532.

132. Mahalanobis, P. C., Bose, Raj Chandra, and Roy, Samarendra Nath. Normalisation of statistical variates and the use of rectangular co-ordinates in the theory of sampling distributions. Indian Jour. Statis. (Sankhyā) 3(1): 1-40. Mar. 1937. 251.8 In2

The paper is divided into 4 sections and an appendix, as follows: 1. Normalisation of variates; 2. Rectangular co-ordinates; 3. Joint distribution of rectangular and normal co-ordinates; 4. Special distributions.

133. Mahalanobis, P. C., Bose, Subhendu Sekhar, Ray, Prabhat Ranjan, and Banerji, Sudhir Kumar. Tables of random samples from a normal population. Indian Jour. Statis. (Sankhyā) 1(3-4): 289-328. Aug. 1934. 251.8 In2

The editors have "converted the whole set of Tippett's random sampling numbers into a set of 10,400 random deviates from a normal population with mean value zero and standard deviation equal to unity." - p. 289.

"The general conclusion is that the present Tables give truly random samples from a normal population with zero as mean and unity as standard deviation and may be used with safety for purposes of artificial sampling at least up to the sixth moment coefficient." - p. 302.

134. Market executives say 2 per cent sample of homes adequate. Sales Mangt. 35(5): 218. Sept. 1, 1934. Libr. Cong. HF5438.A34

Gives the replies to a questionnaire on how many homes constitute a typical cross-section in a community, and the results show there is wide variation of opinion on this point.

135. Merrill, Walter W., jr. Sampling theory in item analysis. *Psychometrika* 2(4): 215-223. Dec. 1937. Libr. Cong. BF1.P86
"Item analysis has as its object the selection of the best items of a group and the consequent elimination of the 'deadwood.'
"A method of applying sampling theory to Horst's maximizing function is outlined, as illustrative of author's observation that the results of item analysis by any of various methods may be similarly tested." - p. 215.
136. Mills, Frederick Cecil. Statistical methods applied to economics and business. Rev. ed., 746pp. New York, H. Holt and co. [1938, (Half-title: American business series; general editor Roswell C. McCrea) 280 M62 1938
List of references, pp. 727-736.
The following chapters contain material on sampling: Ch. XIV, Statistical Induction and the Problem of Sampling, pp. 452-489; Ch. XV, The Analysis of Variance, pp. 490-530; Ch. XVIII, Statistical Induction and the Problem of Sampling, concluded, pp. 598-637.
137. Molina, E. C., and Wilkinson, R. I. The frequency distribution of the unknown mean of a sampled universe. *Bell System Tech. Jour.* 7: 632-645. Oct. 1929. Libr. Cong. TK1.B45
"The discussion is limited to a universe assumed to be normal but whose mean and precision constant are unknown. Several simplifying, yet quite reasonable, assumptions regarding the forms and independence of the a priori frequency distribution of the true mean and standard deviation are incorporated in the analysis so that numerical answers may more easily be deduced." - p. 632.
138. Molina, E. C. Probability in engineering. *Elect. Engin.* 54(4): 423-427. Apr. 1935. Libr. Cong. TK1.A61
The mathematical aspects, value, and fundamentals of probability theory and sampling are explained by the solution of some sample problems of types often encountered.
139. Morgan, W. A. A test for the significance of the difference between the two variances in a sample from a normal bivariate population. *Biometrika* 31(1-2): 13-19. July 1939. 442.8 B522
References, p. 19.
Contents: 1. Derivation of likelihood ratio test; 2. The power of the test; 3. Comparison with Finney's test in the case where p_{12} is known.
140. Mudgett, Bruce D. The application of the theory of sampling to successive observations not independent of each other. *Amer. Statis. Assoc. Jour. Sup.* 24(165A): 108-113. Mar. 1929. 251 Am3
Points out the probable direction that economists and statisticians must take in making proper use of the theory of probability in the analysis of time series.
Discussion by F. E. Wolfe, pp. 114-117.

141. Nair, K. R. The median in tests by randomization. Indian Jour. Statis. (Sankhyā) 4(4): 543-550. Mar. 1940. 251.8 In2
References, p. 550.
"In this paper are obtained the distribution of the p-th ranked individual in the first type of problem and of the difference between the p-th ranked individuals in the second type of problem. Some other distributions are also considered. Incidentally some light is thrown on Pearson's point of view, namely, that even in the test by randomization the statistic used should be efficient in order to control the second kind of error." - p. 543.
142. Nair, K. R. On Tippett's "random sampling numbers." Indian Jour. Statis. (Sankhyā) 4(1): 65-72. Dec. 1938. 251.8 In2
References, p. 72.
A discussion of the nature and randomness of Tippett's numbers and their use in sampling experiments.
143. Nair, K. R. Table of confidence interval for the median in samples from any continuous population. Indian Jour. Statis. (Sankhyā) 4(4): 551-558. Mar. 1940. 251.8 In2
References, p. 558.
Compares the methods of approach and the scope of the tests of significance proposed by W. R. Thompson and S. R. Savur, who have "independently obtained the Confidence Interval without reference to the form of the population."
144. Nair, U. S. The application of the moment function in the study of distribution laws in statistics. Biometrika 30(3-4): 274-294. Jan. 1939. 442.8 B522.
References, p. 294.
This paper is a "modification of one of the papers submitted by the author for the Ph. D. Degree in Statistics of the University of London (1937)."
"In the present paper a method of deriving distribution laws from a slightly different point of view is developed. Certain theorems regarding this method are proved in [paragraph] 2, and the remaining sections are devoted to the application of these theorems to derive the distribution of several criteria that arise in the Theory of Sampling." - p. 274.
145. Newman, D. The distribution of range in samples from a normal population, expressed in terms of an independent estimate of standard deviation. Biometrika 31(1-2): 20-30. July 1939. 442.8 B522
References, p. 30.
Three practical examples are used to illustrate the discussion.
146. Neyman, Jerzy. Contribution to the theory of sampling human populations. Amer. Statis. Assoc. Jour. 33(201): 101-116. Mar. 1938. 251 Am3

A theoretical and practical discussion of the theory of double sampling.

The problem is stated as the undertaking of a field survey to determine the average value of some character of a population, such as the amount of money spent for food by families residing in a given district. Since the total cost of the survey is to be limited, the data must be gathered from a small sample of the population. "In view of the great variability of the character, the sample appears to be too small to yield an estimate of the desired degree of accuracy. Now the character is correlated with a second character which can be determined much more readily and at a low cost per family. Since a very accurate estimate of the second character can be secured at relatively small expense, and since for any given value of it, the variation of the original character will be smaller than it is in the whole population, a more accurate estimate of the original character may be obtained for the same total expenditure by arranging the sampling of the population in two steps. The first step is to secure data, for the second character only, from a relatively large random sample of the population in order to obtain an accurate estimate of the distribution of this character. The second step is to divide this sample, as in stratified sampling, into classes or strata according to the value of the second character and to draw at random from each of the strata a small sample for the costly intensive interviewing necessary to secure data regarding the first character.

"An estimate of the first character based on these samples may be more accurate than one based on an equally expensive sample drawn at random without stratification. The question is to determine for a given expenditure, the sizes of the initial sample and the subsequent samples which yield the most accurate estimate of the first character." - pp. 101-102.

The numerous mathematical formulas and computations involved are presented in detail and with explanations of their applications.

147. Neyman, Jerzy. On statistical methods in social and economic research. Census by sampling and other problems. In U. S. Dept. of agriculture. Graduate school. Lectures and conferences on mathematical statistics delivered by J. Neyman...April 1937, pp. 89-108, processed. Washington, D. C. [1938] 1.9 Ag81E1c

This is the edited report of a conference with Dr. Neyman whose discussion and observations were based on questions submitted in advance of the meeting. The text contains explanations and evaluations of the two different methods of sampling generally used in social work, i.e., purposive selection, and random sampling.

148. Neyman, Jerzy. On the two different aspects of the representative method: the method of stratified sampling and the method of purposive selection. Roy. Statis. Soc. Jour. 97(4): 558-606. 1934. 251 R81J
Read before the Royal Statistical Society, June 19th, 1934.
Discussion on Dr. Neyman's paper, pp. 606-625.
Contents: I. Introductory; II. Mathematical theories underlying the representative method; III. Different aspects of the representative method; IV. Comparison of the two methods of sampling; V. Conclusions; VI. Appendix.
In his Conclusions, the writer states: "The final conclusion which both the theoretical considerations and the above examples suggest is that the only method which can be advised for general use is the method of stratified random sampling. If the conditions of the practical work allow, then the elements of the sampling should be individuals. Otherwise we may sample groups, which however, should be as small as possible. The examples of enquiries in London, in Bulgaria, and in Poland show that random sampling by groups does not present unsurmountable difficulties." - p. 588.
149. Neyman, Jerzy, and Pearson, Egon Sharpe. On the use and interpretation of certain test criteria for purposes of statistical inference. 2 pts. Biometrika 20A(1-2, 3-4): 175-240, 263-294. July, Dec. 1928. 442.8 B522
Contents:
Part I: 1. Introductory; 2. Sampling from a normal population; 3. Sampling from a rectangular population; 4. Sampling from an exponential population; 5. Conclusion; 6. Appendix.
Part II: 1. An extension of the definition of likelihood; 2. The fundamental X^2 problem; 3. The test of goodness of fit; 4. A sampling experiment; 5. Summary of the position; 6. The case of two samples; 7. Application to contingency tables.
150. O'Toole, A. L. On a best value of R in samples of R from a finite population of N. Ann. Math. Statis. 5(2): 146-152. June 1934. 251.8 An7
"In conclusion it may be said that there would seem to be good reason to suggest that, when possible the investigator arrange to have twice as many variates in the control group or parent population as in each of the samples to be analyzed." - p. 152.
151. Parten, Mildred. Social background studies. Jour. Ed. Sociol. 4(9): 569-579. May 1931.
Not examined.
"The problem of obtaining a true sample of a given population is being attacked in the research work of the Social Background Studies of New Haven under the Institute of Human Relations.

As constant units the block and the Federal Census enumeration districts were selected for special study... It is hoped that these studies will provide a base for the determination of differential rates among various age, nationality, regional and economic groups, will be of assistance for finding representative samples of control groups for comparative purposes, will throw light on normal family structure and behavior and provide various economic and social indices." - Social Sci. Abs., v. 3, Oct. 1931, item no. 16446.

152. Passfield, Sidney James Webb, baron, and Webb, Mrs. Beatrice (Potter). Methods of social study, by Sidney and Beatrice Webb. 263pp. New York, Longmans Green and co., 1932. 280 W383M
The chapter on Use of Statistics contains some discussion on the use of sampling in social studies, pp. 210-212.
153. Paterson, D. D. Statistical technique on agricultural research; a simple exposition of practice and procedure in biometry. 263pp. New York and London, McGraw-Hill book co., inc., 1939. (Half-title: McGraw-Hill publications in the agricultural sciences) 251 P27
Selected bibliography, pp. 243-248.
An exposition of the mathematical calculations involved in sampling procedures is found on pp. 16-24.
154. Pearson, Egon Sharpe. The analysis of variance in cases of non-normal variation. Biometrika 23(1-2): 114-133. Nov. 1931. 442.8 B522
The sampled population consisted of 200 cases. The paper is divided into six parts: 1. The problem; 2. A brief mathematical analysis of the position; 3. Results of experimental sampling; 4. A comparative case in which the two estimates of variance are essentially independent; 5. The more complex problems in the analysis of variance; 6. Summary.
155. Pearson, Egon Sharpe. The distribution of frequency constants in small samples from non-normal symmetrical and skew populations, by Egon S. Pearson assisted by N. K. Adyanthāya, and others. Biometrika 21(1-4, sect. B): 259-286. Dec. 1929. 442.8 B522
Contents: 1. The use of "Student's" z-test, with populations not normal; 2. The population sampled; 3. The single sample test; 4. The two sample test; 5. Examination of the second type of error; 6. An alternative test.
156. Pearson, Egon Sharpe. The distribution of frequency constants in small samples from symmetrical populations (Preliminary notice), by Egon S. Pearson assisted by N. K. Adyanthāya. Biometrika 20A(3-4): 356-360. Dec. 1928. 442.8 B522
"It is hoped that the following preliminary results may be of some interest to practical workers, both in showing the extent

to which the tests developed for the case of samples from a normal population are valid, and also in suggesting modifications of these tests when required." - p. 356.

157. Pearson, Egon Sharpe. A further development of tests for normality. *Biometrika* 22(1-2): 239-249. July 1930. 442.8 B522
The writer gives a summary of the work of Fisher and Craig, and adds his own discussion and formulas for determining the normality of the population sampled.
158. Pearson, Egon Sharpe, and Wilks, S. S. Methods of statistical analysis appropriate for k samples of two variables. *Biometrika* 25(3-4): 353-378. Dec. 1933. 442.8 B522
Contents: 1. Introduction; 2. Derivation of the criteria; 3. Interpretation of the criteria; 4. The moment of coefficients and distributions of the criteria; 5. Practical illustrations; 6. Conclusion; 7. Appendix.
In their Conclusions, the writers state: "In the present paper the special case of two correlated variables has been taken, in order to illustrate (a) the process of reasoning underlying the methods, (b) the practical application of the resulting tests, (c) their relation to other tests in use."
159. Pearson, Egon Sharpe. The percentage limits for the distribution of range in samples from a normal population. *Biometrika* 24(3-4): 404-417. Nov. 1932. 442.8 B522
"Table A given on p. 416 below represents an attempt to summarise in most convenient form for practical use the recent work on the distribution of range in samples from a normal population. It deals only with the case of samples of 100 or less. The accompanying discussion may be divided into 3 parts: 1. The method of computation of Table A. 2. Experimental checks on the adequacy of the approximation involved. 3. Illustrations of the use of Table A."
160. Pearson, Egon Sharpe. Some aspects of the problem of randomization. *Biometrika* 29(1-2): 53-64. June 1937. 442.8 B522
References, p. 64.
The paper is divided into three sections: I. Introductory; II. Randomization; III. Randomization applied to the Latin Square.
"I have referred to the idea of arranging a sampling procedure so that conclusions drawn upon application of an appropriate statistical technique will be subject to a known and controlled risk of error. The principle of randomization, whose introduction is largely due to R. A. Fisher, provides a device to aid in the achievement of this objective. Most of the statistical tests used in the more complex sampling problems have been developed on the assumption that the variables are normally distributed, and while it is often clear that considerable departure

from normality will not seriously effect their validity, it may be asked how far can tests be constructed which are completely independent of any assumption of normality?" - p. 56.

161. Pearson, Egon Sharpe. Some notes on sampling tests with two variables. *Biometrika* 21(1-4, sect. B): 337-360. Dec. 1929. 442.8 B522

Contents: 1. Introductory; 2. The application of the principle of likelihood; 3. The sampling distribution of θ ; 4. The effect of non-normality; 5. Sampling experiments; 6. The practical determination of the probability integral of $f(\theta)$; 7. The distribution of the correlation coefficient in the experiments; 8. R. A. Fisher's transformation of the r -distribution.

162. Pearson, Karl. Historical note on the distribution of standard deviations of samples of any size from an indefinitely large normal parent population. *Biometrika* 23(3-4): 416-418. Dec. 1931. 442.8 B522

This is an editorial in the *Miscellanea* section.

163. Pearson, Karl. On a method of ascertaining limits to the actual number of marked members in a population of given size from a sample. *Biometrika* 20A(1-2): 149-174. July 1928. 442.8 B522

In addition to the main paper which contains tables, diagrams and formulas, there are 2 Appendixes: I. Note on the theory of inverse probabilities; II. Note on a solution due to Laplace.

164. Pearson, Karl. On a method of determining whether a sample of size n supposed to have been drawn from a parent population having a known probability integral has probably been drawn at random. *Biometrika* 25(3-4): 379-410. Dec. 1933. 442.8 B522

A discussion of a general criterion for random sampling, including several illustrations of the application to specific situations.

Among his conclusions, the author gives this one: "A very general test, the $P_{\lambda n}$ test, has been discussed which seems to the writer to involve fewer approximations and assumptions than the P_{x^2} test. He would emphasise its advantages in this respect in the case of small samples, where it appears to him that the application of the P_{x^2} test may well lead to erroneous conclusions, for it fails in stringency."

165. Pearson, Karl, Jeffery, G. B., and Elderton, Ethel M. On the distribution of the first product moment-coefficient, in samples drawn from an indefinitely large normal population. *Biometrika* 21(1-4, sect. A): 164-201. Dec. 1929. 442.8 B522

Contains numerous tables, graphs, and formulae.

"As a general statement of the results of this paper we may say that the distribution of p_{11} has been ascertained theoretically when the sampling is from a normal population, and tables have

been provided for tracing the curve of distribution of p_{11} , up to samples of 25. Further it has been shown that good fits are obtained for samples greater than 25 by use of a Pearson curve with the appropriate moment-coefficients. This gives us confidence in holding that for samples in excess of 25 the distribution of p_{11} , with the use of the more general moments of that coefficient determined for any form of sampled populations by Mr. Pepper, will also be effectively described by a Pearson curve." - p. 193.

166. Pearson, Karl. On the nature of the relationship between two of "Student's" variates (z_1 and z_2) when samples are taken from a bivariate normal population. *Biometrika* 22(3-4): 405-422. May 1931. 442.8 B522
167. Pearson, Karl. On the parent population with independent variates which gives the minimum value of ϕ^2 for a given sample. *Biometrika* 25(1-2): 134-146. May 1933. 442.8 B522
"This paper arises from a very bad blunder made by me in the last issue of *Biometrika*, vol. xxiv, pp. 461-463. It has probably been noticed by others, and I hasten to correct it, for I recognised my error as soon as the printed Journal was in my hands.
"My problem was the following: Given that a sample in the form of a bivariate contingency table has been drawn from a parent population, what is the best form of parent population to take on the assumption that the variates are not correlated in that population?" - p. 134.
168. Pearson, Karl. On the probability that two independent distributions of frequency are really samples from the same parent population. *Biometrika* 24(3-4): 457-470. Nov. 1932. 442.8 B522
"We see that if $A+B+D$ and C be supposed to be two samples from the same parent population at a maximum whatever that population might be, two such samples could not arise more than 6 times in 1000 trials." - p. 469.
169. Pearson, Karl. Some properties of "Student's" z : Correlation, regression and scedasticity of z with the mean and standard deviation of the sample. *Biometrika* 23(1-2): 1-9. Nov. 1931. 442.8 B522
The writer concludes that "the z test is not so efficient even for small samples as some have held. It may indeed suffice to show an improbability, but if it show nothing improbable, we must then bear in mind that it is not a very stringent test, and that other tests may indicate improbability where the z test indicates none." - p. 9.

170. Pearson, Karl, and Stoessiger, Brenda. Tables of the probability integrals of symmetrical frequency curves in the case of low powers such as arise in the theory of small samples. *Biometrika* 22(3-4): 253-283. May 1931. 442.8 B522

The tables appear on pp. 274-283 and are preceded by formulas and discussion.

171. Peatman, John Gray. Hazards and fallacies of statistical method in psychological measurement. *Psychol. Rec.* 1(20): 365-390. Oct. 1937. Libr. Cong. BF1.P68

In his discussion on the Hazards of Generalizing, there is some material on the problem of determining to what extent the results of measurement are a fair sample of all the instances about which we wish to make a generalization. There is discussion on several angles of the choice of fair population samples, and also on Some Specific Statistical Fallacies.

172. Peek, R. L., jr. Test of an observed difference in the frequency of two results. *Amer. Statis. Assoc. Jour.* 32(199): 532-536. Sept. 1937. 251 Am3

"On the hypothesis that the difference for the universe has some assigned value, there may be estimated the probability of a sample in which the difference deviates from its expected value by as much as that actually observed. If the probability of such a sample is very small, the hypothesis may be rejected, and the conclusion reached that the difference for the universe has some other value than the assigned one." - p. 532.

173. Pepper, Joseph. The sampling distribution of the third moment coefficient: an experiment. *Biometrika* 24(1-2): 55-64. May 1932. 442.8 B522

Contains numerous equations, formulas and diagrams to illustrate the discussion.

174. Pepper, Joseph. Studies in the theory of sampling. *Biometrika* 21(1-4, sect. B): 231-258. Dec. 1929. 442.8 B522

"In this paper, I have investigated theoretically the problem of sampling from any bivariate population, not necessarily normal or infinite. The method employed is purely algebraical and is an extension of two variates of the methods used by "Student," Dr. Church and Dr. Neyman. Although the algebra is often heavy and complicated, yet the method has the advantage of yielding the result in a general form, from which the special cases of univariate, normal or infinite sampled populations may be deduced." - p. 231.

175. Peterson, Arthur G. A guide to collecting, describing, and summarizing price data; with particular reference to historical series of local market prices. 32pp., processed. Washington, D. C., U. S. Dept. of agriculture, Bureau of agricultural economics, 1940.

Bibliographical footnotes.

"Completed in 1933 for use within the Bureau of Agricultural Economics, this guide is now issued for limited distribution among those engaged in price research."

Contains a brief exposition of sampling theory on pp. 7-11.

176. Pitman, E. J. G. Significance tests which may be applied to samples from any populations. 3 pts. Roy. Statis. Soc. Jour. Sup. 4(1-2): 119-130, 225-232. 1937; Biometrika 29(3-4): 322-335. Feb. 1938. 251 R81Js; 442.8 B522

References, p. 335.

The last two parts of this series of papers have the following sub-titles: II. The correlation coefficient test; III. The analysis of variance test.

The writer summarizes Part I of his paper thus: "It is shown that valid tests of significance can be devised which involve no assumptions about the forms of the populations sampled. It is also shown that fiducial limits can be determined for the difference of means of populations of the same form, no matter what the form of the populations may be."

In the summary to Part II, he states: "A test of dependence is proposed which is based on the correlation coefficient of a sample but which makes no assumptions about the population sampled. It is shown that an approximate form of the test will give the same results as the usual test based on normality. Moreover the validity of the approximation is determined by the sample values alone, without any reference to the (probably unknown) characteristics of the population sampled."

The summary to Part III is as follows: "The form of the analysis of variance test which involves no assumptions of normality is discussed. Expressions for the first four moments of the statistic used in this test are obtained. From these it appears that when the number of individuals in each batch, and the number of batches are both not too small, the usual test may be safely applied. A method of testing the validity of the approximation which this test employs is stated, and modifications of procedure, when necessary, are suggested."

177. Rhodes, Edmund Cecil. Elementary statistical methods. 243pp. London, G. Routledge & sons, ltd., 1933. (Half-title: London school of economics and political science. Studies in statistics and scientific method...no. 1) 251 R34

Investigation by sampling, and the kinds of sample inquiry are explained on pp. 14-19, and a brief section on tests of random sampling is given on p. 58.

178. Richardson, Clarence Hudson. An introduction to statistical analysis. 285pp. New York, Harcourt, Brace and co., [1934] 251 R39
Selected books for supplementary reading, pp. 276-278.

Ch. 11, The Theory of Sampling: Measures of Reliability, pp. 251-275, contains a discussion arranged under the following headings: Introduction; Problem of this chapter; An experiment in sampling; Distribution of means; Reliability of standard deviation, Reliability of the difference between two measures; Summary of reliability formulas.

179. Rider, Paul Reece. A note on small sample theory. Amer. Statis. Assoc. Jour. 26(174): 172-174. June 1931. 251 Am3

Revision of a paper delivered at the ninety-second annual meeting of the American Statistical Association at Cleveland, Ohio, Dec. 30, 1930.

The writer's concluding paragraph follows: "It must be remembered, however, as Professor Rietz has pointed out, that Fisher's results are all based upon the assumption of normality in the sampled population, and most of the present activity in small sample theory seems to center upon ascertaining to what extent the methods of 'Student' and Fisher may be applied to samples from non-normal universes, and devising new methods where these are not applicable."

180. Rider, Paul Reece. On small samples from certain non-normal universes. Ann. Math. Statis. 2(1): 48-65. Feb. 1931. 251.8 An7

Explains the Z -distribution in small sample theory as applied to "a triangular population, which is a specimen of a limited skew distribution, and also to a U-shaped universe." - p. 49.

181. Rider, Paul Reece. On the distribution of the correlation coefficient in small samples. Biometrika 24(3-4): 382-403. Nov. 1932. 442.8 B522

Bibliography, p. 403.

The two main sections of this paper are: I. Sampling from non-normal populations and from a normal population having high correlation; II. The effect of the coarseness of grouping.

182. Rider, Paul Reece. On the distribution of the ratio of mean to standard deviation in small samples from non-normal universes. Biometrika 21(1-4, sect. A): 124-143. Dec. 1929. 442.8 B522

The subject is discussed under the following headings: Introduction; Rectangular universe; Other types of universe; Distributions of various statistical parameters in samples from a rectangular universe; Geometric methods; and Appendix.

183. Rider, Paul Reece. A survey of the theory of small samples. pp. 577-628. Princeton, N. J., 1930. 325 R43

Reprinted from the Annals of Mathematics, 2d series, v. 31, no. 4, pp. 577-628, Oct. 1930.

Originally printed in Hamburg, Germany, by Lütcke and Wulff. Bibliography, pp. 624-628.

The writer reviews the theory of small samples including the work of R. A. Fisher, "Student", and others, and sets forth the results obtained. He divides his study into five parts. Part I takes up "Student's" distribution; Part II discusses the distributions of correlation coefficients; Part III deals with the analysis of variance; Part IV considers the distribution of multiple correlation coefficients; and Part V discusses various results obtained for small samples from non-normal universes.

184. Rietz, H. L. Comments on applications of recently developed theory of small samples. Amer. Statis. Assoc. Jour. 26(174): 150-158. June 1931. 251 Am3

Revision of a paper delivered at the ninety-second annual meeting of the American Statistical Association at Cleveland, Ohio, Dec. 30, 1930.

The writer summarizes his paper as follows: "An attempt has been made to emphasize the limitations on the theory of small samples involved in the assumption that the parent distribution is normal; for when we consider the effect of this limitation, it is fairly obvious that the problem of small samples is not solved in the exact general form in which it may be made to appear in statistical practice. While one limitation is thus emphasized, lest we forget, it seems well to emphasize in conclusion that the validity of the applications are dependent on drawing a random sample. This condition is likely to be relatively even more difficult to satisfy in statistical practice with small samples than with large samples. This condition is a factor in making it desirable to avoid small samples when possible, but it should hardly prevent the drawing of probable inferences from small samples when it is impracticable to obtain more data."

185. Rietz, H. L. On the distribution of the "Student" ratio for small samples from certain non-normal populations. Ann. Math. Statis. 10(3): 265-274. Sept. 1939. 251.8 An7

Bibliography, p. 274.

"Presented in part before the American Mathematical Society under a somewhat different title, Nov. 26, 1937."

"The present paper gives an analysis of data obtained by experimental sampling from two non-normal distributions whose sources we shall now describe. The parent distributions with which this paper is concerned are theoretical distributions resulting from certain urn schemata devised by the writer some years ago." - p. 265.

186. Riggleman, John Randolph, and Frisbee, Ira N. Business statistics. Ed. 2, 790pp. New York and London, McGraw-Hill book co., inc., 1938. 251 R443 Ed. 2

Bibliography, pp. 761-772.

Ch. II, Collection of Data, contains a section, pp. 21-25, on sampling in which there is a discussion of the principles upon which sampling is based, selection of the sample, and checking the adequacy of the sample.

187. Romanowsky, V. On the criteria that two given samples belong to the same normal population (on the different coefficients of racial likeness). *Metron* 7(3): 3-46. June 30, 1928. 251.8 M56
Contents: I. Partial coefficients; II. Total coefficients; III. The case of the known general population.
The writer here studies the distributions of various coefficients of racial likeness for successive pairs of samples.
188. Ross, Frank Alexander. On generalization from limited data. *Social Forces* 10(1): 32-37. Oct. 1931. 280.8 J823
Several cases are cited in which generalizations were based on too small a sample, and a warning is sounded against applying statistical techniques to a universe where the mass of material is too limited.
189. Roy, S. N. A geometrical note on the use of rectangular co-ordinates in the theory of sampling distributions connected with a multivariate normal population. *Indian Jour. Statis. (Sankhyā)* 3(3): 273-284. May 1938. 251.8 In2
The "laborious" algebraic processes frequently used in similar discussions are here replaced by hyper-space geometry, with particular application to a paper in the *Indian Journal of Statistics* (3(1): 1-40, March 1937) by P. C. Mahalanobis.
190. Roy, S. N., and Bose, R. C. The use and distribution of the studentized D^2 statistic when the variances and covariances are based on k samples. *Indian Jour. Statis. (Sankhyā)* 4(4): 535-542. Mar. 1940. 251.8 In2
References, p. 542.
"We shall attempt in the present paper to define a sample statistic based on mean differences of only a pair of samples but on a variance and covariance set which is pooled from k samples instead of from only one pair of samples as we did in the previous case." - p. 536.
191. St. Georgescu, N. Further contributions to the sampling problem. *Biometrika* 24(1-2): 65-107. May 1932. 442.8 B522
"In this paper I shall introduce new functions in connection with the distributions of random variables and offer a new method - based on these functions - which will allow us to obtain either exact formulae for small samples, or approximated results for large samples. Applications will be made to the case of a normal population." - p. 66.

192. The sampling distribution of the criterion λ_{H1} when the hypothesis tested is not true. *Biometrika* 29(1-2): 124-132. June 1937. 442.8 B522

This article is in three parts: an Editorial Note; a Note on the general sampling moments of λ_{H1} by S. S. Wilks; and An investigation into the adequacy of Dr. Wilks's curves, by Catherine M. Thompson.

193. Sarle, Charles Faye. Adequacy and reliability of crop yield estimates. U. S. Dept. Agr. Tech. Bul. 311, 137pp. Washington, D. C., 1932. 1 Ag84Te no. 311

Bibliography, p. 137.

The discussion of sampling principles in the section, Adequacy of Sample Data, pp. 12-39, will be of interest to those studying sampling in social and economic data. It includes material on representativeness, methods of selection, bias, randomness, and errors encountered and their treatment.

194. Sarle, Charles Faye. Development of partial and sample census methods. *Jour. Farm Econ.* 21(1): 356-364. Feb. 1939. 280.8 J822

Issued also in processed form by the U. S. Department of Agriculture, Bureau of Agricultural Economics (1.9 Ec71De)

Paper presented at the joint meeting of the American Statistical Association and American Farm Economic Association, December 1938.

In order to obtain more timely and accurate agricultural statistics, and have them show greater geographic detail, wider scope, and greater emphasis on dynamic changes now occurring in farming, the partial and sample census for intercensal years has been developed. The writer describes the methods for taking an annual sample census and discusses them under these five sub-heads: 1. Objectives in taking the sample; 2. Method of estimation to be used; 3. Kind and size of sampling unit; 4. Method of selecting the sampling unit; 5. Size of sample in terms of number of observations. On p. 360, the wider usefulness of the annual sample census is stated thus: "The sample of farms obtained by an annual sample census would provide a basis for the stratification of farms within a type-of-farming area or other geographic stratum. It would then be possible to use these farms in one or more of these strata for special intensive surveys and studies. Generalizations could be made from such a sample for a given kind of farm in a type-of-farming area. This method, known as 'double sampling,' could be used to excellent advantage for farm management studies."

195. Sarle, Charles Faye. Future improvement in agricultural statistics. *Jour. Farm Econ.* 21(4): 838-845. Nov. 1939. 280.8 J822

"Both the experience of the U. S. Department of Agriculture in making estimates and forecasts of agricultural production and the results of recent research in sampling and estimating indicate

that improvement in accuracy of agricultural statistics will come about by further development of technique along four general lines as follows: 1. By the use of more precise methods for observing agricultural phenomena. 2. By the use of more objective methods of sampling. 3. By increasing the size of samples. 4. By increasing the objectivity of the methods used in estimating and forecasting from sample data."

196. Sarle, Charles Faye. The possibilities and limitations of objective sampling in strengthening agricultural statistics. 14pp.; processed. Washington, D. C., U. S. Dept. of Agriculture, Agricultural marketing service [1939?] 1.942 A2P84

Also in *Econometrica* 8(1): 45-61. Jan. 1940. (280.8 Ec78)

Summarized in Research Conference on Economics and Statistics, Colorado Springs. Report of fifth annual Research conference on economics and statistics, July 3 to 28, 1939, pp. 34-36.

[Chicago] University of Chicago [1939] (280.9 R31 5th, 1939)

Paper presented before Cowles Commission Fifth Annual Research Conference on Economics and Statistics, Colorado Springs, July 10, 1939.

The writer makes specific suggestions for using objective sampling methods in obtaining more and better statistics on the various phases of agriculture. He also presents a critical description of "some of the more important methods of sampling and estimating now used by the U. S. Department of Agriculture and of some of the results obtained in developing more objective sampling methods." - p. 60.

197. Sarle, Charles Faye. The theory of sampling as applied to crop estimating; issued for the use of the staff of the Division of crop and livestock estimates. 27pp., processed. Washington, D. C., U. S. Dept. of agriculture, Bur. of agricultural economics, Div. of crop and livestock estimates, 1929. 1.9 Ec71Th

References, p. 27.

Contains an exposition of the underlying fundamental principles of sampling, as well as the application and interpretation of the procedure to a particular field.

198. Schultz, Theodore W. Testing the significance of mean values drawn from stratified samples. *Jour. Farm Econ.* 15(3): 452-475. July 1933. 280.8 J822

The writer's major purpose is "to show, principally by example, that: (1) By using analysis of variance the significance of many statistics used by agricultural economists may be substantially improved; (2) the technique is essential to exploit fully and effectively materials drawn from a stratified or otherwise restricted random sample, and (3) it is necessary to plan the internal structural arrangement of a sample to fit the fundamental principles underlying the technique before maximum statistical

results can be obtained. The best way to get an understanding of analysis of variance is by means of examples. With this in mind much of the remainder of the paper will be devoted to a study of corn yield estimates of Iowa. These estimates are samples and they will be used to illustrate the fundamentals of the procedure as well as the steps and calculations required to make the application."

199. Schutz, H. H. Selection of areas for sample agricultural enumerations. II. Tests of various sampling methods. Jour. Farm Econ. 19(2): 464-467. May 1937. 280.8 J822
Abstract of a paper read at the 27th annual meeting of the American Farm Economic Association, Chicago, Illinois, Dec. 29, 1936, in joint session with the American Statistical Association.
A discussion of the "best method of selecting sample areas, and the size and nature of the unit to employ."
For part I of this article, see Shepard, J. B., item no. 201.
Discussions of both papers by Z. R. Pettet, pp. 467-469.
200. Shaw, Frederick John Freshwater. A handbook of statistics for use in plant breeding and agricultural problems. 182pp. Delhi, Imperial council of agricultural research, India, 1936. 64 Sh2
Ch. 1, pp. 1-3, Sampling, contains a brief discussion, including theory, methods, and reliability.
201. Shepard, J. B. Selection of areas for sample agricultural enumerations. I. How the statistics most needed could be secured. Jour. Farm Econ. 19(2): 454-464. May 1937. 280.8 J822
The U. S. Bureau of Agricultural Economics Library has a reprint of this article.
This paper was read at the 27th annual meeting of the American Farm Economic Association, Chicago, Dec. 29, 1936; in joint session with the American Statistical Association.
The most serious defects in present agricultural statistics relating to crops and livestock, income, population, tenancy, and living conditions are pointed out, and the remedy suggested is the annual enumeration of sample areas all over the country. The writer tells how such sample surveys might be planned and conducted, at what cost, and what types of information would be obtained and what its uses might be. He suggests that different agencies in the Department of Agriculture might have differing opinions as to the selection of the size and character of sample areas, depending upon the work of the agencies, but that the advantages of pooling their statistical needs and working together are obvious.
For part II of this article, see Schutz, H. H., item no. 199.
Discussions of both papers by Z. R. Pettet, pp. 467-469.

202. Shewhart, Walter A. Annual survey of statistical technique: sample theory. *Econometrika* 1(3): 225-237. July 1933. 280.8 Ec78
203. Shewhart, Walter A. Economic control of quality of manufactured product. 501pp. New York, D. VanNostrand co., inc., 1931. 251 Sh5
Appendix III, pp. 473-491, is a Bibliographic Guide, arranged to correspond with the parts of the text. Part IV, Sampling Fluctuations in Quality, pp. 163-248, is composed of four chapters which contain a general and theoretical discussion of the subject, and are illustrated with numerous graphs, charts and formulas.
The author of this book is a member of the technical staff of Bell Telephone Laboratories, inc., and the material in the volume applies particularly to the measurement of manufactured goods. However, the theory of sampling as set forth in the section cited above, is of interest to this bibliography.
204. Shewhart, Walter A. Random sampling. *Amer. Math. Monthly* 38(5): 245-270. May 1931. Libr. Cong. QA1.A515
Paper presented at the Providence, R. I., meeting of the Mathematical Association of America, Sept. 8, 1930.
Defines the theory of random sampling and explains the usefulness of the application of the theory.
205. Shewhart, Walter A., and Winters, F. W. Small samples - new experimental results. *Amer. Statis. Assoc. Jour.* 23(162): 144-153. June 1928. 251 An3
Discusses the problem of determining the error of the average obtained from a small sample.
Illustrated with charts.
206. Smith, James G. Elementary statistics; an introduction to the principles of scientific methods. 517pp. New York, H. Holt and co. [1934] 251 Sm63
Ch. 17, The Theory of Errors and the Theory of Sampling, pp. 297-317, contains a discussion of the theory and problems involved, particularly the question of representativeness of data and the probability of error, with illustrations and statements of the general rules and formulas to be applied.
207. Smith, John H. Tests of significance; what they mean and how to use them. *Jour. Business Univ. Chicago* 12(4, pt. 2): 1-90. Oct. 1939. Libr. Cong. HF5001.J57
"Studies in Business Administration v. 10, no. 1."
Selected bibliography, pp. 87-90.
The purpose of this study is to present "as simply as possible an organized treatment of the fundamental principles of sampling theory which underlie the proper measures of unusualness in support of inferences. Its original features are

chiefly concerned with organization, emphasis, and simplification of mathematical derivations...

"In connection with conditions of sampling, the point of view presented is that the entire set of conditions on which the sampling distribution of a statistic is based constitute the hypothesis which may be tested." - Preface.

Contents: 1. Introduction; 2. Sampling distributions of number of successes; 3. Normal distribution and the problem of inference; 4. The Chi-square test for sets of means; 5. Tests for sets of means using estimates of variance; 6. Tests for regression coefficients; 7. Analysis of variance and partial correlation ratios; 8. Tests for correlation coefficients; 9. Chi-square test for goodness of fit; 10. Conclusion.

The Appendices, which are processed, contain the following: A. Approximations to binomial probabilities; B. General sampling distributions and methods of sampling; C. Sampling distribution of Chi-square; D. Simultaneous sampling distributions of means and sums of squares of residuals; E. Sampling distributions of F ; n^2 , and Student's t ; F. Sampling distributions of regression coefficients.

208. Snedecor, George Weddel. Design of sampling experiments in the social sciences. Jour. Farm Econ. 21(4): 846-855. Nov. 1939. 280.8 J822

The U. S. Bureau of Agricultural Economics Library has a reprint of this article.

An historical survey of the growth of accepted sampling theory, with discussions of Kjaer's work, published in 1895, and Bowley's work early in the twentieth century, and some statements regarding present status and future problems for research.

209. Snedecor, George Weddel. Statistical methods. Applied to experiments in agriculture and biology. 422pp. Ames, Iowa, Iowa State college press, 1940. 251 Sn2 Ed. 3

References at end of each chapter.

The technical mathematics used in sampling procedure are set forth in the following chapters: Ch. 3, Sampling from a Normally Distributed Population, pp. 46-66; Ch. 8, Large Sample Theory, pp. 142-161; Chs. 10-13, which deal with analysis of variance and covariance, pp. 179-307; Ch. 16, Large Samples of Enumeration Data. Binomial and Poisson Distributions, pp. 362-385; Ch. 17, Design and Analysis of Samplings, pp. 386-414.

210. Social science research council. Advisory committee on economics and social research in agriculture. Research method and procedure in agricultural economics. 2v., processed. [Washington, D. C.] 1928. 281 S012R

In v. 1, pt. II, Statistical Method, there is a section on Sampling, pp. 49-57, which discusses the theory and its applications in the field of agricultural economics.

The section Inference from Results of Statistical Analysis of v. 2, pp. 271-285, is of interest. Many paragraphs and brief references to sampling appear in other parts of these volumes. Consult especially v. 1, pp. 41, 67, 150, 135 and v. 2, pp. 275, 297.

211. Social science research council. Committee on scientific method in the social sciences. Methods in social science, a case book... edited by Stuart A. Rice. 822pp. Chicago, University of Chicago press [1931] 280 Sol2

Index of Analysts, pp. 773-776, is a list of the principal studies and surveys discussed.

In Analysis 43, Behavior Alternatives as Statistical Data in Studies by William F. Ogburn and Ernest W. Burgess, analyzed by Stuart A. Rice, the writer discusses sampling as illustrated by the three studies analyzed from the angles of selection of sample, size, randomness, and control of variables.

For other material on sampling, consult the index.

212. Soper, H. E. Sampling moments of moments of samples of n units each drawn from an unchanging sampled population, from the point of view of semi-invariants. Roy. Statis. Soc. Jour. 93(1): 104-114. 1930. 251 R81J

Summarizes the methods used and ends reached for those who "are interested in statistical theory but not adepts in algebraical symbolism."

213. "Sophister." Discussion of small samples drawn from an infinite skew population. Biometrika 20A(3-4): 389-423. Dec. 1928. 442.8 B522

The author states that his objects in this paper are to determine: "(1) How far considerable skewness in the population sampled influences the distribution of the constants of small samples. (2) As far as possible equations describing the distribution of variance, standard deviation and 'Student's' z in the case of such small samples. (3) How far skewness, often unrecognisable in practical testing, may be a source of error when inferences are drawn on the hypothesis that the sampled population follows a normal curve of frequency."

214. Sorenson, Herbert. Statistics for students of psychology and education. 373pp. New York, McGraw-Hill book co., inc., 1936. Libr. Cong. HA29.S65

Ch. 16, Sampling, Chance, and Probability of Occurrence, pp. 281-293, contains a discussion of representative samples, random sampling, and deductions made from a study of samples.

Scattered material on sampling errors may be found by consulting the index.

215. Spearman, C. Sampling error of tetrad differences. Jour. Ed. Psychol. 22(5): 388. May 1931. Libr. Cong. LB1051.A2J6
Not examined.

"In the formula for the probable error or variance of tetrad differences, there is apt to be scant account taken of the special assumptions upon which the formula is based. One of these, that the variables should have a normal frequency distribution, is only dangerous when great accuracy is wanted." - Social Sci. Abs., v. 3, Oct. 1931, item no. 16476.

216. Starch, Daniel. Factors in the reliability of samples. Amer. Statis. Assoc. Jour. Sup. 27(177A): 190-201. Mar. 1932.
251 Am3

Presented at the 93d annual meeting of the American Statistical Association in Washington, D. C., December 1931.

Since the cost of securing complete data in the field of advertising and marketing problems is prohibitive, much of the research must rely on some type of sampling method. "If a sample is properly secured, is of sufficient size and is properly handled statistically, the results are almost without exception satisfactory and adequate for practical use. In fact, in most cases a satisfactory sample is surprisingly small if proper regard is given to the scientific requirements in securing and handling the sample." - p. 190.

The discussion is arranged under these three headings:

1. Procuring the sample; 2. Size of the sample; 3. Statistical treatment of the sample.

217. Starkey, Daisy M. A test of significance of the difference between means of samples from two normal populations without assuming equal variances. Ann. Math. Statis. 9(3): 201-214. Sept. 1938. 251.8 An7

The subject is discussed under the following headings:

1. History of the problem; 2. The case of small samples; 3. Samples of large numbers; 4. The distributions of the test quantities which correspond to (3) and (11) for equal means, when the ratio of the variances is a known quantity.

218. Stephan, Frederick F. Representative sampling in large-scale surveys. Amer. Statis. Assoc. Jour. 34(206): 343-352. June 1939.
251 Am3

Three types of sampling, eight distinct steps which constitute the procedure in a sampling survey, and the testing of sampling methods, as well as an evaluation of the usefulness, potentialities, and pitfalls of the process are outlined and discussed in this paper which was originally presented at the annual meeting of the American Statistical Association in Detroit, Dec. 29, 1938.

219. Stephan, Frederick F. Practical problems of sampling procedure. *Amer. Sociol. Rev.* 1(4): 569-580. Aug. 1936. 280.8 An37
Paper read before a joint session of the American Sociological Society and the American Statistical Association, December 1935.
Some of the problems that sociologists and economists encounter in securing the samples and in estimating the risks are discussed. The paper is in three sections: 1. Sampling from schedules or files; 2. Sampling in field inquiries; 3. General rules of sampling.
220. Stephan, Frederick F. Sampling errors and interpretations of social data ordered in time and space. *Amer. Statis. Assoc. Jour. Sup.* 31(185A): 165-166. Mar. 1934. 251 An3
Abstract of the writer's original paper, prepared by C. E. Gehlke.
"Census tract data are receiving increasing attention as objects of social research, and hence the question of the applicability of formulas of sampling to them is pertinent... When, however, the data of census tracts are drawn upon for generalizations and causational inferences, certain difficulties arise. The error formulas have been applied but it is doubtful whether they are in point, any more than they are when used upon the data of time series. Here, as in time series, the conditions of random selection are not satisfied." - p. 165.
221. Stock, J. Stevens, and Frankel, Lester R. The allocation of samplings among several strata. *Ann. Math. Statis.* 10(3): 288-293. Sept. 1939. 251.8 An7
The writers state the problem as follows: "Given several well defined areas of study and a fixed number of observations with which to make the survey, how best to distribute the observations such that each area will be represented with equal precision." - p. 283.
Their concluding sentence is: "Thus, the number of samplings from each stratum is, for all practical purposes, proportional to the standard deviations, irrespective of the size of the various strata."
222. Stouffer, Samuel A. Sociology and sampling. In Bernard, Luther Lee, ed. *Fields and methods of sociology*, pp. 476-488. New York, Ray Long and R. R. Smith, inc. [1934]. Libr. Cong. HM34.B4
Bibliography, pp. 487-488.
Application of the sampling method to sociological research is the subject of this paper. Representative samples, how to obtain them, and illustrations of this technique in actual studies are discussed.

223. Stouffer, Samuel A. Statistical induction in rural social research. Social Forces 13(4): 505-515. May 1935. 280.8 J823
The discussion is centered on the following questions: "1. What a priori reason is there for hoping that the sample will be representative of the totality which the final generalization is to encompass? 2. What basis is there for estimating the reliability and validity of the indexes used? 3. Is the sample large enough? 4. Is there corroborative evidence from other studies?"
224. Sukhatme, P. V. Contributions to the theory of the representative method. Roy. Statis. Soc. Jour. Sup. 2(2): 253-268. 1935. 251 R81Js
Compares two methods of selecting a representative sample from a stratified population, and shows that "almost invariably the precision of the estimate will be increased if Dr. Neyman's method be adopted in preference to the method of proportional sampling. Further it has been found that the gain in precision is of considerable magnitude whenever the variability of the character sought within the single strata is very different. The method is, therefore, to be particularly recommended in cases when the investigation planned concerns a rather heterogeneous area, i.e. including both big cities and rural districts." - p. 266.
225. Sukhatme, P. V. On Fisher and Behrens' test of significance for the difference in means of two normal samples. Indian Jour. Statis. (Sankhyā) 4(1): 39-48. Dec. 1938. 251.8 In2
References, p. 44.
"The object of this paper is to tabulate the 5 per cent. values of Fisher and Behrens' solution for the difference in means of two normal samples and to give tables of the ordinates of 'Student's' t distribution for the sequence 10, 12, 15, 20, 24, 30, 60, ∞ and the nine values less than 10." - p. 39.
226. Sukhatme, P. V. On the distribution of X^2 in samples of the Poisson series. Roy. Statis. Soc. Jour. Sup. 5(1): 75-79. 1938. 251 R81Js
Mathematical discussion, accompanied by four tables.
227. Sukhatme, P. V. The problem of k-samples for Poisson population. Natl. Inst. Sci. India. Proc. 3(3): 297-305. 1937. Libr. Cong. Q73.N3
The author develops a statistical technique called the technique of "Count" analysis for samples drawn at random from a Poisson population.
228. Sukhatme, P. V. Tests of significance for samples of the X^2 -population with two degrees of freedom. Ann. Eugenics 8(1): 52-56. Oct. 1937. 442.8 An73

Develops the technique of "Interval" analysis for samples drawn at random from the exponential population. "It is shown that the tests of interval analysis are perfectly analogous to those of Analysis of Variance tests for the normal law variation." - Summary.

229. Thompson, William R. On a criterion for the rejection of observations and the distribution of the ratio of deviation to sample standard deviation. *Ann. Math. Statis.* 6(4): 214-219. Dec. 1935. 251.8 An7

Bibliography, p. 219.

Contains formulae, tables, and calculations.

230. Thompson, William R. On confidence ranges for the median and other expectation distributions for populations of unknown distribution form. *Ann. Math. Statis.* 7(3): 122-128. Sept. 1936. 251.8 An7

"Insistent problems involve estimation of mathematical expectation that in further sampling we shall find x lying within a given interval, or similar expectation with regard to parameters of U such as the unknown median. It might seem that...all we should claim is that it is possible to draw from U the sample actually observed... What additional statements as to U may be appropriate in view of this randomness are our immediate concern." - p. 122.

231. Thompson, William R. On the likelihood that one unknown probability exceeds another in view of the evidence of two samples. *Biometrika* 25(3-4): 285-294. Dec. 1933. 442.8 B522

"In elaborating the relations of the present communication interest was not centred upon the interpretation of particular data, but grew out of a general interest in problems of research planning. From this point of view there can be no objection to the use of data, however meagre, as a guide to action required before more can be collected; although serious objection can otherwise be raised to argument based upon a small number of observations. Indeed, the fact that such objection can never be eliminated entirely - no matter how great the number of observations - suggested the possible value of seeking other modes of operation than that of taking a large number of observations before analysis or any attempt to direct our course." - p. 285.

232. Tippett, Leonard Henry C. The methods of statistics; an introduction mainly for experimentalists. Ed. 2, rev. and enl., 280pp. London, Williams and Morgate, Ltd. [1937] 251 T49 Ed. 2
References, pp. 271-274.

In addition to the shorter sections on sampling which may be found by consulting the index, the following chapters contain

longer treatments: I. Distributions derived from theory of probability, pp. 43-66; III. Errors of random sampling and statistical inference, pp. 67-97; V. Small samples, pp. 110-124; VI. Analysis of variance, pp. 125-139; VIII. Sampling errors of correlation and regression constants, pp. 172-188; X. The further theory of errors and principles of experimental arrangement, pp. 204-242.

233. Tolley, Howard Ross. Economic data from the sampling point of view. Amer. Statis. Assoc. Jour. Sup. 24(165A): 69-72. Mar. 1929. 251 Am3

The Library of the U. S. Bureau of Agricultural Economics has a reprint of this article.

The applicability of available error formulas, the developing of new and satisfactory formulas, and the judging of the accuracy of statistical results in social science studies are topics considered in this paper, which was read at the 90th annual meeting of the American Statistical Association in Chicago, December 1938.

234. Treloar, Alan Edward, and Wilder, Marian A. The adequacy of "Student's" criterion of deviations in small sample means. Ann. Math. Statis. 5(4): 324-341. Dec. 1934. 251.8 An7

Literature cited, p. 338.

In their Summary, the writers state that "Results such as those given herein stress again the dangers attendant upon the drawing of deductions of practical importance from a single sample of small size. When only a single sample is available it is certainly desirable that the statistical analysis should depend not merely upon most likely estimates of needed parameters, but also upon those of less probability which might readily be true and which guard against the erroneous segregation of possibly insignificant deviations."

235. Treloar, Alan Edward. Elements of statistical reasoning. 261pp. New York, J. Wiley & sons, inc. 1939. 251 T71

Partial contents: Ch. 10, Errors of random sampling, pp. 128-151; Ch. 11, Sampling errors of the correlation coefficient, pp. 152-164; Ch. 14, Sampling errors of proportions, pp. 200-209.

236. Treloar, Alan Edward. An outline of biometric analysis. Various paging, processed. Minneapolis, Burgess publishing co., 1935. 325 T71 1935

The following sections pertain to sampling theory and technique: Ch. 7 of Part 1, Errors of Random Sampling, pp. 26-29; Part 3; The Interpretation of Statistics with Special Reference to Small Samples, pp. 1-58.

237. Truska, L. . . The simultaneous distribution in samples of mean and standard deviation, and of mean and variance. *Biometrika* 31(3-4): 256-271. Mar. 1940. 442.8 B532

"In this study I propose to give the application of 'the conception of the probability of passage' to the solution of the rather difficult general problem mentioned above [in the title]. From this single example it is possible to deduce that the introduction of a 'conception of the probability of passage' into mathematical statistics would at least make the solution of a range of difficult problems considerably easier."
- p. 256.

Contains many formulas and diagrams.

238. Vernon, Raymond. Predetermining the necessary size of a sample in marketing studies. *Jour. Mktg.* 2(1): 9-12. July 1937. 280.38 J82

The paper presents a technique in the problem of determining the size of a sample necessary to obtain an arithmetic average of a desired accuracy. The mechanics, derivation, assumptions and limitations of the method are described, and the comments of a statistician, (R. L. Kozelka) are appended.

239. Vickery, C. W. On drawing a random sample from a set of punched cards. *Roy. Statis. Soc. Jour. Sup.* 6(1): 62-66. 1939. 251 R81Js

The discussion of random sampling numbers is arranged under the following topics: 1. Introduction; 2. Uses of the technique; 3. Technique involving serial numbers; 4. Technique without serial numbers; 5. A random sampling machine.

240. Wald, A., and Wolfowitz, J. On a test whether two samples are from the same population. *Ann. Math. Statis.* 11(2): 147-162. June 1940. 251.8 An7

References, p. 162.

Presented to the Institute of Mathematical Statistics, Philadelphia, Dec. 27, 1939.

The writers seek to test the hypothesis that the distribution of the functions of two independent variables are identical. Two theorems are stated and proved and many formulae are included.

241. Walker, Helen M. The sampling problem in educational research. *Teachers Col. Rec.* 30(8): 760-774. May 1929. Libr. Cong. L11.T4

Points out the need for adequacy, representativeness and randomness in sampling, and reproduces some student work to illustrate situations in which these criteria would not be satisfied.

242. Waugh, Albert Edmund. Elements of statistical method. 381pp. New York and London, McGraw-Hill book co., inc., 1938. 251 W35
Selected books on statistical method, pp. 371-373.
Ch. VII, Measures of Reliability, pp. 131-159, contains a discussion of the probable and standard error as applied to samples of a universe. There are other references relating to the mathematics used in sampling calculations, which may be found by consulting the index.
243. [Weaver, Otis T.] Estimating the reliability of a small sample (less than thirty) taken from a large universe. 5pp., processed. Washington, D. C., U. S. Dept. of agriculture, Bur. of agricultural economics, Div. of cotton marketing [1932] 1.9 Ec733Es
Contains three pages of tables.
244. Welch, B. L. On tests for homogeneity. Biometrika 30(1-2): 149-158. June 1938. 442.8 B522
References, p. 158.
The following sections make up the paper: 1. Introduction; 2. Sampling a limited population; 3. Sampling a more extended population; 4. The X^2 test for homogeneity of binomial series; 5. Further remarks; 6. Summary.
245. Welch, B. L. The significance of the difference between two means when the population variances are unequal. Biometrika 29(3-4): 350-361. Feb. 1938. 442.8 B522
In summarizing his paper, the writer states: "Three tests of the hypothesis that the means of two normal populations are equal have been considered in some detail. The object has been to study how closely each of these controls the risk of rejecting the hypothesis when it is actually true. None of the tests was exact in the sense that it would control this risk precisely, whatever the unknown ratio θ of the variances of the two populations."
"Note on an approximation used by B. L. Welch," by Elizabeth Tanburn, is given on pp. 361-362.
246. Welch, B. L. Some problems in the analysis of regression among k samples of two variables. Biometrika 27(1-2): 145-160. Mar. 1935. 442.8 B522
The paper is divided into 8 sections, as follows: I. Introduction; II. The method; III. Types of hypotheses considered and notation used; IV. The test for H; V. The test for H_1 ; VI. The tests for H_2 ; VII. The hypotheses H; VIII. Illustrative example.
247. Wert, James Edwin. Educational statistics. 305pp. New York and London, McGraw-Hill book co., inc., 1938. (Half-title: McGraw-Hill series in education) Libr. Cong. LB2846.W42

Ch. 9, Sampling, pp. 136-162, contains a discussion on representativeness and adequacy of the sample, and on the computation of standard errors and probable errors.

248. Wicksell, S. D. On correlation functions of type III. *Biometrika* 25(1-2): 121-133. May 1933. 442.8 B522

The writer states that the chief object of his paper is to "study the correlation surface obtained for the second order moments in samples of x and y , which are taken at random from a normally distributed bivariate supply (supposed to be infinitely large). As it is clear that the marginal distributions of this surface will both be of Type III, we have here an interesting object of investigation, i.e. a solid Type III distribution. The most convenient way to study problems of this kind seems to be by the aid of the so-called reciprocal or characteristic functions of the distributions." - p. 121.

249. Wilks, Samuel Stanley. The analysis of variance and covariance in non-orthogonal data. *Metron* 13(2): 141-154. Feb. 28, 1938. 251.8 M56

"The method of determining constants and computing residuals is cumbersome at best, but there is a method of finding the sum of squared residuals without having to determine the constants, which the author proposes to discuss here. The device is simply one of introducing variates which take the values 0 or 1 and reducing the whole procedure to a problem in classical regression theory, and evaluating certain determinants." - p.142.

250. Wilks, Samuel Stanley. Certain generalizations in the analysis of variance. *Biometrika* 24(3-4): 471-494. Nov. 1932. 442.8 B522

Section 3 of this paper, pp. 476-478, deals with Generalization of the Variance of a Sample.

251. Wilks, Samuel Stanley. Fiducial distributions in fiducial inference. *Ann. Math. Statis.* 9(4): 272-280. Dec. 1938. 251.8 An7

Bibliography, p. 280.

"An expository paper presented to the American Statistical Association on Dec. 28, 1937, at the invitation of the Program Committee."

"Since 1930 the ideas and terminology surrounding the fiducial method have been developed...into a system for making inferences from a sample of observations about the values of parameters which characterize the distribution of the hypothetical population from which the sample is assumed to have been drawn." - p. 272.

252. Wilks, Samuel Stanley. The large-sample distribution of the likelihood ratio for testing composite hypotheses. *Ann. Math. Statis.* 9(1): 60-63. Mar. 1938. 251.8 An7

253. Wilks, Samuel Stanley. Lectures on the theory of statistical inference, 1936-1937, Princeton University. 106pp., processed. Ann Arbor, Michigan, Edwards brothers, inc., 1937. 251 W65
Literature for supplementary reading, pp. 103-106.
Ch. II, Sampling Theory, pp. 21-50, contains technical mathematical formulae, with a minimum of discussion, for problems in sampling. The writer, in his preface, refers to this volume as "the present set of notes, given as a one-semester course of lectures to graduate students." Some of the sections in Ch. II are: Determination of certain sampling distributions by characteristic functions; Determination of sampling distributions from moment equations; and Geometrical methods of finding sampling distributions.
254. Wilks, Samuel Stanley. Moment-generating operators for determinants of product moments in samples from a normal system. Ann. Math. (ser. 2) 35(2): 312-340. Apr. 1934. Libr. Cong. QA1.A6
Subtopics are: 1. Introduction; 2. Moments of determinants of total product moments; 3. The combination of sets of component product moments; 4. Applications of the operations to sampling problems.
255. Wilks, Samuel Stanley. Moments and distributions of estimates of population parameters from fragmentary samples. Ann. Math. Statis. 3(3): 163-195. Aug. 1932. 251.8 An7
"In this paper it is the purpose of the author to investigate incomplete samples from a normal bivariate population... In the first part of the paper we shall consider various sets of simultaneous maximum likelihood estimates of the population parameters and the limiting forms of their sampling variances and covariances in large samples. In the second part we shall consider other less efficient, but simpler systems of estimates." - Introduction.
256. Wilks, Samuel Stanley. On the distribution of statistics in samples from a normal population of two variables with matched sampling of one variable. Metron 9(3-4): 87-126. Mar. 1, 1932. 251.8 M56
The Library of the U. S. Dept. of Agriculture has a reprint of this paper. (325 W65)
"In this paper, the author has been primarily concerned with the moments, distributions, standard errors and expected values of the most important statistics belonging to a variate y for samples in which the distribution of a correlated variate x is made identical, item by item, with a given distribution, independently of the y 's. Except at two points, no attempt has been made to generalize the results by considering a more general type of such sampling than that described for two variates." - Conclusion.

257. Wilks, Samuel Stanley. On the sampling distribution of the multiple correlation coefficient. *Ann. Math. Statis.* 3(3): 196-203. Aug. 1932. 251.8 An7

"In this paper it will be shown that the distribution of the multiple correlation coefficient can be derived directly from Wishart's generalized product moment distribution without making use of geometrical notions and the property of the invariance of ρ under linear transformations of the independent variates." - p. 196.

258. Wilks, Samuel Stanley. Shortest confidence intervals from large samples. *Ann. Math. Statis.* 9(3): 166-175. Sept. 1938. 251.8 An7

References, p. 175.

The problem of obtaining "best" confidence intervals for large samples is considered. "Under fairly general conditions it will be seen that a rather simple asymptotic solution exists for the large-sample case, which is connected in an essential manner with the method of maximum likelihood." - p. 167.

259. Wilks, Samuel Stanley. The standard error of the means of "matched" samples. *Jour. Ed. Psychol.* 22(3): 205-208. Mar. 1931. Libr. Cong. LB1051.A2J6

Considers the mathematical derivation of the expression for the variation in the mean of one character of the items of a sample when the distribution of another correlated character is made identical for all samples, item by item, with an arbitrary distribution.

260. Wilson, Edwin B. Sampling error of the median. *Science* 92(2377): 58-59. July 19, 1940. 470 Sci2

Brief mathematical article in the "discussion" section of the periodical.

261. Wishart, John. A comparison of the semi-invariants of the distributions of moment and semi-invariant estimates in samples from an infinite population. *Biometrika* 25(1-2): 52-60. May 1933. 442.8 B522

"Let there be given a population, supposed infinite in extent, but subject to this having any law of distribution with finite moments. It may be a population of one or many variables. The population may be regarded as completely specified by a knowledge of all its characteristic parameters, which may be moment coefficients or semi-invariants, or expressible in terms of these. For a sample of size n drawn at random from this population we may calculate in some manner certain functions which are to be regarded as estimates of the population moment coefficients, or semi-invariants. The simultaneous distribution in repeated samples of the various estimates will depend

upon that of the parent population, and the problem I wish to take up deals with the determination of the moment coefficients, or semi-invariants, of this simultaneous distribution." - p. 52.

262. Wishart, John. The correlation between product moments of any order in samples from a normal population. Roy. Soc. Edinburgh. Proc. 49(1): 78-90. 1929. 501 Ed4P
References, p. 90.

"Certain simple results of the large sample theory on the correlation between the estimated direct and product moment coefficients in samples from a bi-variate population have prompted me in this paper to consider how far they are true exactly." - p. 78.

263. Wishart, John. The derivation of certain high order sampling product moments from a normal population. Biometrika 22(1-2): 224-238. July 1930. 442.8 B522

"It is the purpose of the present paper to supply the formulae which will enable the results to be pushed to a further stage in the approximation." - p. 224.

264. Wishart, John. The generalized product moment distribution in samples from a normal multivariate population. Biometrika 20A(1-2): 32-52. June 1928. 442.8 B522

The discussion is divided into the following sections:

1. Introduction;
2. Tri-variate product moment distribution;
3. Multi-variate distribution. Use of quadratic co-ordinates;
4. Moment coefficients of the distribution;
5. Derived coefficients.

The writer adds a Note to his paper, p. 424 of the Miscellanea section.

265. Wishart, John. The mean and second moment coefficient of the multiple correlation coefficient in samples from a normal population. Biometrika 22(3-4): 353-361. May 1931. 442.8 B522

Editorial appendix to this paper, pp. 362-376.

"The purpose of the first section of this paper is to determine the mean value of R^2 . Later, the analysis is extended to the derivation of the second coefficient, or variance, of R^2 , although the utility of this quantity, for a distribution which is far from normal, is not so great as would at first sight appear. In both cases the results are compared with Hall's large sample approximations." - p. 353.

266. Wishart, John. A note on the distribution of the correlation ratio. Biometrika 24(3-4): 441-456. Nov. 1932. 442.8 B522

"Expressions are reached for the probability integral of the distribution, and for the mean value and variance of the square of the sample correlation ratio." - Summary.

267. Wishart, John. A problem in combinatorial analysis giving the distribution of certain moment statistics. London Math. Soc. Proc. (ser. 2) 29(4): 309-320. Mar. 15, 1929. Libr. Cong. QA1.L5
"One naturally finds that more reliance can be placed on a large than on a small sample. But whatever its size it is unsafe to take a sample estimate as furnishing the required population value without determining the errors to which the estimates are subject. A complete knowledge regarding these can be obtained if the frequency distribution, in samples, of the various moment coefficients can be determined theoretically." - p. 309.
Deals with the distribution of second order moment statistics from a normal population.
268. Wishart, John. Sampling errors in the theory of two factors. Brit. Jour. Psychol. 19(2): 180-187. Oct. 1928.
Not examined.
"In order to achieve a more precise method of testing the significance of the value of a tetrad difference, the writer sets up a function, involving the product moments instead of correlation coefficients, which becomes zero when the tetrad difference becomes zero, and of which the standard deviation is known accurately. The importance of the new method of testing the two factor theory is illustrated by an example. The mathematical proofs of the two theorems evolved are presented in an appendix." - Social Sci. Abs., v. 1, June 1929, item no. 2485.
269. Woodward, Julian L. A statistical study of the foreign news content of American newspapers. Amer. Sociol. Soc. Papers. 24(2): 153-155. May 1930. 280.9 Am37
"The present study of the foreign news content of ten large dailies develops and applies a technique for determining the statistical reliability of a sampling procedure employed in obtaining the data." - Social Sci. Abs., v. 2, Dec. 1930, item no. 16840.
270. Woofter, T. J. Common errors in sampling. Social Forces 11(4): 521-525. May 1933. 280.8 J823
Three types of mistakes that reputable investigators repeatedly make in sampling studies are discussed.
271. Yates, F., and Zaccopanay, I. The estimation of the efficiency of sampling, with special reference to sampling for yield in cereal experiments. Jour. Agr. Sci. 25(4): 543-577. Oct. 1935. 10 J822
Bibliography, p. 577.
"A preliminary discussion of the interpretation of the analysis of variance as applied to sampling results is given, and an expression is found for the loss of information arising out of sampling. The results of the discussion are applicable

to all types of sampling carried out on replicated experiments." - Summary.

272. Yule, George Udny, and Kendall, M. G. An introduction to the theory of statistics. With 55 diagrams and 4 folding plates. Ed. 11, rev., 570pp. London, Charles Griffin & co., ltd., 1937. 251 Y9 Ed. 11

References, pp. 495-528.

The six chapters in this text book which are devoted to sampling, constitute an extensive discussion of the theory and its application, including the technical mathematics involved. The titles of chapters 18-23 are: Preliminary notions on sampling, pp. 332-349; The Sampling of attributes - large samples, pp. 352-372; The sampling of variables - large samples, pp. 373-393; The sampling of variables - large samples, continued; pp. 394-412; The χ^2 distribution, pp. 413-433; The sampling of variables - small samples, pp. 434-461. Each chapter contains a summary in concise form, followed by "Exercises."

The bibliography of 33 pages is arranged by chapters. The citations to material on sampling are found on pp. 516-524.

273. Yule, George Udny. A test of Tippett's random sampling numbers. Roy. Statis. Soc. Jour. 101(1): 167-172. 1938. 251 R81J

In order to test his impression that Tippett's series was rather "patchy", the writer carried out the test described in this article. He concludes as follows: "While no one of the preceding results leads to a highly improbable divergence from the expectation on random sampling some of the values of P are not as high as could be wished, and Table IV appears to confirm the impression of 'patchiness' especially in the earlier part of the Tables, which alone I had been using."

SOME STUDIES USING SAMPLING TECHNIQUE

274. Allen, R. H., and others. Part-time farming in the Southeast, by R. H. Allen, L. S. Cottrell, jr., W. W. Troxell, Harriet L. Herring, and A. D. Edwards. U. S. Works Prog. Admin. Div. Social Res. Res. Monog. 9, 317pp. Washington, D. C., 1937. 173.2 W89Re.no. 9

The findings of an investigation of combined farming-industrial employment, its types, benefits and disadvantages, and possibilities of developing other desirable farming-industrial combinations are published in this monograph.

The study was based on a sample enumeration of six counties in Alabama, Georgia and South Carolina. The methods used in selecting the sample counties, determining their representativeness, selecting cases for enumeration, and the procedures employed are explained in Appendix C, Methodological Note, pp. 281-292.

Part I is in four chapters: I. The part-time farmer and his farm; II. Off-the-farm employment; III. The part-time farmer's living and social conditions; IV. Conclusions. Part II contains five chapters: I. The cotton textile subregion of Alabama, Georgia, and South Carolina; II. The coal and iron subregion of Alabama; III. The Atlantic Coast subregion; IV. The lumber subregion of Alabama, Georgia, and South Carolina; V. The naval stores subregion of Alabama and Georgia.

275. Allred, Charles E., Robinson, James L., and Luebke, B. H. Rural credit in Tennessee, 1923. [U. S. Works Prog. Admin. Coop. Plan of Rural Res.] Monog. 82, 48pp., processed. Knoxville, Tenn., Oct. 25, 1938. 173.2 W89Co

"Agricultural Economics and Rural Sociology Department, Agricultural Experiment Station, University of Tennessee."

"The survey covered 600 farms in five counties of the State... The counties were selected as being typical of five important agricultural areas of the State: Madison of the upland cotton counties of west Tennessee; Williamson of the fertile Central Basin counties with livestock farming predominating; Montgomery of the Dark tobacco area along the northern border; Putnam of the eastern Highland Rim counties with a type of agriculture that is largely self-sufficing; and Cumberland of the Cumberland Plateau, which was just then getting started on an agricultural development based on small crops of Irish potatoes." - p. 1.

Types of credit, interest rates, security, short and long term loans, value of mortgaged farms, indebtedness of white and colored owners, and merchant credit are topics considered and analyzed in tables and charts. The summary in 20 statements sets forth the findings in concrete form.

276. Asch, Berta, and Mangus, A. R. Farmers on relief and rehabilitation. U. S. Works Prog. Admin. Div. Social Res. Res. Monog. no. 8, 226pp. Washington, D. C., 1937. 173.2 W89Re

This report describes the "extent of the farm relief problem and the underlying causes of distress; the development of the administrative programs which were formulated to meet the situation; the types and amounts of assistance given farm households; the social characteristics of these households; the relation of farmers on relief to the land with respect to residence and tenure and their relation to the factors of production and experience; and the trend of farm relief through 1935." - p. ix.

The data are based on a sample enumeration, the technique and procedure of which are fully explained in Appendix B, Methodology of Rural Current Change Studies, pp. 143-202. The county was chosen as the unit of sampling because it was a political unit and because of the previous information relating to it available in Census reports. Since the method of selecting a random sample proved to be unworkable, a controlled sample was chosen.

Nine major type-of-farming areas characterized by geographical contiguity and agricultural homogeneity including 1,673 counties, were delimited for study. The counties were then sub-grouped within each area on the basis of certain rather permanent social and economic conditions. 138 counties constituted the final sample, the size of which varied from 7.4 to 18.8 percent of all counties in the different areas under investigation.

277. Aull, G. H. Some economic characteristics of owner-operated farms in South Carolina. S. C. Agr. Expt. Sta. Bul. 316, 31pp. Clemson College, 1938.

"Detailed analyses have been made of the records in the case of 512 white-owner and 162 Negro-owner farms in eight counties of South Carolina, representative of the different type-of-farming areas in the state... The principal groupings were: by type-of-farming area, by size, by investments per farm, and by farm income per farm." - Summary.

278. Beck, P. G., and Forster, M. C. Six rural problem areas. Relief - resources - rehabilitation. An analysis of the human and material resources in six rural areas with high relief rates. U. S. Fed. Emergency Relief Admin. Div. Res. Statis. and Finance. Res. Sect. Res. Monog. no. 1, 167pp. Washington, D. C., 1935.
173.2.W89Re no. 1

Bibliography, pp. 165-167.

The information and conclusions derived from this investigation are based on a survey of 65 counties representative of six separate but homogeneous regions having distinct social and economic problems and included approximately one half of the rural families receiving relief in the United States.

The problem areas, having monthly recurring high relief rates, were identified as: 1. Appalachian-Ozark area; 2. Lake States cut-over area; 3. Spring wheat area; 4. Winter wheat area; 5. Western cotton area; 6. Eastern cotton belt.

The criteria other than high relief rates by which the areas were delimited, and the factors considered in selecting sample counties representative of the range of conditions prevalent in each area, are given in a "Methodological note," pp. 153-155.

After consulting census tabulations and county relief data, the final selections of counties were approved by persons from State Agricultural Colleges and State Emergency Relief Administrations.

Several appendices and supplementary tables contain information on relief rates, family composition, ages and occupations, socio-economic resources, and standards of living.

279. Belden, Joe. Measuring college thought. Pub. Opinion Quart. 3(3): 458-462. July 1939. 280.8 P962

The organization and work of Student Opinion Surveys of America are described by its editor. With headquarters at the University

of Texas, the Surveys "were established in December 1938 to provide a scientific sampling referendum for the colleges of the nation. The reports now appearing weekly in eighty-five of the leading college and university newspapers are designed to parallel in the campus press the findings of the American Institute of Public Opinion as they are used in metropolitan newspapers." - p. 458.

280. Bowley, A. L. Number of children in working-class families in London, 1929-30. Roy. Statis. Soc. Jour. 98(2): 363-375. 1935. 251 R81J

This study is based on data gathered for the New Survey of London Life and Labour. "The purpose of this analysis is solely to determine the relations, if any, between class and number and age of children and age of the mother."

The information was obtained "by personal visits from about one house in forty throughout London and nine contiguous Boroughs." - p. 364. "The major sample was systematically chosen, so that the numbers from the various Boroughs could be combined with definite weights. The present selection is sporadic and depends on the accident whether the wife's age is stated and the husband's wage is sufficiently known. It has therefore been regarded as a chance selection and aggregated in districts without weighting." - p. 364.

281. Brunner, Edmund de S., and Kolb, J. H. Rural social trends. 386pp. New York and London, McGraw-Hill book co., inc., 1933. 281.2 B83R

This is one of a series of monographs published under the direction of the President's Research Committee on Social Trends.

"The data upon which this volume rests are almost exclusively of two types. First, United States census data, much of it unpublished, was secured for several hundred counties and for 177 agricultural villages. Second, trained investigators were sent into 140 agricultural village communities, including the villages and their rural hinterland; and into 26 counties. Except for five of these counties, all these areas had been previously studied by the Institute of Social and Religious Research in either 1921 or 1924. The five counties had been previously surveyed by state colleges of agriculture. The same techniques previously employed were used." - Preface.

The study contains information on rural population mobility and characteristics, community structure and relationships, organizations and institutions, and social, religious, economic and educational life.

282. Carmichael, Fitzhugh Lee, and Nassimbene, R. Changing aspects of urban relief. 93pp. Washington, D. C., U. S. Works progress administration, Division of research, 1939. 173.2 W89Ch

The operation of direct relief in a representative sample of

13 cities during the year 1935 when the transfer from direct relief to the Works Program was made is described. "Statistical tests show that the relief population of these cities is generally representative of the total urban relief population in respect to age, sex, and occupational background." - p. XII.

"For ready reference the sections of this report are arranged under broad headings pertaining to the following subjects: proportion of the population receiving relief or wage assistance; trends of the relief and wage assistance load; accession and separation rates; reasons for opening and closing relief cases; occupational and industrial shifts of experienced workers; supplementation of private-employment earnings with relief; unemployment duration and reemployment; and transfers to the Works Program." - p. XII.

283. Coats, R. H. Enumeration and sampling in the field of the census. Amer. Statis. Assoc. Jour. 26(175): 270-284. Sept. 1931. 251 Am3

"Developed from a paper presented at the Ninety-Second Annual meeting of the American Statistical Association, Dec. 31, 1930."

The writer is Dominion Statistician for Canada, and he bases his discussion in this paper on the situations encountered and problems involved in planning the seventh census of Canada. He sets forth some reasons (based on specific examples) why certain typical subjects in the census field do not lend themselves to sampling and why others do, and predicts that enumeration will not be replaced, since it is essential for gaining a certain amount of fundamental information, but that sampling procedure will be expanded "to build up a mass of refined and superstructural material." Enumeration and sampling in the census field are not conflicting methods, but go hand in hand.

284. Cochran, W. G., and Watson, D. J. An experiment on observer's bias in the selection of shoot-heights. Empire Jour. Expt. Agr. 4(13): 69-76. Jan. 1936. 10 Em7

A sampling experiment is described, and the writers conclude: "The presence of observers' bias in sampling results greatly detracts from the value of the results, and one of the most important problems in the application of statistical methods to agriculture and industry is to devise reasonably quick methods of taking a proper random sample in cases where the material sampled is difficult to demarcate or handle."

285. Davidson, Dwight M., jr., and Hummel, B. L. Standards of living in six Virginia counties. U. S. Dept. Agr. Farm Security Admin. Social Res. Rpt. 15, 116pp., processed. Washington, D. C., Mar. 1940. 1.95 Sol no. 15

In defining the scope of the study, the writers state: "The

present study of sample families in six widely separated counties in Virginia...was made through the joint cooperation of the Bureau of Agricultural Economics, the Work Projects Administration, the Farm Security Administration, and the Virginia Polytechnic Institute. Through a field investigation made in the early part of 1936 a total of 2,491 usable income and expenditure records of white families for the preceding year, 1935, were obtained. Although primary interest was focused upon farm-family living, the study was expanded to include comparable data from town and village families in those same counties and thereby to yield a comparison between rural and urban living behavior as measured by the total value of goods and services consumed. Of these schedules 1,730 (69 per cent) were secured from white families on open-country farms and 761 (31 per cent) from white families residing in urban areas.

"Outside the six selected counties the enumerators secured 158 additional schedules from white families (84 on farms and 74 in towns and villages), primarily as a check upon techniques employed in the sample areas. Inasmuch as subsequent analysis showed these schedules to be comparable with those of the larger segment, they have been used in this report to increase the size and application of the sample." - pp. 5-6.

The study is divided into five chapters: I. Introduction, pp. 3-13; II. Value of family living and housing facilities, pp. 14-75; III. Cash receipts and disbursements, pp. 76-82; IV. Population characteristics and mobility, pp. 83-102; V. Reading and leisure activities, pp. 103-108.

286. Dodson, L. S. Living conditions and population migration in four Appalachian counties. U. S. Dept. Agr. Farm Security Admin. Social Res. Rpt. 3, 152pp., processed. Washington, D. C., 1937. 1.95 Sol no. 3

Bureau of Agricultural Economics cooperating.

The sample consisted of two typical townships in each of Avery and Haywood Counties in North Carolina, and one magisterial district in each of Morgan and Magoffin Counties in Kentucky. These four counties were singled out as representative of the Appalachians. Every family in the chosen townships and districts was interviewed and scheduled.

The data include information on social changes, population mobility, industrial enterprises and handicrafts, living conditions, social institutions, relief, and taxation.

287. Farnham, Rebecca, and Link, Irene. Effects of the works program on rural relief. A survey of rural relief cases closed in seven states, July through November 1935. U. S. Works Prog. Admin. Div. Social Res. Res. Monog. 13, 115pp. Washington, D. C., 1938. 173.2 W89Re no. 13

This report, which describes the effects of the transfer of

needy rural families from the Federal Emergency Relief Administration to more specialized programs of assistance, is a follow-up study of general relief cases enumerated in the Survey of Current Changes in the Rural Relief Population in June 1935.

"In the interests of economy of time and of funds it was found necessary to limit the scope of the present study to a single month, to a relatively small number of counties, and to a relatively small sample of households from each county...

"Seven States were selected for the follow-up study of closed cases. These were Montana, South Dakota, Wisconsin, Iowa, West Virginia, North Carolina, and Georgia, in each of which the Rural Current Change Survey had been made in June 1935. The selection of the 7 States from the 32 included in the larger survey was based chiefly on administrative considerations... In addition the States covered a fairly wide geographical range including the West, Midwest, and South and represented a variety of type-of-farming areas and of rural nonagricultural enterprises. The 7 States contained 71 sample counties, previously selected as representative of the rural relief situation.

"The universe of cases sampled within each county consisted of all cases which received general relief in June and were closed during 1 of the 5 succeeding months, including those that were reopened on general relief rolls." - pp. 97-98.

"Since a separate sample was drawn for each of the 5 months in each of the 71 counties sampled, a total of 355 subsamples was taken. These samples varied in size from 5 percent to 50 percent of all cases sampled. The great bulk of the samples were, however, 50 percent of the total. Of the 355 samples taken, 312 were 50 percent samples, 30 were 25 percent samples, 10 were 12.5 percent samples, and only 3 were 5 percent samples."

- p. 101.

288. Franzblau, Mrs. Rose Nadler. Race difference in mental and physical traits. Arch. Psychol., N. Y. 26(177): 1-44. Apr. 1935.
Libr. Cong. BF21.A7

Bibliography, pp. 43-44.

"This study was based upon a sampling of Danish girls in Copenhagen, one of Italian girls in Rome and two corresponding samplings of the same races in the United States." - p. 41.

The object of the investigation was to find whether any race differences exist in intelligence or age of puberty between Danes and Italians here and abroad, and whether there is any relationship between physical and mental maturity.

The writer found that there were no inherent race differences between these racial groups.

289. George, R. F. A sample investigation of the 1931 population census with reference to earners and non-earners. Roy. Statis. Soc. Jour. 99(1): 147-161. 1936. 251 R81J

The writer states in his introductory paragraph that "Information as to the number of earners and non-earners and the size of

Families according to occupation is not given in the Census Reports. In order to gather data on this subject, a random sample was taken by the courtesy of the Registrar-General from the original 1931 Census schedules. The schedules are bound together in volumes each containing 250, and to avoid undue portorage, one bound volume in approximately every 80 feet of shelving was selected. All the private families recorded in that volume were taken for the sample. In this way, cards for 22,980 private families were punched and sorted on Hollerith machines. The particulars recorded were as follows: (1) Identity of schedule. (2) Classification of each member of the family according to age... (3) Number of earners and non-earners. (4) Age, sex and occupation of each earner." - p. 147.

"From data given in the housing volume of the Population Census, certain comparisons can be made between the official figures for England and Wales and those of this investigation. It is possible to compare the percentage of private families and of the population living in private families according to size of family for the country as a whole and for the sample." - p. 148.

This comparison brought out a slight divergence between the sample and the known distribution of the population.

The results of the study are set forth in several tables, which are interpreted in the text.

290. Ghosh, Tariniprosad. Sampling in family budget enquiries. Indian Jour. Statis. (Sankhyā) 4(4): 501-504. Mar. 1940. 251.8 In2

Some of the outstanding family budget enquiries undertaken by the sampling method in India, Japan, Great Britain, Germany and the United States are noted in this article. Certain difficulties encountered in the rural areas of India are set forth in the conclusion.

291. Great Britain. Royal commission on unemployment insurance. Report... Appendices to the minutes of evidence... Part V, pp. 239-304. London, H. M. Stationery off., 1932. Libr. Cong. HD7096.G7A4 1931a Appx.

Part 5 contains Appendix 26, Analysis of Persons Insured against Unemployment in Great Britain at July, 1930. (Enquiry by One Per Cent. Sample) and Appendix 27, Analysis of Persons on the Registers of Employment Exchanges at 2nd February, 1931. (Enquiry by One-half of One Per Cent. Sample).

The method of selecting and of analyzing the sample is explained. "The new sample was selected from the files at the Claims and Record Office, Kew, of unemployment books for the year 1929-30... The sample was selected by measuring off, while in the racks, each block of 100 books, and extracting the last book in each measured block... The number of books selected in this manner approximated closely to 1 per cent. of the total known to be in the racks. The new sample was, therefore, selected in a different manner from that of April, 1926. The latter was taken from the ledger accounts direct and the change

was made for economy in time and labour... The sample was reduced to a total of 120,000 including 86,740 books for males and 33,260 for females. These figures represent 1 per cent. of the estimated insured population at July 1930... The schedule included a record of age, occupation, industry, contributions and benefit." - p. 241.

The tables and descriptive material give the findings of this survey.

The Analysis of Persons of the Registers of Employment Exchanges contains information on personal circumstances and industrial history. The sample in this survey was selected by choosing one case in every 200 (at random). The method, and reliability of the sample are discussed on p. 265.

292. Hanna, Hugh S. Adequacy of the sample in budgetary studies. Amer. Statis. Assoc. Jour. 31(185A): 131-134. Mar. 1934. Sup. 251 An3
The extraordinary expense involved in making budgetary surveys, have, according to this author, conditioned the size of the sample. He suggests that "considerable addition to our limited information on the subject might be obtained through a careful breaking down of the samples made available in existing or in future surveys, and in this connection I submit the partial results of a hurried and a rather rough-and-ready sample analysis which I have made of the schedules secured in the cost-of-living survey of Federal employees made by the Bureau of Labor Statistics in 1928." - p. 131.
293. Haring, Chester E. What is an adequate audience sample? Advertising and Selling 32(10): 40, 42, 72. Sept. 1939. Libr. Cong. HF5801.A29
Reports a study of morning radio listening in New York, from which experience it is concluded that the size of sample in market research varies with the aim of the research. A comparatively small sample was found to be adequate for obtaining answers to categorical questions, whereas the size of the sample must be increased when the number of possible answers or variables increases.
294. Herring, E. Pendleton. How does the voter make up his mind? Pub. Opin. Quart. 2(1): 24-35. Jan. 1938. 280.8 P962
Presents the findings of a study made by means of a questionnaire distributed by the League of Women Voters in six States. The respondents were men and women in five occupational classes, selected with reference to geographical distribution, economic interest, and party allegiance. The questionnaire dealt with various aspects of the problem of civil service reform.
295. Hiller, Ernest Theodore. Houseboat and river-bottoms people. A study of 683 households in sample localities adjacent to the Ohio and Mississippi rivers. 146pp. Urbana, University of Illinois press, 1939. 281.2 H55H

In cooperation with the Federal Emergency Relief Administration and the National Research Project of the Works Progress Administration.

Bibliography, pp. 140-141.

"Specifically stated, the purpose of this study is to show the manner of living by people in relatively simple social and industrial conditions, in an environment offering opportunities for self-help in acquiring subsistence. Such an environment seemed to be supplied by the rural and village areas along the midwest rivers. Accordingly, sample residents along the river-front in six Illinois counties bordering on the Ohio and Mississippi rivers were selected for a trial study... The sample taken from these areas comprises 683 households. Although approximately 750 schedules were taken, some of these were discarded because they either lacked full information or varied too far from the type of group chosen for study."

The scope and method of the study are explained in the first chapter, and the following chapters contain information as indicated by their titles: 2. Squatter occupancy of marginal land; 3. River self-help pursuits; 4. Vocational assortment; 5. Unemployment, mutual aid, and relief; 6. Types of shelter and residential mobility; 7. Household composition and family organization; 8. Ecological organization and the community; 9. Culture continuity and ecological organization; 10. Summary.

296. Hilton, John. Some further enquiries by sample. Roy. Statis. Soc. Jour. 91(4): 519-530. 1928. 251 R81J

Discussion of Mr. Hilton's paper, pp. 531-540.

The statistical problems, experiences, and lessons derived (but not the facts disclosed) from four separate studies of small samples of population insured against unemployment in England are presented in detail in this paper which was read before the Royal Statistical Society on June 19, 1928.

297. Hitt, Homer L., and Bradford, Reed H. Relation of residential instability to fertility. Rural Sociol. 5(1): 88-92. Mar. 1940. 281.28 R88

The Library of the Bureau of Agricultural Economics has a reprint of this article.

"The findings of this study are based on population schedules taken in January and February of 1939 from 1,046 farm households residing in the sugar parishes of South Louisiana. The sampling procedure used to select these households was designed to distribute the sample in a proportionate manner among the several parishes and parts of parishes comprising the sugar area." - p.88.

298. Hincks, Maynard A. Report of a study on consumer preferences for potatoes in the Boston market. In New England research council on marketing and food supply. Proceedings of the annual meeting...held on April 24 and 25, 1940 at Boston, Massachusetts, pp. 37-53. Boston [1940] 252.004 N443M

The paper is in two parts: Part I. Sampling procedure used in the study of consumer preferences for Maine potatoes in part of the metropolitan Boston area; Part II. General opinion of enumerators as to consumer preferences for potatoes.

The sample of families interviewed was selected as follows: "The number of consumer records taken in each of the cities and towns was apportioned according to the number of families in each with respect to the number of families in the entire area of study... The consumers who were interviewed for records were selected by the application of Tippett's Random sampling numbers to the local directory for each city and town. To avoid the drawing of approximately 1800 names and addresses from the city directories, one fourth of this number were drawn by random sampling procedure and these addresses were designated as 'locations.' Each location became the nucleus of four consumer records... For each location there was a specific address; the enumerator then selected three more addresses by use of a definite pattern established in the office. The enumerators were instructed to avoid taking all records on any one floor in dwelling units of two or more families." - p. 41.

299. Hogg, Margaret Hope. Incidence of work shortage. Report of a survey by sample of families made in New Haven, Connecticut in May-June, 1931. 136pp. New York, Russell Sage foundation, 1932. Libr. Cong. HD5726.N37H6

"To experiment with procedure in applying the only method which is sure to produce representative facts, namely the method of random sampling, and to demonstrate its practicability was then the first object of this study." - p. 13.

On pp. 14-19, the author answers charges made against sampling as a survey technique.

Part II, Detail of Survey, pp. 45 to 51, contains an explanation of the method used in this investigation, i. e. procedure in obtaining data, form of schedule used, size of sample, tests of the success of sampling process, degree of detail allowed by size of sample, and trustworthiness of the information.

Appendix I, pp. 107-117, Evidence on Representativeness of Sample Population Studied. The findings of the survey on unemployment are given in the text and statistical tables of those chapters which do not deal with methodology.

300. Jensen, Raymond J. An experiment in the design of agricultural surveys. Jour. Farm Econ. 21(4): 856-863. Nov. 1939. 280.8 J822

This is "Journal Paper no. J685 of the Iowa Agricultural Experiment Station, Ames, Iowa Project no. 611."

The writer describes the Iowa agricultural survey made cooperatively by the Bureau of Agricultural Economics and Iowa State College in 1938/39, and calls it "an experiment in survey design." The sampling methods used, some of the results obtained, and conclusions drawn are set forth.

301. John, M. E. Part-time farming in six industrial areas in Pennsylvania. Pa. Agr. Expt. Sta. Bul. 361, 49pp. State College, 1938.

"This study, begun in 1936, had as its main purpose to discover in what ways, to what extent and under what conditions farming is making a contribution to the family living of part-time farmers in the industrial areas of Pennsylvania... 887 part-time farmers...were interviewed... An effort was made to choose those areas representative of the dominant types of agriculture and of industry in the state." - p. 1.

302. Johnson, Donovan A., and Eurich, Alvin C. An empirical test of sampling. Jour. Expt. Ed. 3(3): 174-179, processed. Mar. 1935. Libr. Cong. L11.J77

"This study is a practical test of the theory of sampling. Specifically information concerning the qualifications of high school teachers, principals and superintendents in Minnesota was collected in regard to all such persons employed in the state - a total of 3,437. The total population was divided into 10 random samples. Data were analyzed for each sample and for various combinations of samples..." It was concluded that "a 30 percent sample... is sufficiently large to represent the entire group in dealing with data concerning teachers' qualifications."

303. Jones, David Caradog. The cost of living of a sample of middle-class families. Roy. Statis. Soc. Jour. 91(4): 463-502. 1928. 251 R81J

Discussion, pp. 503-518.

Only 254, or 10 percent of the questionnaires distributed, were returned and incorporated into this report. The families included were from a homogeneous group, all heads of families belonging to the same profession. Eighteen tables illustrate the text, and a copy of the questionnaire sent out to obtain the data is appended at the close of the article.

304. Jones, David Caradog, and Clark, Colin G. Housing in Liverpool: a survey by sample of present conditions. Roy. Statis. Soc. Jour. 93(4): 489-521. 1930. 251 R81J

Paper read before the Royal Statistical Society, May 20, 1930.

Discussion, pp. 522-537.

An account of the Liverpool Housing Survey, financed by the Laura Spelman Rockefeller Foundation, in which the authors present their findings on the housing situation, and "explain the geographical plan of the census, how the random sample of houses to be visited was chosen, who were the visitors, what information they endeavoured to get, and what difficulties they encountered in getting it." - p. 493.

The sampling ratio chosen was 1 in 30 of all inhabited buildings; the number of families investigated was 4853. The text contains tables which show the distribution of families in houses, by registration districts and by number of families per

house, the distribution of overcrowded families in tenements of different size, the distribution according to economic class of the families sampled, etc. There is an appendix of maps, schedules, and other information.

...A supplementary article by D. Caradog Jones, entitled "Data Relating to Rents and Incomes in a Sample of Overcrowded Families in Liverpool", appears on pp. 561-568 of the same issue of the Journal.

305. Jones, David Caradog. The social survey of Merseyside. An analysis of material relating to poverty, overcrowding, and the social services. Roy. Statis. Soc. Jour. 94(2): 218-250. 1931.

251 R81J

Paper read before the Royal Statistical Society, Feb. 17, 1931.

Discussion, pp. 250-266.

The information on which this paper is based was obtained from the Liverpool Housing Survey, which was extended to include an area known as Merseyside.

"In our Survey a random sample of 1 in 30 of all the inhabited buildings in the area was taken, and all which fell within a certain class, defined by the occupation of the head of the household, were investigated. The occupations included might be broadly described as the type which are subject to the National Insurance Acts. The total number of inhabited buildings in Merseyside amounted to over a quarter of a million, and the number sampled was 8,543. These included many which for one reason or another were outside the scope of the Survey, such as institutions, public-houses, large shops and houses inhabited by non-working-class families. Some houses were occupied by more than one family. Particulars, more or less complete, were obtained concerning 6,906 families, or 93 per cent. of those that were approached as being within the Survey."

The results are set forth in 11 tables and an appendix, and in a summary of 22 points, all of which are discussed in the text.

306. Jones, Harold Ellis, and Conrad, Herbert Spencer. The growth and decline of intelligence: a study of a homogeneous group between the ages of ten and sixty: Genet. Psychol. Monog. 13(3): 223-298. Mar. 1933. Libr. Cong. LB1101.G4

References, pp. 294-295.

In order to trace the growth and decline of mental-test ability between the ages of 10 and 60 years, the Army Alpha Intelligence Test was given to 1191 unselected subjects in 9 counties and 19 villages representative of Central and Northern New England. "To insure fairness of sampling, a technique was developed involving a free motion-picture show and supplementary house-to-house testing."

"The validity of the present research rests upon the fairness and homogeneity of sampling." - p. 276. The sample is rather

fully described in Appendix A, pp. 276-283, and the statistical technique is explained in Appendix B. Ch. I also describes the sample and the methods of administering the test.

The results and conclusions of the study are summarized on pp. 272-275, and are set forth in detail in the text and tables of the report.

307. Kifer, R. S., and Stewart, H. L. Farming hazards in the drought area. U. S. Works Prog. Admin. Div. Social Res. Res. Monog. 16, 219pp. Washington, D. C., 1938. 173.2 W39Re no. 16

Bureau of Agricultural Economics cooperating.

"To provide a more complete picture of the situation in the different sections of the Great Plains, 13 counties distributed throughout the drought area were selected from which more detailed information was obtained. The counties studied were selected to represent different conditions in the Great Plains, and an attempt was made to select counties which would be representative of the larger surrounding areas." - p. 196.

In selecting counties for special study, the factors considered were: (1) Climatic conditions; (2) Soil type; (3) Systems of farming; (4) Proportion of farmers on relief; (5) Available data for the area.

Data assembled in each of the selected counties were taken from: A. County records; B. Agricultural Adjustment Administration contracts; C. Records of county director of the Emergency Relief Administration or the poor commissioner; D. Records of the State or local rehabilitation office; E. Records of the county agricultural agent; F. Farm survey records.

"The farms surveyed in each county were selected at random within the crop-producing areas. Sufficient farms were surveyed in each area to give a reliable sample. In those counties where different type-of-farming areas prevailed as a result of a marked difference in soil or topographic features, each farming area was sampled and tabulated separately. The counties surveyed, the number of farms reported in the selected counties by the United States Census of Agriculture in 1935, the number of sample farms surveyed, and the percentage of all farms surveyed are shown in table A." - p. 197.

Almost 1000 farms were studied intensively and it is upon information obtained therefrom that the report is largely based. The Great Plains are divided into three regions, Northern, Central, and Southern, and the information given for each region includes: Situation of farmers after the 1934 drought; types of farming; natural factors affecting agriculture; crop yields, organization of farms; indebtedness; tenure of operators and ownership of land.

The final chapter contains a discussion on the prospects for rehabilitation of farmers in 13 areas.

308. Kirkpatrick, E. L. Analysis of 70,000 rural rehabilitation families. U. S. Dept. Agr. Farm Security Admin. Social Res. Rpt. 9, 93pp., processed. Washington, D. C., 1938. 1.95 Sol no. 9

In cooperation with the Bureau of Agricultural Economics.

This is not a report of an integral study, but rather a combination of all the available research data on rural rehabilitation clients obtained by consolidating information from three different analyses.

Chs. II and III contain material on 30,000 cases in Alabama and 20,000 cases in Arkansas. Chs. IV and V contain an analysis of about 11,600 cases in the States of Michigan, Wisconsin, and Minnesota and of 4,600 cases in the States of Montana, Wyoming, and Colorado.

The third part of the study was made by the sampling method. Questionnaires were sent out to be filled in by rural rehabilitation supervisors in carefully selected States. The samples "were selected by type-of-farming areas and therefore come nearer giving a national picture than any other section of the report. This section covers approximately 3,000 cases." - Foreword.

The information obtained includes tenure status, mobility, family composition, education, and family living. The supplementary tables make comparisons easy.

309. Kirkpatrick, E. L., Tough, Rosalind, and Cowles, May L. The life cycle of the farm family in relation to its standards of living and ability to provide. Wis. Agr. Expt. Sta. Res. Bul. 121, 38pp. [Madison] Sept. 1934.

In cooperation with the U. S. Dept. of Agriculture.

The object of this study is "to compare the behavior patterns at the various stages of the family's life cycle and to present the trend in the consumption habits and functioning of a selected group of farm families." - p. 1.

"Two hundred and sixty-seven Wisconsin farm families were selected from a total of 900 families on the following bases: (a) families were included from the six major type of farming areas of the state, (b) only families with sons and daughters were chosen, the latter ranging in age from less than 6 years to 19 or more, and (c) with the location and the type of family determined according to points (a) and (b) the families were otherwise chosen at random." - p. 2.

"The families in the study are representative; i.e. to the extent that they were selected without any known bias. Therefore, since typical farm families were chosen for study, an analysis of their consumptions and recreational habits, at each stage of development or through the family cycle, approaches as closely as possible, an ideal research procedure." - p. 3.

310. Kiser, Clyde V. Pitfalls in sampling for population study. Amer. Statis. Assoc. Jour. 29(187): 250-256. Sept. 1934. 251 Am3

The study was based on eight areas in Syracuse, New York, and on 1,564 families within these areas. Two supplementary groups of families were later surveyed to strengthen the sample and make

it representative. The writer's concluding paragraph follows: "The broad implications of this report are that careful study must be made of factors likely to influence the representativeness of a sample and that the safeguards adopted must depend upon the nature of the problem. So far as samples for population study are concerned, a definite bias is introduced unless the sample is selected with care and, once selected, is thoroughly canvassed. It is a persistent bias which cannot be corrected by mere extension of the sample. Revisits to homes originally missed and the inclusion of secondary families in the sample are basic to representative sampling for studies of birth rates."

311. Kneeland, Hildegard, Schoenberg, Erika H., and Friedman, Milton. Plans for a study of the consumption of goods and services by American families. *Amer. Statis. Assoc. Jour.* 31(193): 135-140. Mar. 1936. 251 Am3

"The data collected in the survey will be obtained in part through a short sampling schedule, covering a random sample of about 336,000 families. This schedule will provide information on family income during the past year, on the occupations of members of the family gainfully employed, on family composition and on the type of housing. A longer schedule, covering information on expenditures and savings during the year, on ownership of important types of durable goods and on other aspects of consumption, will be secured from a controlled sample of about 53,000 families, drawn largely from the random sample.

"From about 3,000 of the families included in the controlled sample, records of food consumption will be secured, to provide accurate data on the nutritive adequacy of the diet. These records will be kept for one week at each season during the year following the scheduling. They will be accompanied by records of the incidence of sickness of the members of the family, in order to make possible an analysis of the relation of diet and health.

"The study has been planned from the viewpoint of the analysis of the data...the sample has been concentrated so as to permit clear-cut comparisons with respect to these factors." - p. 135.

"The study will be restricted, in the main, to six areas of the country, each fairly distinctive and homogeneous with respect to geographic and cultural characteristics." - p. 136. The areas included are: East Central, New England, Southeast, West Central, Rocky Mountain, and Pacific Northwest.

"In each of these areas, communities have been selected to permit comparisons of consumption patterns for five distinct degrees of urbanization - the large city, the middle-size city, the small city, the village and the farm community. In addition, two very large cities - New York and Chicago - have been included, to provide a picture of metropolitan living." - p. 136.

312. Kumlien, W. F., and others. The standard of living of farm and village families in six South Dakota counties, 1935, by W. F. Kumlien, Charles P. Loomis, Zetta E. Bankert, Edmund de S. Brunner, and Robert L. MacNamara. S. Dak. Agr. Expt. Sta. Bul. 320, 63pp. Brookings, 1938.

This survey was made in cooperation with the Social Research Division, Works Progress Administration, the Social Research Section of the Farm Security Administration, and the Bureau of Agricultural Economics of the U. S. Dept. of Agriculture.

"The block sampling was accomplished by township and village sections within six representative counties of the State... A total of 1875 usable schedules were obtained, 1,101 from the open-country and 774 from villages. There were 646 schedules from farm owners, 455 from farm tenants; 376 from village owners, and 398 from village tenants." - p. 5.

313. Link, Irene. Relief and rehabilitation in the drought area. U. S. Works Prog. Admin. Div. Social Res. Res. Bul. Ser. 5, no. 3, 57pp. Washington, D. C., 1937. 173.2 W89Ref

Appendix B contains a list of the sample counties on which the study is based.

The material includes: Federal relief programs in eight drought States, relief history of rural households, and personal and occupational characteristics of rural relief households.

314. Lively, C. E., and Taeuber, Conrad. Rural migration in the United States. U. S. Works Prog. Admin. Div. Res. Res. Monog. 19, 192pp. Washington, D. C., 1939. 173.2 W89Re no. 19

Selected bibliography, pp. 177-183.

This investigation was undertaken in order to determine the extent and direction of movements of rural population and the relationship between these movements and economic status, depression, population growth, drought, unemployment, relief needs, quality of land, and other socio-economic factors.

The methodology employed in the study, both in analyzing available census data for the survey of broad movements of the rural population, and in the field surveys of sampled areas, is explained in Appendix B, pp. 163-171.

The field surveys were carried on in eight States, Arizona, Iowa, Kentucky, Maryland, North Carolina, North Dakota, Ohio, and South Dakota. "Within each state the selection of the sample areas and the size of the sample were determined by local needs, interests, and resources. In some cases the sample was considered representative of rural areas of the State in general. In others the survey was limited to some significant situation within the State." - p. 168.

315. [London school of economics and political science.] New survey of London life & labour. 9 v. London, P. S. King & Son, ltd., 1930-1935. Libr. Cong. HN398.L7L6

Not examined.

"Sir Hubert L. Smith, director of the survey."

"This survey was made with special reference to the changes since the publication of Charles Booth's 'Life and Labour of the People in London.'" - v. 1, Introduction.

A discussion of the objectives of this study, the sampling methods used, progress made, and the relation of the survey to the earlier surveys of London made by Charles Booth, is given in an article of the same title by the director of the survey in the Journal of the Royal Statistical Society, v. 92, 1929, pp. 530-547.

In the present survey a combination of two methods of investigation was used - one extensive and indirect enquiry referred to as the "Poverty Survey", and the other an intensive direct study by the method of random sampling.

316. Loomis, Charles P., and Leonard, O. E. Standards of living in an Indian-Mexican village and on a reclamation project. U. S. Dept. Agr. Farm Security Admin. Social Res. Rpt. 14, 49pp., processed. Washington, D. C., 1938. 1.95 Sol no. 14

Bureau of Agricultural Economics cooperating.

The samples consisted of 37 Indian-Mexican families, typical of the other farm laborers living at Tortugas, New Mexico, along the Rio Grande, and 65 families, almost exclusively farm operators, engaged in commercial large-scale agriculture on the Tule Lake (California and Oregon) irrigation project. These two very dissimilar rural communities have "one characteristic in common - the scale of family living in both groups depends upon the market."

317. Loomis, Charles P., and Dodson, L. S. Standards of living in four southern Appalachian mountain counties. U. S. Dept. Agr. Farm Security Admin. Social Res. Rpt. 10, 59pp., processed. Washington, D. C., 1938. 1.95 Sol no. 10

Bureau of Agricultural Economics cooperating.

Avery and Haywood Counties in North Carolina and Magoffin and Morgan Counties in Kentucky were selected as representative of the Northeastern Cumberland Plateau and the Blue Ridge Mountains. "Included in the report are data for 733 open-country farm families and 83 village non-farm families. The block-sample areas on which the study was based were selected in typical rural areas that had witnessed high increases in farms and farm population between 1930 and 1935... This study emphasizes the material elements in the level of living." - Foreword by Carl C. Taylor.

"Expenditure and income data were secured from every other family in four townships in North Carolina, and two magisterial districts in Kentucky. Only open-country farm families and village non-farm families were analyzed, the records of 488 owners and 245 tenants in the open country and of 83 village families being investigated." - p. 5.

The report includes information on expenditures for food, housing, clothing, health, advancement, automobiles, savings and investments, and incidentals.

The appendix contains supplementary tables, a methodological note, and a discussion on the sample as related to possible universes.

318. Loomis, Charles P., and others. Standards of living in the Great Lakes cut-over area, by Charles P. Loomis, Joseph J. Lister, and Dwight M. Davidson. U. S. Dept. Agr. Farm Security Admin. Social Res. Rpt. 13, 63pp., processed. Washington, D. C., 1938. 1.95 Sol no. 13

Bureau of Agricultural Economics cooperating.

The study is based on sample schedules obtained from 850 open-country and 122 village families in 10 counties of the cut-over regions of Michigan, Wisconsin and Minnesota.

"It is believed that the interviewed families are representative of those living in the open country and villages of the Great Lakes Cut-Over." - p. 3.

The data cover cash receipts and disbursements, value of family consumption of food, housing, clothing, health, automobiles, incidentals, and advancement. Also included is a chapter on the family, its structure, occupations, education, reading materials, leaving home and getting married.

319. Lorge, Irving. American agricultural villages: 1930. Amer. Statis. Assoc. Monog. 1, 133pp. New York, 1933. 251 Am3M no. 1

This monograph presents comparable information for the identical sample of 177 agricultural villages for the year 1930 as that contained in an earlier study by C. L. Fry entitled "A Census Analysis of American Villages." There is detailed population data for 177 representative agricultural incorporated villages that are farmers' service station towns.

320. McCormick, Thomas C. Comparative study of rural relief and non-relief households. U. S. Works Prog. Admin. Div. Social Res. Res. Monog. 2, 141pp., processed. Washington, D. C., 1935. 173.2 W89Re no. 2

The differences that existed between rural households receiving public emergency relief in October 1933, and their neighbors who had not received such relief are pointed out and measured in this monograph. The study was designed as a follow-up of the Relief Census taken by the Federal Emergency Relief Administration, in order to get more detailed information on a sample of the relief households.

Forty-seven sample counties were selected from 19 states in 13 distinct types of farming areas. Procedures employed in choosing the sample, in surveying the areas chosen, and in weighting the samples are described in a Methodological Note, pp. 117-119.

Maps, figures and tables supplement the text.

The four main chapters are: I. Rural relief situation in October 1933; II. Residence, composition, and education of relief and non-relief households; III. Earnings and other economic assets and liabilities of relief and non-relief households; IV. Occupations, industries, and unemployment of male heads and other members of relief and non-relief households.

A summary of this material is given in an article by Mr. McCormick entitled Rural Families on Relief, in Rural Sociology, v. 1, pp. 430-440. December 1936.

321. Mahalanobis, P. C. A sample survey of the acreage under jute in Bengal. Indian Jour. Statis. (Sankhyā) 4(4): 511-531. Mar. 1940. 251.8 In2

Paper read at The Indian Statistical Conference at Lahore, January 1939.

Summary of the discussion on planning experiments, pp. 530-531.

In describing the problems involved in making the survey, the writer states: "From the statistical point of view our aim is to evolve a sampling technique which will give, for any given total expenditure, the highest possible accuracy in the final estimates. For this it is necessary to determine three things, namely, (a) what is the best size of the sampling units; (b) what is the total number of such sampling units which should be used to attain the desired degree of accuracy in the final estimates; and (c) what is the best way of distributing these sampling units among the different districts, regions or zones covered by the survey. It is clear that the above questions can only be answered in reference to the sampling errors and the cost of operations of the method used." - p. 513.

322. Mangus, A. R. Changing aspects of rural relief. U. S. Works Prog. Admin. Div. Social Res. Res. Monog. 14, 233pp. Washington, D. C., 1933. 173.2 W59Re no. 14

The report describes the characteristics of people receiving relief in rural areas, their age and sex, marital condition, size and structure of households, education, employability, migration, occupations and experience.

Because of limitations on time and funds, a complete investigation was prohibitive and sampling became necessary. The techniques and procedures used in selecting sample counties, the reliability of the data gathered and the type of information collected are fully explained in Appendix B, Methodology of Rural Current Change Studies, pp. 161-217. Names of the counties that constituted the sample and the schedules used are included.

Since the county was the unit for administering relief in most of the country and a great deal of information concerning the population was available from U. S. Census publications, the county was chosen as the unit for sampling. The choice of a sample by random selection proved to be unworkable, and a "controlled" sample was chosen instead, based on "certain background

factors assumed to be correlated with various aspects of rural relief. The selection of these background factors was based on a priori reasoning, ordinary logic and common sense, and upon the considered judgment and knowledge of research scholars familiar with the sociology and economics of rural life.

"In classifying counties for the selection of a controlled sample, the major control was introduced by grouping the units according to the dominant type of farming engaged in by the farm population, on the assumption that type of farming was a factor relevant to the rural relief situation in many of its aspects. It was possible by the use of 1930 Census data to define a number of large aggregations of counties which possessed a high degree of homogeneity with respect to the major agricultural source of income and which in general were geographically contiguous areas." - p. 164.

"The final list of sample units, including 138 counties, represented 9 major type-of-farming areas overlapping 33 states... The size of the sample varied from 7.4 percent of all counties in the Corn Belt to 18.8 percent of the counties in that part of the Ranching Area actually sampled." - p. 170.

323. Mangus, A. R. Cultural regions within the rural-farm population. 39pp., processed. [Washington, D. C., U. S. Works progress administration, Division of social research, July, 1938.] 173.2 W89Cul

The methods used and the tentative results obtained in delineating 29 rural-farm regions (containing 210 subregions) of reasonably uniform social and economic characteristics in the United States are presented.

"Still another advantage in defining socio-economic areas is the establishment of a basis for representative sampling of the population according to various characteristics by determining the nature and extent of the areas to be sampled and by selecting the counties which will represent these areas with reasonable accuracy." - p. 1.

324. Mangus, A. R. Regional aspects of contemporary culture. Amer. Sociol. Rev. 4(4): 506-515. Aug. 1939. 280.8 Am37

Reviews a forthcoming study, with particular reference to methodology, made by the author for the Division of Research, Works Progress Administration on rural cultural regions and subregions of the United States.

325. Mangus, A. R. Rural regions of the United States. 230pp. Washington, D. C., U. S. Federal works agency, Work projects administration, Div. of research, 1940. 173.2 W89Rr

The United States is divided geographically by this study into definite rural regions whose social and economic conditions are fairly similar and whose differences are distinct.

"Two different sizes of areas are delimited, as obviously a

greater degree of internal similarity is possible in small than in large regions. On the basis of carefully selected cultural indices, the counties of the United States have been classified into 218 rural-farm subregions. These in turn have been combined into 32 general rural-farm regions. Taking into account the characteristics of the rural-nonfarm population as well as of the rural-farm population, 264 rural subregions have been delineated and combined into 34 general rural regions. With few exceptions the boundaries of the rural and the rural-farm regions are similar.

"The regions have been used as the basis for the selection of typical counties. Three different sizes of representative samples have been selected for both the rural-farm and the total rural population. Such samples may be utilized for social studies which are too detailed for Nation-wide coverage." - Letter of Transmittal.

Ch. V, Selection of Sample Counties to Represent Rural Regions and Subregions, pp. 91-116, sets forth the factors and cultural indices considered in selecting the small, intermediate-sized, and large sample series of counties to represent the rural and rural-farm cultural regions and subregions of the United States. The actual counties chosen to represent each region are named.

Appendix A contains supplementary tables giving a wealth of additional information, and Appendix C contains a detailed classification of the counties of the United States into regions and subregions.

326. Mangus, A. R. Sampling in the field of rural relief. Amer. Statis. Assoc. Jour. 29(188): 410-415. Dec. 1934. 251 Am3

A procedure adopted by the Federal Emergency Relief Administration for selecting representative units for studying the rural relief situation is described. The county, including the total population of families or persons on farms or in villages, was chosen as the sampling unit. The units were classified so that the sampling process might be applied to a fairly homogeneous population of counties. The sample selected was composed of 32 of the 426 Eastern Cotton Belt Counties. The writer states that "The method adopted for selecting these counties was based on the theory that relief factors are more likely to be controlled by combinations of variables operating jointly than by a series of variables operating separately." - p. 413. The technique followed is outlined.

327. Melvin, Bruce L. Rural youth on relief. U. S. Works Prog. Admin. Div. Social Res. Res. Monog. 11, 112pp. Washington, D. C., 1937. 173.2 W292e no. 11

The number and location, personal characteristics, educational status, occupations of rural youth in relief households, and the youth programs of Emergency agencies are studied in this monograph.

"This survey was made in 304 counties scattered in 31 states and in 83 New England townships. The counties and townships were chosen on the basis of certain selected criteria as a sample which would afford data representative of the rural United States. For purposes of this study, the counties and townships have been grouped into four broad regions: New England, North, South, and West. Where desirable for comparative purposes, data for nine type-of-farming areas surveyed in February, June, and October 1935 have also been presented." - p. xiii.

The lists of sample counties and townships surveyed are found in Appendix B, pp. 99-104. Illustrated by numerous tables, diagrams, and photographs.

328. Melvin, Bruce L., and Smith, Elna N. Youth in agricultural villages. U. S. Works Prog. Admin. Div. Res. Res. Monog. 21, 143pp. Washington, D. C., 1940. 173.2 W89Re no. 21

Data for this survey covering the year June 1, 1935 to June 1, 1936 on rural-nonfarm youth, 16-29 years of age in 45 agricultural villages of the United States were obtained by the interview method. "Every household in each village was visited and the sex, age, and employment status of each person in the household were recorded on the schedule." - p. xv.

"The particular villages studied were selected from 140 villages which had been previously surveyed by the Institute of Social and Religious Research as typical of agricultural villages and which were again being studied in the summer of 1936. [foot-note - The original villages were selected in the early twenties on the basis of practical considerations and personal judgment of their typicality. The selections were made in consultation with persons well acquainted with the rural situation in each state.] The 45 villages were considered representative in general of agricultural villages in 7 regions - Middle Atlantic, Southeast, Southwest, East North Central, West North Central, Western, and Pacific...

"Conclusions respecting youth in the villages surveyed can be applied generally to agricultural village youth in the country as a whole if certain limitations are kept in mind. The 45 villages are, with a few exceptions, in areas that represent average or better than average agricultural territory." - p. xiii.

The information obtained regarding village youth includes: mobility, personal characteristics, economically independent youth away from the villages, school attendance and educational attainment, employment, occupations, financial status, and social and recreational activities.

The monograph is of interest as a sampling study of social and economic data, particularly because of the selection of actual sampling points in the United States.

329. Michigan. State emergency welfare relief commission. Michigan census of population and unemployment... Age, sex and employment status of gainful workers in five types of communities. 32pp., processed. Lansing, Mich., 1936. Libr. Cong. HD8053.M5A3

This is bulletin no. 1 of the first series of these publications, and in it are set forth the sampling procedures and definitions.

"The final plan was designed to obtain a representative sample of every type of population in the State by enumeration of somewhat less than half of the total population... The sampling procedure had to be adapted to aspects of population groups reported in the 1930 Census and to practical problems of field control of the enumerating. The various types of population groups were classified for practical purposes into 5 classes. Estimates were worked out separately for each of these 5 groups and these were combined into regional and state totals."

The textual material is supplemented with numerous charts, graphs and statistical tables.

330. Monroe, Day. Analyzing families by composition type with respect to consumption. Amer. Statis. Assoc. Jour. 32(197): 35-39. Mar. 1937. 251 Am3

Text of a paper presented at the 98th annual meeting of the American Statistical Association in Chicago, December 1936.

Some of the results obtained in the Study of Consumer Purchases, made cooperatively by four federal agencies by sampling procedures, are outlined, and the seven types of families are listed. "Since these seven types represent approximately 96 per cent of the native white families in the random sample taken in small cities and villages and 93 per cent of the random farm sample, they are representative of the great majority of the nation's families." - p. 35.

Discussion, by Hazel Kyrk, pp. 47-49.

331. Moore, H. R. Hill land and people in Ross county, Ohio. A study of selected areas. Ohio. Univ. Dept. Rural Econ. and Ohio Agr. Expt. Sta. Mimeogr. Bul. 125, 44pp., processed. Columbus, 1940. 281.9 Oh32

In cooperation with U. S. Dept. of Agriculture, Bureau of Agricultural Economics.

The study was made in order to obtain certain information on rural life in the two principal types of hill areas in the county.

"This report has been prepared at the request of the Ross County Land Use Planning Committee which, in the process of developing a unified program, encountered the need for additional information on the economic and social factors related to land use in the poor land areas of the county. Five sample areas were selected for study, each area representative of a different combination of physical resources, economic development and social conditions." - p. 1.

In the section on p. 4, which describes the method of study, the writer says of the five sample areas: "So far as practicable all households living within a solid block of territory were interviewed in order to get a cross section of the economic and social conditions. Data were collected to show the present pattern of land use on each land holding, potential future use, volume of crop production, livestock kept, condition of buildings, size of households, occupation of persons in each household, number of children in school, and lastly, the opinions and attitudes of the people in respect to the application of various types of governmental aid to each land holding. When possible both the head of the family and the housewife were interviewed."

The results obtained are set forth in the statistical tables and in the discussion, and the three concluding pages contain some final observations and recommendations.

332. National civic federation. Industrial welfare dept. Study: extent of old age dependency. Report...upon economic and physical status of persons 65 years of age and over in New York, New Jersey, Pennsylvania and Connecticut, includes additional data from Massachusetts... 158pp. [New York, 1928] Libr. Cong. HV1465.N27
Not examined.

"P. Tecumseh Sherman, chairman, Committee on old age annuities; Edmund S. Cogswell, director of research."

A criticism of this study by I. M. Rubinow, with the title, *Where Will You Be at 65?* appeared in the *New Republic*, v. 54, pp. 289-291, Apr. 25, 1928. (Libr. Cong. AP2.N624). In it the writer pointed out that an unwarranted conclusion was drawn from the study. The study had concluded that "Men in this country stand a better chance of being worth \$10,000 or more between 65 and 75 than of being destitute." Mr. Rubinow calls attention to the omission of all aged persons confined in institutions, and the inclusion of a disproportionate number of persons of middle class occupations.

The data were collected in 11 cities in four industrial states on the Atlantic seaboard, which according to Mr. Rubinow, is not a representative section of the nation, and the sample consisted of about one-fourth of one per cent of the aged population of the United States.

333. Palmer, Gladys L., and Wood, Katherine D. Urban workers on relief. U. S. Works Prog. Admin. Div. Social Res. Res. Monog. 4, 2 pts. Washington, D. C., 1936. 173.2 W39Re no. 4

Part I, *The Occupational Characteristics of Workers on Relief in Urban Areas*, May 1934, (203pp.) is by Gladys L. Palmer and Katherine D. Wood. Part II, *The Occupational Characteristics of Workers on Relief in 79 Cities*, May 1934, (301pp.) is by Katherine D. Wood.

The survey was based on a sample enumeration from which generalizations concerning the total urban relief load could be made.

Seventy-nine cities "widely distributed geographically and ranging from 10,000 to over 1,000,000 population were selected for study. These 79 cities had a combined relief case load of approximately 1,150,000 cases in May 1934, slightly more than 40 percent of the total urban load. From this number of over a million cases, approximately 165,000 cases were visited and interviewed. These cases were selected at random from the total number of cases receiving unemployment relief from public funds in each of the 79 cities. The size of the sample depended upon the size of the city, the size of the case load, and the number of cities of a certain size chosen to represent all cities of that size in the United States, in this study. This theoretical sampling ratio varied from 1 to 30 cases in New York City to a 100 percent sample in cities with populations under 50,000. Certain adjustments were later made in the sampling ratios to afford better representation of cities of all sizes in the combined sample. This weighted summary of about 202,000 cases is used throughout the report except when data are presented for cities separately. In the latter, the sample originally taken has been multiplied by the sampling ratio in order to represent the entire case load of each city. The results of this sampling method have been tested for race, sex, and age by comparison with the Relief Census of October 1933." - pp. xvii-xviii.

334. Reid, Margaret G., and Britton, Virginia. Iowa incomes as reported in income tax returns. Iowa Agr. Expt. Sta. Res. Bul. 236, pp. 112-189. Ames, 1938.

The analysis and conclusions are based on data taken from federal income tax returns and Iowa State income tax returns. In addition a random sample of Iowa income tax returns for 1934 incomes covering 9,764 schedules is analyzed. The basis of selection and representativeness are described and the analysis of the sample set forth on pp. 133-146.

335. [Sabin, A. R.] A new technique for the estimation of changes in farm employment. 25pp., processed. [Washington, D. C.] U. S. Dept. of agriculture, Agricultural marketing service, 1940. (Series of analyses of sample farm data no. 1) 1 M341A

Prepared with the assistance of the Work Projects Administration for the City of New York.

Presents the findings of a study undertaken in October 1938 "to determine more exactly the nature of the voluntary sample of employment conditions on farms of regular crop correspondents of the Agricultural Marketing Service of the U. S. Dept. of Agriculture. A basis for improving quantitative estimates of employment based on that voluntary sample was developed from

this investigation. Analysis of the basic data, made possible by this study, uncovered a method for stratifying and weighting the sample which overcame many previous difficulties. The new method was thoroughly tested during the study, and the feasibility of using a voluntary sample in estimating employment was demonstrated." - Explanatory note.

336. Schickele, Rainer, and Himmel, John P. Socio-economic phases of soil conservation in the Tarkio creek area. Economics of agricultural land use adjustments. II. Iowa Agr. Expt. Sta. Res. Bul. 241, pp. 352-408. Ames, 1938.

Soil Conservation Service and Bureau of Agricultural Economics of the U. S. Dept. of Agriculture cooperating.

The data were obtained from a farm to farm survey in eight sample blocks representing a typical cross section of the farming conditions in this area. The survey schedule contained information on land use, crop acreages and yields, livestock system tenure status, buildings and family information.

337. Schoenberg, Erika H., and Parten, Mildred. Methods and problems of sampling presented by the urban study of consumer purchases. Amer. Statis. Assoc. Jour. 32(198): 311-322. June 1937. 251 Am3

"Revision of a paper presented at the Ninety-eighth Annual Meeting of the American Statistical Association (at a joint session with the American Farm Economic Association), Chicago, December 29, 1936."

"The purpose of this paper is to present to social scientists the problems of sampling encountered in the Urban Study of Consumer Purchases and to indicate the methods designed to meet these problems... The experience gained in the field of sampling is considered of technical interest for two reasons: (1) The study included four distinct samples - a random sample, a selected random sample, a stratified sample, and a controlled sample. (2) The study was undertaken on a very large scale in all sections of the country, in thirty-two communities of varying sizes ranging from Wallingford, Connecticut, with a population of approximately 11,000 to New York City." - p. 311.

The writers discuss the character of the samples, and particularly the methods used in selecting the four samples and tell of the difficulties involved in collecting data from the families decided upon for each sample.

338. Schuler, E. A. Social status and farm tenure - attitudes and social conditions of corn belt and cotton belt farmers. U. S. Dept. Agr. Farm Security Admin. Social Res. Rpt. 4, 253pp., processed. Washington, D. C., 1938. 1.95 Sol no. 4

Bureau of Agricultural Economics cooperating.

The sampling procedures employed are explained in the Methodology section of the Appendix.

"It was estimated that about 2,700 schedules could be secured within the time limits imposed and the funds available. Type of

farming was decided upon as the basis for determining the extent of the areas to be sampled. It was agreed, furthermore, that the sample taken should be confined to those types of farming areas which contributed most heavily, both relatively and absolutely, to agricultural tenantry. The Cotton Belt and the Corn Belt being thus automatically selected, it was later determined that a single local area should be secured from the Flue-cured Tobacco Area in the southeastern States. Lists of counties which constitute the Cotton Belt, the Corn Belt, and the Flue-cured Tobacco Regions were made up.

"The number of farm operators, white and colored, by tenure (full owners, managers, croppers, and other tenants) as given in the 1935 Census of Agriculture data, were then determined county by county so that the total number in each tenure class by race was determined for each of the three type-of-farming areas involved." - p. 244. From these selected areas and groups of farmers the samples were chosen.

The Foreword calls this a study in social psychology, and states that "it represents a study of the attitudes, opinions, and aspirations of families whose economic and social status is to a considerable extent predicated upon their land-tenure status."

The following chapter titles indicate the scope and contents of the volume: 1. Introduction. 2. Region and race: are all farmers alike? 3. Attitudes and opinions: what do farmers think about farm problems? 4. The agricultural ladder: how is it working? 5. Landlord-tenant relationships: what do they involve? 6. Moves and migration: how often and how far? 7. Group life in the country: what does it consist of? 8. Levels and standards of living: what farm families have and what they prefer.

339. Shen, Ching-Lai. Fundamentals of the theory of inverse sampling. *Ann. Math. Statis.* 7(2): 62-112. June 1936. 251.8 An7

A dissertation submitted in partial fulfillment of the requirement for the degree of doctor of philosophy in the University of Michigan.

The paper is composed of four parts, three of which are divided into several sections: I. Introduction; II. Fundamental relation between the moments of the distribution of sampling means and the moments of the distribution of the hypothetical means associated with the parent population; III. Inverse sampling associated with a normal parent population; IV. Inverse sampling associated with a parent population distributed according to Pearson's Type III function.

340. Simpson, Herbert D. Tax racket and tax reform in Chicago. 287pp. Chicago, Institute for economic research, Northwestern university [1930] 284.5 Si5T

Bibliography, pp. 265-280.

Contents: Part I. The tax racket; Part II. Tax relief; Part III. Tax remedy.

Ch. III, Method of Investigation, explains the procedure used in the study, the period covered, and discusses the representativeness and weighting of various elements in the sample. The object was to obtain actual sales value of groups of properties for a given period, in order to compare them with assessed values for taxation.

341. Snyder, L. B. Tax system of Nebraska with special reference to its relation to agriculture. Nebr. Agr. Expt. Sta. Res. Bul. 105, 82pp. Lincoln, 1938.

This study was based on a sample of 12 counties in the selection of which "an effort was made to select counties whose officials would cooperate, counties that represent the different areas of the state and provide information concerning the two types of county government found in the state." - p. 5.

342. Sparlin, Estal E. Inequalities in the Arkansas property tax assessment system. Ark. Agr. Expt. Sta. Bul. 369, 27pp. Fayetteville, 1939.

"The chief purpose of this study has been to determine the extent of inequalities in the tax assessment system and to study the causes and consequences." - p. 3.

The survey was based on a sample which included 834 rural and 677 urban properties located in the 5 selected districts and 522 rural properties scattered throughout the area not included in the sample districts.

343. Stecker, Margaret Loomis. Intercity differences in costs of living in March 1935, 59 cities. U. S. Works Prog. Admin. Div. Social Res. Res. Monog. 12, 216pp. Washington, D. C., 1937.
173.2 W89Re no. 12

The findings of an investigation made to determine the annual costs of self-support at two levels of living (a basic maintenance and an emergency level) for a 4-person manual worker's family in 59 cities of the United States are published in this monograph.

The cities chosen for the survey were selected on the bases of geographic location, size, and socio-economic characteristics.

"Inasmuch as 40 percent of all inhabitants of the United States live in cities of 25,000 or more, and a greater body of information is available regarding the characteristics of these communities and their residents than of smaller places, the study was confined to cities of this size. Nearly 50 percent of the total population and slightly more than 63 percent of the urban population live east of the Mississippi and north of the Ohio Rivers. This area is more homogeneous in climate and in social and economic life than the remainder of the country, which comprises several times as much territory, but the remainder of the country also was represented." - p. 91.

"Information has often been collected to show how much families spend to live and what they obtain for their money... Until this

study was made, however, data were not available to show how much is required for support at a uniform level of living in a large number of places at the same time, or how these costs compare on an intercity basis." - p. xi.

344. Sydenstricker, Edgar, and Notestein, Frank W. Differential fertility according to social class. A study of 69,620 native white married women under 45 years of age based upon the United States census returns of 1910. Amer. Statis. Assoc. Jour. 25(169): 9-32. Mar. 1930. 251 Am3

Contains several tables and charts to illustrate the text.

"The present study is based on samples taken from the original 1910 census schedules or enumeration sheets. In order to obtain an adequate and relatively homogeneous sample of each of certain social classes, the data selected were limited to those wives in families in which both husband and wife were native white of native parents and were only once married. Altogether punch cards have been made for about 100,000 married women, approximately 60,000 of which constitute a sample of northern cities, and the remainder a sample of the rural parts of neighboring counties.

"The urban sample was selected from the 33 northern cities having populations over 100,000 (in 1910) to insure urban conditions, and under 500,000 to avoid the dominating influence of our largest metropolitan centers." - pp. 10, 13.

The rural sample was drawn from 74 counties and geographic distribution was based on the principle that "those selected from any state should form approximately the same proportion of the total rural sample as those selected from the cities of that state formed of the total urban sample." - p. 13.

The writer concludes that "The analysis of the rates for the selected groups indicates that in general the social classes are fairly homogeneous with respect to fertility. With the two exceptions noted the rates for the selected groups were much nearer that for their own class than that for any other class." - p. 32.

345. Thomas, Dorothy Swain. The Swedish census of 1935-6. Amer. Statis. Assoc. Jour. 31(195): 541-544. Sept. 1936. 251 Am3

A combination of an indirect census (purely demographic data gathered from population registers) and a direct census (based on a 20% sample of the population) was undertaken by the Swedish Population Commission as a basis for recommendations about future population policy. The procedures involved are outlined. The writer's concluding lines follow: "The combination of the direct and indirect methods of enumeration should, to some extent, act as a check on both. The combination of a sampling procedure with a complete enumeration will make possible a test of the representative nature of the sample and has a theoretical interest as well as a practical utility as a guide to the type of inference that can be drawn from the sample."

346. Thompson, Warren S., and Jackson, Nelle E. Fertility in rural areas in relation to their distance from cities, 1930. Rural Sociol. 5(2): 143-162. June 1940. 281.28 R88

"This study is based on data for the rural population of 16 groups of townships extending in a stated direction from eleven large cities of the United States. One group of townships lies in the Middle Atlantic states, three in the East North Central, three in the West North Central, three in the South Atlantic, three in the West South Central and three in the Pacific states." - p. 143.

The writers conclude that isolation and economic status were the most significant factors which they were able to measure with the data available that were important in throwing light on the variations in the birth rate in rural communities.

347. U. S. Census of partial employment, unemployment, and occupations: 1937. Final report on total and partial unemployment. Volume IV. The enumerative check census, by Calvert L. Dedrick and Morris H. Hansen. 187pp. Washington, D. C., U. S. Govt. print. off., 1938. 173.3 Un3F v. 4

The national unemployment census was taken in two separate parts. The first was by voluntary registration in the United States, Alaska and Hawaii, conducted under the supervision of local postal employees, on unemployment report cards prepared for this purpose. Findings are given in detail for states, counties, and cities in the first three volumes of the final report of the census. The second phase of the census was an enumerative check census made by a house-to-house canvass by regular postal carriers, in selected areas throughout the United States. "This combination of methods offered the possibility of securing quickly and at a minimum of expense national, State, and local data for the preponderant majority of the unemployed and the partly employed, and at the same time provided a measure of the significance of the information so secured." - p. 1.

"Just as the national voluntary registration was a new method for securing unemployment data for localities, States, and the country as a whole, so the sample census breaks new ground in statistical procedures. It not only makes new applications of sampling techniques to the problem of securing national data quickly and economically, but in the analyses presented in the following chapters each important estimate is accompanied by a measure of its statistical validity...

"The postal routes to be enumerated were selected as follows: The 93,728 postal routes in the United States were listed by location, by type, and by city size for urban routes. Prior to the drawing of the sample, 2,132 routes located in the business areas of large cities were eliminated and the remaining 91,596 postal routes were grouped into blocks of 50 each. From each of these blocks a single route was selected by lot, thus giving a 2 percent sample of all residential postal routes...

"This sampling technique presented one major difficulty: Persons not residing on postal routes could not be covered by the enumerative check... Allowance has been made wherever possible in this report for these conditions affecting the selection of the sample...

"The evaluation of sampling reliability is somewhat unusual in a large enumeration of this type but is essential in order to assure the general reader that the estimates and generalizations in this report are not mere statistical accidents but are facts derived by careful scientific procedures which can be checked by those who are interested in this phase of the report. Several tables in this report give the limits of sampling variation for the statistics estimated from the enumerative check census." - Introduction.

Includes information on: estimated number and age of the unemployed; employment and availability for employment; and employment by race, by farm and non-farm residence, and by geographic divisions. The appendices contain material on sampling errors, methods of estimation, schedules and instructions.

348. U. S. Dept. of agriculture. Bureau of home economics. Family income and expenditures. U. S. Dept. Agr. Misc. Pub. 339, 345, 356, 370. Washington, D. C., 1939. (Consumer purchases study) 1 Ag84M

Contents:

No. 339. Pacific region. Part 1, family income, by Day Monroe, Marjorie S. Weber, and Helen Hollingsworth. 380pp. (Urban and village series)

No. 345. Plains and mountain region. Part 1, family income, by Gertrude Schmidt Weiss, Day Monroe, and Kathryn Cronister. 330pp. (Urban and village series)

No. 356. Pacific region and plains and mountain region. Part 1, family income, by Day Monroe, Dorothy S. Martin, Margaret Perry, and Kathryn Cronister. 330pp. (Farm series)

No. 370. Middle Atlantic and north central region, New England region. Part I, family income, by Day Monroe, Elizabeth Phelps, and Idella G. Swisher. 447pp. (Urban and village series)

These are four in a series of reports covering income and expenditures of small city, village, and farm families throughout the United States.

"The study of consumer purchases was conducted by the Bureau of Home Economics of the United States Department of Agriculture, and the Bureau of Labor Statistics of the United States Department of Labor, with the cooperation of the National Resources Committee, the Works Progress Administration, and the Central Statistical Board. Plans for the study were formulated by the National Resources Committee and the two operating bureaus, with the advice of the two other cooperating agencies. The project was financed by the Works Progress Administration." - Foreword.

Two appendices which describe the sampling procedure employed in the study, viz. Appendix C. Methodology: Procedures Used in Collection and Analysis of the Data, and Appendix D. Appraisal of the Sample of Families from Which Income Data Were Obtained, are found in each of these bulletins.

The consumer purchases study was based on three samples: 1. a random sample of family dwelling units, 2. an income sample, and 3. a consumption or expenditure sample. The communities selected for study included "families living in 2 metropolises, 6 large cities, 14 middle-sized cities, 29 small cities, 140 villages and 66 farm counties...

"The broad geographic regions studied were selected to represent the major cultural and economic groups of the country and at the same time to include as large a proportion of the population as possible. An effort was made to have each region distinctive, so that regional differences might be investigated, yet to have a somewhat homogeneous population within the defined boundaries.

"Economic activities, cultural patterns, proportion of native-white families in the population, density of population, and relationship to other cities within the region were considered in selecting the specific cities for study. The group of cities, rather than any one city, was representative of some of the outstanding characteristics of the region...

"Farm counties were chosen on the basis of the prevalent type of agriculture. For the study as a whole, 14 types of farming important in the Nation's business of agriculture were selected. The basis for choice thus was national and regional rather than State...

"Because of these bases of selection no one community can be described as typical of a State or an entire region, or of the United States as a whole. But grouped together, they represent communities of certain type and size within each region, and form the basis of estimates for the entire population." - p. 3 of Misc. Pub. no. 345.

349. U. S. Dept. of agriculture. Bureau of home economics. The farm-housing survey. U. S. Dept. Agr. Misc. Pub. 323, 42pp. Washington, D. C., 1939. 1 Ag84M no. 323

This survey was directed by the Bureau of Home Economics, in cooperation with the Bureau of Agricultural Engineering, the Extension Service, and the Office of the Secretary.

The publication is composed largely of tables which set forth the results obtained from selected data compiled by field workers. "Sampling was on the basis of a 10-percent representation of the farm dwellings in each State... The counties or areas studied were selected by State committees appointed by the State directors of extension. Some of the factors entering into the selection of the areas to be studied were types of farming,

physiographic features, average value of farm and farm dwelling, nationality of farm population, comparative numbers of owners and tenant operators, and the length of settlement." - p. 1.

An article entitled "Housing in Rural America" by Florence M. Swire, published in *Rural Sociology*, v. 4, Dec. 1939, pp. 449-457, analyzes data based on this Farm Housing Survey, and summarizes the results obtained from the sample of 595,855 rural homes.

350. U. S. Dept. of labor. Bureau of labor statistics. Study of consumer purchases. U. S. Dept. Labor. Bur. Labor Statist. Bul. 642-649. Washington, D. C., 1939-1940. 158.6 B87

Contents:

No. 642, v. 1. Family income in Chicago 1935-36, by A. D. H. Kaplan, Faith M. Williams, and Erika H. Wulff. 210pp. (Urban series)

No. 642, v. 2. Family expenditure in Chicago, 1935-36, by A. D. H. Kaplan, Faith M. Williams, and Mildred Hartsough. 256pp. (Urban series)

No. 643, v. 2. Family expenditure in New York City, 1935-36, by A. D. H. Kaplan, Faith M. Williams, and Alice C. Hanson. 232pp. (Urban series)

No. 644, v. 1. Family income in nine cities of the East Central region, 1935-36, by A. D. H. Kaplan, Faith M. Williams, and Richard Hellman. 537pp. (Urban series)

No. 645, v. 1. Family income in five New England cities, 1935-36, by A. D. H. Kaplan, Faith M. Williams, and Dorothy McCamman. 351pp. (Urban series)

No. 646, v. 2. Family expenditure in six urban communities of the West Central-Rocky Mountain region, 1935-1936, by A. D. H. Kaplan, Faith M. Williams, and Lenore A. Epstein. 313pp. (Urban series)

No. 647, v. 1. Family income in the Southeastern region, 1935-36, by A. D. H. Kaplan, Faith M. Williams, and Jessie S. Bernard. 520pp. (Urban series)

No. 647, v. 2. Family income and expenditure in selected Southeastern cities, 1935-36. Family expenditure, by A. D. H. Kaplan, Faith M. Williams, and Lenore A. Epstein. 298pp. (Urban series)

No. 648, v. 4. Family expenditures in selected cities, 1935-36. Food. 40pp. (Urban technical series)

No. 648, v. 5. Family expenditures in selected cities, 1935-36. Medical care. 312pp. (Urban technical series)

No. 648, v. 6. Family expenditures in selected cities, 1935-36. Travel and transportation. 165pp. (Urban technical series)

No. 649, v. 1. Family income in four urban communities in the Pacific Northwest region 1935-36, by A. D. H. Kaplan, Faith M. Williams, and Mildred Parten. 297pp. (Urban series)

These are reports in a series of studies "based on data secured from a survey conducted in 1936 by the U. S. Bureau of Labor

Statistics in 32 cities, varying in size and representing different sections of the country. The Urban Series of the Study of Consumer Purchases is paralleled by a survey of small-city, village, and farm families conducted by the Bureau of Home Economics of the U. S. Department of Agriculture. Both surveys, which together constitute the Study of Consumer Purchases, were administered under a grant of funds from the Works Progress Administration. The National Resources Committee and the Central Statistical Board both cooperated in the Nation-wide study." - Preface.

Each bulletin contains appendixes which explain the scope and character of the samples taken in the study, and the sampling procedure employed. The schedule forms used are reproduced and discussed, and the methods by which community patterns were ascertained are presented. A random sample and a "controlled" sample were used.

"To begin with, a random sample was taken of the total family population in the communities selected for study. This sample ranged from 4 percent of the family population in New York and 10 percent in Chicago up to 100 percent in most of the smaller cities and in the farm and village communities. For the Urban Study of Consumer Purchases this sample included a total of about 625,000 families. From them were selected about 250,000 families which completed the short schedule, referred to as the 'family schedule', giving information on income and sources of income; occupations of the employed members; the membership of the economic family; home tenure; and the rent or rental value of the premises... In order, however, to ascertain the relative position of the 'eligible' sample in the total population, family schedules, including the data on incomes, were also taken in each community from every family in a selected part of the random sample." - Bul. 642, v. 1, p. 174.

The cities chosen for study in this investigation are listed and classified by size groups in Appendix A of the first bulletin.

351. U. S. Dept. of labor. Employment service. Division of standards and research. Survey of employment service information... July 1, 1936, to March 31, 1937. 200pp. Washington, D. C., 1938. 158.31 Su7

Presents information on the characteristics of persons seeking work through the U. S. Employment Service, including geographical and industrial distribution, age and occupations of applicants. Appendix C, pp. 103-104, contains a description of the sampling method employed in selecting the seven State sample. "This sample was chosen by use of a statistical technique for selecting the States the distribution of whose combined figures most nearly coincided with the distribution of the United States active file totals for occupational, industrial, and age groups, by sex." - p. 103.

352. U. S. National resources committee. Consumer expenditures in the United States. Estimates for 1935-36. 195pp. Washington, D. C., 1939. 173.2 N214Coe

The information contained in this report is based primarily on data from the Consumer Purchases Study.

"Both random and controlled sampling methods were used in the study, three distinct samples being taken in obtaining the data. The information was obtained by field agents, through personal interviews with housewife and other members of the family." - p. 104.

"Approximately 60,000 families living in 51 cities, 140 villages, and 66 farm counties were covered by the consumption schedules." - p. 16.

Communities covered, schedules employed, sampling procedures, and methods used to insure reliability of the data are fully explained.

353. U. S. National resources committee. Consumer incomes in the United States. Their distribution in 1935-36. 104pp. Washington, D. C., 1938. 173.2 N214Con

The estimates contained in this study are based chiefly on data obtained from the nation-wide sample selected for the Consumer Purchases Study. The communities covered, sampling procedures, sample forms with discussion of the schedules used, and methods used to assure reliability of data are fully described in the appendices to the monograph. The figures for incomes of families, single individuals, and institutional residents are set forth in detail and the sampling methods used for each group are explained.

Summaries of the findings of this study have been issued by The Marketing Division of Hearst Magazines, Inc. under the following titles: A Handbook of Facts on the National Consumer Purchase Survey. (38pp., processed [1939?] 280.32 H35); Digest of "Consumer Incomes in the United States - 1935-36" by National Resources Committee. (21pp., processed [1939] 280.12 H35).

The study is evaluated by Rufus S. Tucker in an article entitled "The National Resources Committee's Report on Distribution of Income," published in The Review of Economic Statistics, v. 22, no. 4, November 1940, pp. 165-182. (251.8 R32) The "non-representative nature of the sample communities" is discussed and the method of calculating the national income is criticized.

354. U. S. Public health service. National institute of health. Div. of public health methods. The national health survey 1935-1936. Significance, scope and method of a nation-wide family canvass of sickness in relation to its social and economic setting. 11pp., processed. Washington, D. C., 1938. 151.67 N21

This is a preliminary report of the National Health Survey, which explains the methodology and aims of the undertaking.

The population surveyed, selection of the sample, schedules used, selection and training of enumerators and sampling procedures are considered. The data were gathered in 84 cities of varied size regarded as typical of four main geographic regions and included 744,000 families distributed in 19 states. Twenty-three rural counties located in three states were included, even though these were not typical of the whole rural population.

The findings of the survey are published in a series of reports on Hearing, Population, Sickness, Medical Care, etc.

355. Vickery, C. W. Punched card technique for the correction of bias in sampling. *Amer. Statis. Assoc. Jour.* 33(203): 552-556. Sept. 1938. 251 Am3

The Texas Highway Planning Survey made this study to "determine for each population group in the State the number of motor vehicles of each type whose owners are resident in that group, as well as the amount of gasoline taxes and license fees paid by such owners and other information of similar character." The data were secured from questionnaires whose rate of return varied considerably from county to county, and among rural and urban residents. Consequently, a group of controls to overcome this bias or variation was determined upon. "The large size of the sample, over 350,000 questionnaires, required the use of the punched card method for preparing tabulations. A technique was devised for preparing, directly from the punched cards, tabulations properly adjusted to the level of the total population of motor vehicles, with the elements of bias, so far as possible, corrected." This technique is an application of the method of stratified sampling.

In the March 1939 issue of the *American Statistical Association Journal*, pp. 110-111, is a further note on the punched card technique.

356. Wakeley, Ray E. Differential mobility within the rural population in 18 Iowa townships, 1928 to 1935. *Iowa Agr. Expt. Sta. Res. Bul.* 249, pp. 277-318. Ames, 1938.

Bibliography, p. 318.

Federal Emergency Relief Administration, Iowa Emergency Relief Administration, and Works Progress Administration cooperating.

In the Appendix to this bulletin, the writer states: "The townships included in the survey have some merit as a sample for the state or for similar areas within the limitations herewith set forth...the sample surveyed comprises too small a proportion of the population to represent adequately the state from a statistical point of view."

357. Wakeley, Ray E., and Anderson, A. H. Relief in rural Iowa. *Iowa Agr. Expt. Sta. Bul.* 377, pp. 346-388. Ames, 1938.

Social Research Division of Federal Works Progress Administration cooperating.

The study is based on a sample of nine counties selected to represent the relief situation in the rural area, including towns and cities having less than 25,000 population in 1930.

In addition to the discussion and figures, there is an appendix giving detailed information on relief in the nine sample counties from 1932 to 1936.

358. Webb, John N., and Brown, Malcolm. Migrant families. U. S. Works Prog. Admin. Div. Social Res. Res. Monog. 18, 192pp. Washington, D. C., 1938. 173.2 W89Re no. 18

The findings of this study are set forth in seven chapters: I. Reasons for migration; II. Origins and movement; III. Background of migration; IV. Migrant families and the transient program; V. Personal characteristics; VI. Occupational resources; VII. Conclusions. Supplementary tables, schedules, etc., are included in the 4 appendixes.

The source of information for the report is "a representative sample of 5,489 migrant families selected from the total number receiving care in transient bureaus during September 1935. All the families considered in this report were interstate migrants. The sample was drawn from 85 cities located in 39 States and the District of Columbia. The cities were chosen to provide the wide geographical distribution necessary to the inclusion of all types of migrant families, as well as to take account of differences resulting from variations in size of city and from variations among the States in transient relief programs. The number of families selected in each State was proportionate to the number of families under care in each State during July 1935. A system of random selection was applied within each city to insure freedom from bias in choosing the families to be interviewed." - p. xviii.

There was an urban bias in the sample, unattached transients were excluded, and the less successful depression migrants were probably over-represented.

359. Webb, John N. The migratory-casual worker. U. S. Works Prog. Admin. Div. Social Res. Res. Monog. 7, 128pp. Washington, D. C., 1937. 173.2 W89Re no. 7

The data for this study were taken from records made of "the work histories and itineraries of migratory-casual workers registered for relief in the transient bureaus of these 13 cities. Some of the records taken were unsuited for study... After a careful weeding-out process there were available 500 records suitable for study. All of the 13 cities in the transient relief survey were represented, but nearly three-fifths of the histories came from 4 of the cities - Seattle, Denver, Memphis, and Minneapolis...

"The 500 individuals whose records are used in this report do not represent a sample of migratory-casual workers in a strict statistical sense. Indeed it is difficult to see how such a

sample could be obtained... But at the same time there is no good reason for believing that the characteristics of these 500 workers were so peculiar that an account of their work histories and itineraries would lead to markedly erroneous conclusions." - pp. xi-xii.

Contains many maps and diagrams.

360. Webb, John N. The transient unemployed. A description and analysis of the transient relief population. U. S. Works Prog. Admin. Div. Social Res. Res. Monog. 3, 132pp., processed. Washington, D. C., 1935. 173.2 W89Re no. 3

The findings of this investigation of the occupational and personal characteristics of the transient relief population were obtained from a study of monthly registrations in thirteen cities, which were chosen to represent the various sections of the country.

"In justification of the use of data from thirteen cities to describe the larger population, it is argued that a complete and detailed description of the total population was impossible; that the cities selected were well distributed geographically; and that total registrations in these cities not only varied much as did registrations in the country as a whole, but represented from 7.1 to 8.8 percent of all unattached transients registered each month, and from 11.5 to 15.9 percent of all transient family groups." - p. 23.

The text is illustrated with graphs, maps and tables.

361. Woofter, T. J., jr. Landlord and tenant on the cotton plantation, by T. J. Woofter, jr...with the collaboration of Gordon Blackwell, Harold Hoffsommer, James G. Maddox, Jean M. Massell, B. O. Williams, Waller Wynne, jr. U. S. Works Prog. Admin. Div. Social Res. Res. Monog. 5, 288pp., processed. Washington, D. C., 1936. 173.2 W89Re no. 5

The monograph contains information on many angles of the problem, as indicated by the following chapter titles: I. Plantation areas and tenant classes; II. Ownership; III. Plantation organization and management; IV. The one-crop system; V. Credit; VI. Income; VII. Tenant's standard of living; VIII. Mobility; IX. Education; X. Relief and rehabilitation; XI. Constructive measures.

"The sample selected at random from representative areas averaged 85 percent operated by share tenants with an occasional wage hand family to look after the landlord's unshared operations. The other 15 percent were about equally divided between renter-operated and laborer-operated tracts...the final results are based on 646 schedules of plantations which contained 9,414 tenant and laborer families.

"The sample was restricted to the Eastern Cotton Area in order to secure relative homogeneity in trends and costs of production and in tenant relations, these factors operating somewhat differently in the Western Cotton Area. The sample was, therefore,

apportioned to the States of North Carolina, Georgia, Alabama, Louisiana, Mississippi, and Arkansas on the following basis... The number of plantations in each of these States in 1910 was multiplied by the percentage which cotton production in 1930 was of production in 1910. The proportion which this weighted product formed of the sum of the weighted products determined the proportion of the sample allotted to the State...

"Within each State the sample was apportioned to areas according to the number of plantation counties in the area, weighted by the percentage of tenancy in 1930...

"Within each area, counties were selected that represented the average of all counties in per capita 1930 gross farm income and in the percentage of tenancy in 1930 as shown by a frequency distribution of the counties... Within each county, the sample was selected at random from one or more townships or other minor civil divisions, which were representative of the county according to the percent of tenancy and the value of farm land per acre... To obtain schedules for the required number of plantations in a given county, each enumerator was assigned a township or section of a township, and instructed to enumerate every plantation along a main road and its branch roads until he had obtained the number of plantations apportioned to the township." - pp. 243-245.

362. Yates, F. Some examples of biased sampling. *Ann. Eugenics*. 6(2): 202-213. June 1935. Libr. Cong. HQ750.A1A5

Cites and describes three examples in which some element of personal selection exercised by the sampler yielded biased results. "In all 3 cases a well-designed method of random sampling would have given considerably more accurate results for the same amount of work." - p. 212.

363. Zimmerman, Carle C., and Whetten, Nathan L. Rural families on relief. U. S. Works Prog. Admin. Div. Social Res. Res. Monog. 17, 161pp. Washington, D. C., 1938. 173.2 W89Re no. 17

The data for this study were taken from a survey of 116 New England townships, and of 138 counties which were selected as samples to represent nine major agricultural areas. These are: Eastern Cotton, Western Cotton, Appalachian-Ozark, Lake States Cut-Over, Hay and Dairy, Corn Belt, Spring Wheat, Winter Wheat, and Ranching. The data were gathered in June of 1935, with the exception of those for education and marital condition, which were obtained in October 1935.

The information on rural relief families contained in this monograph includes: types of farm families and the incidence of relief; occupational origin of the heads of families; personal characteristics of the heads of families; size and composition of families; dependent age groups; family structural types; fertility of families; employability, employment, and amount of relief; nobility of families; and education.

Numerous tables and illustrations make a valuable addition to the text.

Public Opinion Surveys

364. Achilles, Paul S., and Link, Henry C. Report on the activities of the Psychological corporation, 1939. Jour. Appl. Psychol. 24(2): 109-121. Apr. 1940. 140.8 J822

The general activities, work in developing scientific methods in this field of research, and research projects and studies made are described. "The Corporation has pioneered in the development of periodic surveys for determining social and economic trends, in fundamental research on statistical and sampling problems, in copy-testing, and in experimenting with new techniques." - p. 113.

365. American institute of public opinion. [Gallup poll.]

Organized in 1935, and first published in October of the same year, the results of this poll of public opinion on many questions of national and international significance have been published regularly in numerous newspapers throughout the United States.

The Bureau of Agricultural Economics Library has copies of the poll results as published in the Washington (D. C.) Post from 1936 to date.

366. American institute of public opinion. The new science of public opinion measurement. 16pp. New York and Princeton, N. J., n. d. Pam. Coll. - Straw votes.

The organization and methods of operation of the well known Gallup Poll are described, and the sampling referendum technique as a tool for the measurement of public opinion is explained. The booklet tells how surveys are conducted, i.e., (1) how the size of the sample is determined, (2) how the cross-section is selected, (3) how questions are worded, (4) the importance of timing. It also contains a discussion of the accuracy of predictions and results, and a consideration of the social value of the measurement of public opinion.

367. American institute of public opinion - surveys, 1938-1939. Pub. Opinion Quart. 3(4): 581-607. Oct. 1939. 280.8 P962

A compilation of the surveys conducted during the period May 1938 to August 1939, including a statement of the issues polled and some indication of the trend of opinion on each issue. An index of the polls is appended.

368. Bartlett, M. S. Sub-sampling for attributes. Roy. Statist. Soc. Jour. Sup. 4(1): 131-135. 1937. 251 R81Js
References, p. 135.

The paper is divided into two sections: I. Introduction. Inferences from normal and binomial samples; II. Subsampling for attributes.

369. Blanar, Abe. How accurate are public-opinion polls? Cong. Rec. 86(98): 9680-9681. (Appendix) May 17, 1940. 148.2 R24

This paper by a graduate student at the University of Missouri was inserted in the Appendix to the Record at the request of the Hon. Walter M. Pierce, Representative from Oregon, as an extension of his remarks on the floor of the House. Mr. Blanar is critical of the American Institute of Public Opinion and the Fortune surveys. He maintains that they make exaggerated claims of accuracy, especially the Gallup Poll, that they are biased, and that their errors are checked by no one except themselves. He concludes as follows: "If these polls wish to lay claim to scientific principles of accuracy, why do they not publish all the significant data? The size of the samples in each survey is varied according to the whims of the investigator. Why is not the size of the sample published with the results of each survey so the adequacy of the sample may be judged? Why is not some consistent practice followed in computing the errors with relation to the significant percentages? Predictions in a Presidential election should be shown for each State. After the election these State percentages should be published alongside the official percentages. In a congressional election the published comparisons should involve percentages for each district. In each case the size of the sample should appear. Can Fortune and the American Institute of Public Opinion live up to these objective standards of accuracy?"

370. Blankenship, Albert B. The choice of words in poll questions. Sociol. and Social Res. 25(1): 12-18. Sept.-Oct. 1940. 280.8 Sol5

Points out and illustrates the dangers of using words with vague or multiple meanings in public opinion poll questions, and of phrasing the question ambiguously, or beyond the intelligence level of those who must answer it.

371. Blankenship, Albert B. Does the question form influence public opinion poll results? Jour. Appl. Psychol. 24(1): 27-30. Feb. 1940: 140.8 J822

The writer concludes that "This study clearly indicates that minor changes in wording may seriously affect the results secured on public opinion polls." - p. 30.

372. Blankenship, Albert B. Pre-testing a questionnaire for a public opinion poll. Sociometry 3(3): 263-269. July 1940.

Describes the making of experimental advance tests on the wording of questions in order to get accurate results in public opinion polls. The qualifications of a good question are said to be: suitability of introduction, avoidance of ambiguity, terminology understandable to the lowest class of respondents, concreteness, adaptation to type of person interviewed, and omission of words with emotional appeal.

373. Blankenship, Albert B. Public opinion polls: a symposium. The case for and against the public opinion poll. Jour. Mktg. 5(2): 110-113. Oct. 1940. 280.38 J82

Discussion, pp. 113-119.

The writer appraises the charges made against polls, particularly scope and phrasing of questions, size of the sample, and relationship of the polls to the democratic process. He refutes all the accusations against them, and suggests that the polls serve a useful purpose.

374. Blankenship, Albert B. The "sample" study in opinion research. Sociometry 3(3): 271-276. July 1940.

The sample or "test-tube" survey "is a limited survey conducted similarly to the proposed large scale study. Every factor except scope in this study is identical with that in the large survey...and the entire study is conducted under normal field conditions. The number of respondents interviewed (usually between 200 and 2000) may be considerably less than on the final study, and this is ordinarily accomplished by simply limiting the number of localities in which the sample study is made." - p. 272.

"Not only does it aid in showing whether a final study should be made, (and may therefore considerably reduce the cost of the study) but it provides an estimate of the cost that will be involved; predicts the type of results that will probably be secured on the final study; aids in determining the nature and size of the final sample required; is a check upon interviewing instructions; may suggest the elimination or addition of several questions; provides a measure of the reliability and internal consistency of the results obtained; and can, if so designed, measure the influence of wording and sequence of questions." - p. 276.

375. Childs, Harwood L. Rule by public opinion. Atlantic Monthly 157(6): 755-764. June 1936. 110 At

The sampling methods used by The Literary Digest, Fortune, and The American Institute of Public Opinion are explained and some advantages and dangers inherent in public opinion polling are set forth.

376. Cook, Stuart, W., and Welch, Alfred C. Methods of measuring the practical effect of polls of public opinion. Jour. Appl. Psychol. 24(4): 441-454. Aug. 1940. 140.8 J822

"This study reports two experiments of an exploratory nature designed to measure the effect of polls of presidential preference upon individual belief. The subjects were 955 college students. Change in belief was measured by straw ballot." - p. 453.

377. Crossley, Archibald M. Straw polls in 1936. Pub. Opinion Quart. 1(1): 24-35. Jan. 1937. 280.8 P962

Considers the reliability of the various straw-vote methods under the following topics: Differences among the polling methods; Detailed examination of polls and forecasts; The Gallup poll and controlled quotas; How to locate the proper survey points; and The future of the polls.

378. Crum, W. L. Looking behind the Gallup poll. Some reasons for believing figures for many states underestimate Willkie strength. Barron's 20(44): 5. Oct. 28, 1940. 284.3 B27

Suggests that circumstances exist for which no sample can make allowances, but which tend to influence the results, and that accidental and unavoidable errors do creep into the poll.

379. Crum, W. L. On analytical interpretation of straw-vote samples. Amer. Statis. Assoc. Jour. 28(182): 152-163. June 1933. 251 An3

The Literary Digest poll serves as the chief illustration in this discussion.

"The straw poll inevitably involves sampling, and on three chief counts. Such a poll, to be of practical use, must be held in advance of the actual election; and therefore, even though it succeeded in covering every voter who subsequently participated in the actual election, sampling errors would arise because of changes in voting intentions. Such a poll must be based upon a selection from the qualified voters; and, even though it covered them perfectly, it could be only a 'sample' of those voters who actually participated in the election. Such a poll, for obvious practical reasons, can not be a perfect report of the entire qualified electorate; and therefore sampling difficulties, in the ordinary sense of incomplete reporting must arise." - p. 152.

380. Doob, Leonard W. An "experimental study" of the Psychological corporation. Psychol. Bul. 35(4): 220-222. Apr. 1938. Libr. Cong. BF1.P75

Criticizes the bias in favor of "big business," and the deliberate creation of a scientific aroma in order to promote its own prestige as demonstrated in the publication. A Study of Public Relations (New York, Psychological Corporation, 1937). The findings were "based on 5000 personal interviews in 60 cities and towns in 40 states, made by 463 trained interviewers under the direction of 60 psychologists associated with the Psychological Corporation" and gathered from February 18 to Mar. 2, 1937. The study "presents in percentages the total replies and those of 4 economic groups to 11 questions pertaining to 'Sit-down Strikes,' the 'Supreme Court,' 'Communism,' 'Big Business,' 'Advertising,' 'Religious Forces,' and 'Other Aspects of Public Relations.'"

The Corporation uses the sampling method in obtaining its information on public opinion and attitudes on various issues.

381. Farmers' views on platform planks. Farm Jour. 64(7): 18-19. July 1940. 6 F2212

Rural opinion on a "Farm Plank" obtained from half a million questionnaires submitted to farm families in every state in the union by field interviewers for The Farm Journal and The Farmer's Wife are summarized in this brief article.

"The only rule laid down for field interviewers in the survey was that questions be asked only of farm families. Democrats, Republicans, Socialists and Farm-Laborites were queried impartially, and answered just as impartially, as Americans giving their opinions on a way out for agriculture and for America. Results of the survey will be placed before the Resolutions Committees of both party conventions." - p. 19.

382. Fortune survey. Fortune 12(1): 65-68, 111, 112, 114, 116, 118, 120, 122, 124. July 1935. 110 F772

This is the first installment of a series of reports, which is still being published, giving the results of a nation-wide scientifically conducted survey of public opinion on questions of national interest, as well as studies of interest in the field of distribution and merchandising. The sampling method employed is explained. The sample must represent "in microcosm the geographic and economic divisions of the country and the distinction between large and small communities." - p. 65.

383. Gallup, George, and Robinson, Claude Everett. American institute of public opinion - surveys. 1935-38. Pub. Opinion Quart. 2(3): 373-398. July 1938. 280.8 P962

An inclusive compilation of the surveys of public opinion on current political and social issues showing trends of public opinion from October 1935 to May 15, 1938. Sampling technique and the methods used are briefly explained on pp. 373-374.

384. Gallup, George. Can we trust the common people? Good Housekeeping 111(4): 21. Oct. 1940. 321.8 G61

An expression of confidence in the wisdom of the masses of people and the democratic form of government as revealed by sampling public opinion by means of cross-section surveys.

385. Gallup, George. Government and the sampling referendum. Amer. Statis. Assoc. Jour. 33(201): 131-142. Mar. 1933. 251 Am3

A brief history of the growth and development of the measurement of public opinion by sampling, its significance, and consequences for representative government are given by the director of the American Institute of Public Opinion in this paper which was presented at the 99th annual meeting of the American Statistical Association in Atlantic City, New Jersey, Dec. 28, 1937. He contends that "sampling referenda make the mass articulate, define the mandates of our leaders, reveal the true popular strength of pressure groups, and show social taboos quantitatively for what they are worth." - p. 137. He then defends the polls

against accusations of dishonesty and partiality within the organization that operates the sampling machinery, against inaccuracy and undependability, against the charge of influencing people to join band wagon tendencies so as to be on the winning side, and against the charge that legislators are induced to follow the mob instead of voting for unpopular issues when these are best for the nation.

386. Gallup, George. The place of public opinion polls in a democracy. Paper prepared for American Political Science Association, Washington, D. C., December 29, 1939. 13pp. [n.p., 1939?]
Pam. Coll. - Straw votes

A discussion of the needs and uses for surveys of public opinion obtained by sampling referendum and a refutation of some of the charges made against such surveys as substitutes for actual government in a democracy.

387. Gallup, George. Public opinion in a democracy. 15pp. [Princeton, N. J.] Published under the University extension fund, Herbert L. Baker foundation, Princeton university, [1939]. Pam. Coll. - Straw votes

The writer sets forth his estimate of the public opinion poll together with its weaknesses and possible uses in the democratic process. He explains the use of the cross-section or sampling survey, and discusses its reliability and the effect of publicizing its results.

388. Gallup, George, and Rae, Saul Forbes. The pulse of democracy: The public opinion poll and how it works. 335pp. New York, Simon and Schuster, 1940. 280.12 G132

The development, uses, and operation of public opinion polls are described and defended and the methods and implications of public opinion measurement are explained. In Ch. 5, Building the Miniature Electorate, pp. 56-76, the writers describe the sampling principles upon which the polls are based. In later chapters they elaborate on the selection of samples, issues, interviewers, and the wording of questions, and discuss the American Institute of Public Opinion's experience with specific public questions. Appendix I contains brief results of some of the polls on major issues.

389. Gallup, George. Putting public opinion to work. Scribner's 100(5): 36-39, 73-74. Nov. 1936. Libr. Cong. AP2.S4

The director of the American Institute of Public Opinion defends his poll, summarizes the principles upon which it operates, and contends that this new sampling technique for the measurement of opinion has a vital part to play in making democracy work more effectively.

390. Gallup, George. Testing public opinion. Pub. Opinion Quart. Sup. 2(1): 8-14. Jan. 1938. 280.8 P962
Describes the work of the American Institute of Public Opinion and discusses some applications of opinion research to the democratic process.
391. Ghiselli, Edwin E. Some further points on public opinion polls. Jour. Mktg. 5(2): 115-119. Oct. 1940. 280.38 J82
Discusses 1. The form of the question; 2. Public opinion polls as a measuring device; 3. The effects of knowledge of the results of opinion polls upon the political behavior of the public.
392. Gosnell, Harold F. How accurate were the polls? Pub. Opinion Quart. 1(1): 97-105. Jan. 1937. 280.8 P962
Compares the predictions made by various straw-vote polls on the presidential elections, with actual election results. "The election showed that there is much yet to be learned about sampling techniques." - p. 97.
393. Hartwell, Dickson. Business asks the public how it may serve best. Business needs to know public opinion no less than the politician and through scientific surveys is finding out. Nation's Business 28(5): 26-28, 106-108. May 1940. 286.8 N212
Some of the methods used in interview-sampling for the measurement of public opinion and attitudes, the wording of questionnaires, the selection of interviewers, the possible effects of publicized polls in influencing public opinion, and the uses that industrial firms and manufacturers make of this tool are described in this article.
394. Henderson, Donald E. V. Opportunities for statistical workers. 56pp. Chicago, Science research associates, [1938] 251 H38
The section entitled "Poll-iticians," pp. 27-30, briefly describes some sampling principles and applications, chiefly the Gallup poll.
395. Katz, Daniel, and Cantril, Hadley. Public opinion polls. Sociometry 1(1-2): 155-179. July-Oct. 1937.
References, pp. 178-179.
Compares and analyzes the methodology employed by some of the better known public opinion polls, and discusses the following: reasons for the existence of straw polls, classification of polls, accuracy of the polls, why the polls were wrong and effect of polls. This is an extensive article which contains considerable discussion of sampling.
396. Lazarsfeld, Paul, and Fiske, Marjorie. The "panel" as a tool for measuring public opinion. Pub. Opinion Quart. 2(4): 596-612. Oct. 1938. 280.8 P962

"Instead of taking a new sample for each poll, repeated interviews with the same group of people have been tried. The experiences met with and the problems involved in such a panel technique will be discussed." - p. 596.

397. Literary digest. Topics of the day. Landon, 1,293,669; Roosevelt, 972,897. Final returns in the Digest's poll of ten million voters. Lit. Digest 122(18): 5-6. Oct. 31, 1936. 110 L71
Gives a tabulated summary, with some discussion, of the returns of the straw vote preceding the presidential election of 1936, in which it was predicted that Mr. Landon would win. The claim is made that the poll is unbiased, that it is neither weighted, adjusted, nor interpreted.
398. National industrial conference board. A statistical survey of public opinion regarding current economic and social problems as reported by newspaper editors in August and September, 1934. Final report. 40pp. New York [1934] (Studies no. 205)
280.12 N213S 1934
399. National industrial conference board. A statistical survey of public opinion regarding current economic and social problems as reported by newspaper editors in the first quarter of 1936. 56pp. New York [1936] (Studies, no. 222) 280.12 N213S 1936
"The present study is the second of two surveys which have extended the investigations of the Board's Research Staff into the field of public opinion on economic problems... The method used has been simple. The Board has assumed that the newspaper and farm journal editors throughout the country, who must be constantly in touch with public opinion in their communities, would be more likely than any other single professional group to have direct and adequate knowledge of public attitudes toward current economic and social problems. The Board has asked them a series of specific questions regarding the state of public opinion in their communities. Most of these questions are the same as were put to the newspaper and farm journal editors in 1934, but new ones have been added in view of developments since that time. As in the case of the previous study, the Board presents the results of this tabulation only for what they may be worth. It makes no attempt to interpret the significance of this statistical information, nor does it assume to judge the extent to which the newspaper and farm journal editors have correctly appraised and reported public attitudes in their communities." - Foreword.
The questions asked of the editors relate to the cost and organization of government, i.e. debts, taxes, policy toward farmers, price fixing, government ownership of public utilities, regulation of profits, wages and hours of labor.

400. Pierce, Walter M. [Remarks in the House of Representatives on his resolution providing for a Congressional committee investigation of polls of public opinion, as they affect elections and legislative matters] Cong. Rec. 86(98): 9613-9614. May 17, 1940. 148.2 R24
"We all understand that such polls are very powerful publicity agencies which, by selection and statement of questions, may become propaganda agencies exercising a potent influence...it is not my purpose to argue against public-opinion polls, but to secure investigation and understanding of their purposes, methods, and results." - p. 9614.
401. Polls of popular opinion on political questions: a statistical analysis. Annalist 56(1446): 427. Oct. 3, 1940. 284.8 An48
An analysis and evaluation of the Gallup Poll, selected for study because "it has claims to being the best of the public opinion estimates and also because it is the most widely advertised... It seems fair to conclude that the value of this and other public opinion polls has been greatly exaggerated by those conducting them and that the margin of error to which they are subject is too great to warrant their results being taken seriously except in cases where the figures run very strongly in one direction."
402. Post-election straws; scientific sampling came out pretty well in campaign and will now continue. Business Week no. 376, pp. 20-22, Nov. 14, 1936. Libr. Cong. HF5001.B89
Compares the accuracy of the Gallup, Crossley and Fortune polls in forecasting 1936 election results.
403. The public opinion polls: Dr. Jekyll or Mr. Hyde? Pub. Opinion Quart. 4(2): 212-284. June 1940. 280.8 P962
This symposium presents a comprehensive consideration of the virtues and the limitations of such public opinion polls as those conducted by The American Institute of Public Opinion and by Fortune Magazine.
"This issue of the Quarterly attempts to bring together under a single cover a serious discussion of the role public opinion polls do, or should, play in our social system, and of the reliability with which they represent true opinion. Since discussion of the merits of the polls has by no means been confined to academic cloisters, and since men in the world of affairs obviously have some stake in poll results and their possible effects, the symposium includes articles by both academicians and non-academicians. The reader will see that critics have not held their punches, that defenders have not hesitated to rise to the occasion, that social scientists and statisticians have tried to envisage the polls with some historical and methodological perspective." - p. 214.

The articles which comprise the symposium are the following: [Introduction] by Hadley Cantril, pp. 212-217; Democracy in reverse, by Robert S. Lynd, pp. 218-220; Straw polls and public administration, by Henry A. Wallace and James L. McCamy, pp. 221-223; The polls and other mechanisms of democracy, by Harold F. Gosnell, pp. 224-228; The Congressmen look at the polls, by George F. Lewis, Jr., pp. 229-231; The U. S. constitution and ten shekels of silver, by O. R. McGuire, pp. 232-235; Opinion polls as the voice of democracy, by Paul T. Cherington, pp. 236-238; A newspaper publisher looks at the polls, by Eugene Meyer, pp. 238-240; Climbing on the bandwagon, by Walter M. Pierce, pp. 241-243; Is there a bandwagon vote? by George Gallup and Saul Forbes Rae, pp. 244-249; Polls and the science of public opinion, by Floyd H. Allport, pp. 249-257; Interviews and interviewers, by James Wechsler, pp. 258-260; Representative sampling and poll reliability, by S. S. Wilks, pp. 261-269 (A technical supplement to Mr. Wilks' article, entitled "Confidence limits and critical differences between percentages," appears on pp. 333-338); Classifying respondents by economic status, by Elmo Roper, pp. 270-272; Poll data and the study of opinion determinants, by Lec Crespi and Donald Rugg, pp. 273-276; Three criteria: knowledge, conviction, and significance, by Daniel Katz, pp. 277-284.

404. Public opinion survey. Pub. Opinion Quart. 4(1): 75-135. Mar. 1940. 280.8 P962

"With this issue the Quarterly introduces a new section featuring measurement of public opinion."

Contents: 1. British Institute of Public Opinion, by S. F. Rae, pp. 77-82; 2. Gallup and Fortune polls, by S. F. Rae, pp. 83-115; 3. Analysis of poll results, Quarterly commentary, by S. F. Rae, pp. 116-119; Looking forward to peace, by Hadley Cantril and Donald Rugg, pp. 119-121; 4. "Panel" studies, by P. F. Lazarsfeld, pp. 122-128; 5. Problems and techniques. Wording questions for the polls, by Elmo Roper, pp. 129-130; Three words, by E. G. Benson, pp. 130-134; Weighted proportions and poll reliability, by Frederick F. Stephan, p. 135.

405. Rice, Stuart Arthur. Measurements of social attitudes and public opinion. In U. S. Dept. of agriculture. Bur. of agricultural economics. Farm population and rural life. The Institute of methods of rural sociological research. Held at the bureau of agricultural economics. Dec. 31, 1929-Jan. 4, 1930. A summary report. pp. 11-23, processed. Washington, D. C., Feb. 1930. 1.9 Ec763In

This paper deals with the possibilities of finding objective indices of rural attitude and the statistical methods of analyzing a series of such indices. The discussion is divided into four possible types of investigation: 1. Controlled verbal; 2. Controlled non-verbal; 3. Uncontrolled verbal; 4. Uncontrolled non-verbal.

406. Rice, Stuart Arthur. Quantitative methods in politics. Amer. Statis. Assoc. Jour. 33(201): 126-130. Mar. 1938. 251 Am3
This is a discussion of the measurement of public opinion, especially as it relates to elections, government and legislative issues. The writer concludes that Mr. Gallup, "to the extent that he is able to master the problems of sampling which he encounters...may summarize American attitudes and opinions more accurately than do elections or any other method yet devised." - p. 130.
407. Robinson, Claude Everett. Recent developments in the straw-poll field. 2 parts. Pub. Opinion Quart. 1(3-4): 45-56, 42-52. July-Oct. 1937. 280.8 P962
These two articles together form an up-to-date supplement to his well known study 'Straw Votes' which was published in 1933.
The discussion is divided into the following parts: "Scientific polls" appear; Technique of sampling public opinion; Predictive value of "scientific polls"; Causes of error in "scientific polls"; Polls follow news developments; Four interpretive principles; Problem of legal regulation; Case against straw polls; Party morale; Manipulation; Bandwagon effect; and Representative government.
408. Robinson, Claude Everett. The straw vote. In Encyclopedia of the Social Sciences, v. 14, pp. 417-419. New York, Macmillan co., 1934. 280 Enl v. 14
Lists some of the outstanding straw polls employing the principle of sampling and discusses the good and evil involved in such polls.
409. Robinson, Claude Everett. Straw votes; a study of political prediction. 203pp. New York, Columbia university press, 1932. Libr. Cong. JK2007.R6 1936
Not available for examination.
410. Robinson, Edward S. Trends of the voter's mind. Jour. Social Psychol. 4(3): 265-284. Aug. 1933. Libr. Cong. HM251.A1J6
With the cooperation of the National League of Women Voters, reactions to the principal presidential candidates and to 24 political statements typical of platform propositions and of the speeches of the campaign were secured in October 1932 from 8419 men and women scattered throughout 37 states and representing five social classes or occupational groups.
The findings of the investigation are given in several statistical tables as well as in statements in the text.
411. Roper, Elmo. Neutral opinion on the court proposal. Pub. Opinion Quart. 1(5): 17-20. July 1937. 280.8 P962
Based on a small and numerically inadequate sample, but one which represents proportionately the prosperous, the middle

classes, and the poor, this preliminary survey of public opinion on the Supreme Court question exposes certain cleavages in opinion.

412. Roper, Elmo. Sampling public opinion. Amer. Statis. Assoc. Jour. 35(210): 325-334. June 1940. 251 An3

Paper presented at the 101st annual meeting of the American Statistical Association in Philadelphia, Dec. 28, 1939.

The writer discusses representativeness in sampling public opinion, as influenced by: geographic areas, size of place, sex of persons interviewed, age, occupation, and economic levels. The questions to be answered in setting up a suitable technique for sampling in this field, according to Mr. Roper are: 1. how to select a representative sample; 2. how to ask questions that the public understands and can answer intelligently; 3. how to do the actual field work.

The wording and phrasing of questions and the reactions to them are discussed. The author maintains that public opinion polls have an important function in democratic government, but that sampling techniques, while much improved in recent years, have still not been perfected.

413. Roslow, Sydney, Wulfeck, Wallace H., and Corby, Philip G. Consumer opinion research: experimental studies on the form of the question. Jour. Appl. Psychol. 24(3): 334-346. June 1940. 140.8 J822

The writers describe the findings of an investigation by The Psychological Corporation, using four different methods to test differences of response to sampling questionnaires when the phrasing or the form of the questions is changed.

414. Roslow, Sydney, and Blankenship, Albert B. Phrasing the question in consumer research. Jour. Appl. Psychol. 23(5): 612-622. Oct. 1939. 140.8 J822

The following nine principles are discussed: 1. The introduction and the opening questions must create rapport; 2. The questions must not be ambiguous; 3. Questions should be concrete, not abstract; 4. Wherever possible, the individual interviewed should be given a means of expression; 5. The effect of context or the point of reference must be considered; 6. The form of the question must be related to the background of the person interviewed; 7. The effect of extreme alternatives must be realized; 8. Questions must be non-emotional and unbiased; 9. The influence of the check-list must be considered.

415. Smith, Charles William, jr. Public opinion in a democracy; a study in American politics. 598pp. New York, Prentice-Hall, inc., 1939. (Political science series; S. C. Wallace, ed.) Libr. Cong. HM261.S6

Bibliography, pp. 567-585.

Ch. 18, Straw Votes and the Measurement of Opinion, pp. 393-417,

contains a description and evaluation of the better known public opinion polls, and explains their methods of selecting samples. The writer concludes: "Public opinion polls are a phenomenon of the modern age that have developed and thrived because of their interest and usefulness to many different kinds of people. Beginning in the use of rather crude and unscientific methods, they have finally reached a stage of scientific technique that although far from perfect, seems to point the way toward increasing improvement and increasing usefulness." - p. 417.

416. Springarn, Jerome H. These public opinion polls; how they work and what they signify. Harpers Mag. 178(1063): 97-104. Dec. 1938. Libr. Cong. AP2.H3

The Gallup and Fortune polls in particular are evaluated and discussed, including something on their choice of sample and accuracy of results. The writer concludes that all such polls have many weaknesses and limitations and that as institutions they "will bear very careful and skeptical watching."

417. Stookey, Charley. They want their dole, says Charley Stookey. Breeder's Gaz. 105(4): 18. Apr. 1940. 49 B74

"Farm editors of the nation do not agree with the results of a poll made by Editor Sam Guard of Breeder's Gazette, which showed livestock farmers 3-to 1 against any government dole or subsidy whatsoever." The opinions of the editors of the American Cotton Grower, The Farmer [St. Paul], The Nebraska Farmer, and Wallaces' Farmer & Iowa Homestead are quoted.

The results of Mr. Guard's poll of volunteers among his readers are given in Breeder's Gazette, v. 105, no. 3, Mar. 1940, pp. 3, 38.

418. Studenski, Paul. How polls can mislead. Harpers Mag. 180(1075): 80-83. Dec. 1939. Libr. Cong. AP2.H3

The discussion is based on a national poll conducted on behalf of a national organization of employers, and a test poll of the same questions given to a group of students. The writer concludes: "This modest experiment seems to me to offer definite proof that polls of public opinion may be so framed as to influence those polled to give certain answers and that pressure groups, assisted by professional poll-taking organizations, may use polls for propaganda purposes. Certainly the public-opinion poll, as an institution, needs very wary watching." - p. 83.

419. [Successful Farming.] The farmer speaks! Successful Farming 36(4): 14-15, 20, 75. Apr. 1938. 6 S12

This is the first report of the sample poll of farmer opinion on social, economic, and political questions which has appeared in the monthly issues of Successful Farming from April 1938 to date. The results of the poll are based on opinions obtained from 6,000,000 farm families throughout the United States. "The

Farmer Speaks' will be without bias or editorial opinion because in this survey all farmers from all our states - rich, poor, owner, tenant - will find a voice." - p. 14.

420. Updegraff, Robert R. Democracy's new mirror. Forum 103(1): 11-14. Jan. 1940. 110 F77

The place of public opinion polls in a democracy, their influence among voters, how they are regarded by Congressmen and Senators, their accuracy, and something of their methodology are discussed in this article.

421. Wallaces' Farmer and Iowa Homestead. [Survey of farm opinions] Iowa farmers cut corn acreage. Survey shows 62 per cent are complying with AAA corn acreage allotments. Wallaces' Farmer and Iowa Homestead 63(12): 1. June 4, 1938. 6 W15

A series of surveys of Iowa farm opinion by the sampling method have been made and published at regular intervals in Wallaces' Farmer and Iowa Homestead. This apparently is one of the first reported. In addition to the findings and results on this particular question, there is on the editorial page, (p. 2) a brief explanation of the sampling procedure used.

422. Warner, Lucien. The reliability of public opinion surveys. Pub. Opinion Quart. 3(3): 376-390. July 1939. 280.8 P962

This discussion of mathematical sources of error in survey results is divided into the following topics: Random sampling; elimination of distorting factors; "tampering" with the random sample; weighting by sectional population; justification of post facto weighting; reliability of whole vs. parts; knowledge of subdivisinal populations essential to weighting; homogeneous and heterogeneous publics; and empirical checks.

423. Wechsler, James. Polling America. Nation 150(3): 64-67. Jan. 20, 1940. 110 N

Evaluates the reliability and potentialities of public opinion polls such as the Gallup and Fortune polls, and discusses their function in a democracy.

424. Weld, L. D. H. Those election straw votes. Printers' Ink 177(7): 6-8, 121-123. Nov. 12, 1936. Libr. Cong. HF5201.P7

An appraisal of the methodology used in the Literary Digest poll with answers to many questions regarding the inaccuracy of its predictions. The writer states that the Digest poll was a very important demonstration bearing on the problem of sampling and that the results of recent polls furnish lessons for advertisers and research men.

425. Wilks, Samuel Stanley. Representative sampling and poll reliability. Pub. Opinion Quart. 4(2): 261-269. June 1940. 280.8 P962

This is one in a symposium of articles on public opinion polls,

which appears in the June issue of Public Opinion Quarterly.

"A mathematical statistician at Princeton University describes the principles of representative sampling which underlie modern polling techniques, and the extent to which poll results obtained from representative samples can be relied on to indicate the opinions of the whole population." - p. 261.

A technical supplement to Mr. Wilks' article, entitled "Confidence Limits and Critical Differences between Percentages," appears on pp. 332-338 of the Quarterly.

426. Willcox, W. F. An attempt to measure public opinion about repealing the eighteenth amendment. Amer. Statis. Assoc. Jour. 26(175): 243-261. Sept. 1931. 251 Am3

"Developed from a paper presented at the Ninety-second Annual Meeting of the American Statistical Association, Dec. 30, 1930."

"The present paper is a study of a specific case in which a nation-wide application of the sampling method has been made to a political issue of great popular interest. The issue is whether the present policy of national prohibition should continue; the sampling method has been applied to it by the two Literary Digest prohibition polls of July, 1922, and February 1930. An attempt is here made to determine the trustworthiness of the inferences from this use of the sampling method by comparing the results of the two polls with the results of various state referenda. The two together afford an unequalled measure of public opinion in the United States and of the changes in that opinion during seven and one-half years." - p. 244.

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- No. 4. Price spreads; a selected list of references relating to analyses of the portion of the consumer's price accruing to various agencies. March 1925. Supply exhausted.
- No. 5. Long-time agricultural programs in the United States - national, regional, and State. June 1925. Supply exhausted.
- No. 6. Aids to writers and editors; a selected list of books on the preparation of manuscripts and the mechanics of writing, for use in the Bureau of Agricultural Economics. June 1925.
- No. 7. Livestock financing; a selected list of references relating to the financing of the livestock industry in the United States. September 1925. (Superseded by No. 62)
- No. 8. The peach industry in the United States; a selected list of references on the economic aspects of the industry including some references relating to Canada. October 1925.
- No. 9. Selected list of references on grain sorghums, grass sorghums, and broom corn. December 1925. Supply exhausted.
- No. 10. Research in rural economics and rural sociology in the Southern States since 1920; a list of the published, unpublished, and current studies. January 1926.
- No. 11. Economic periodicals of foreign countries published in the English language; a selected list. February 1926. Revised, March 1930.
- No. 12. Government control of export and import in foreign countries. February 1926.
- No. 13. Cooperative marketing of tobacco; a selected list of references. February 1926. Supply exhausted.
- No. 14. Factors affecting prices; a selected bibliography, including some references on the theory and practice of price analysis. March 1926. Supply exhausted.

- No. 15. Alabama; an index to the State official sources of agricultural statistics. March 1926.
- No. 16. Periodicals relating to dairying in the U. S., received in the U. S. Department of Agriculture. June 1926.
- No. 17. Farm youth; a selected list of references to literature issued since January 1920. October 1926. (Supplemented by No. 65)
- No. 18. Price fixing by governments 424 B. C.-1926 A. D.; a selected bibliography, including some references on the principles of price fixing, and on price fixing by private organizations. October 1926. (See also No. 79 and No. 86)
- No. 19. The apple industry in the United States; a selected list of references on the economic aspects of the industry together with some references on varieties. June 1927.
- No. 20. Bounties on agricultural products; a selected bibliography. July 1927.
- No. 21. Oklahoma; an index to the State official sources of agricultural statistics...including a list of the unofficial sources of Oklahoma agricultural statistics. August 1927. Supply exhausted.
- No. 22. A list of international organizations interested in agriculture. November 1927. Supply exhausted.
- No. 23. Control of production of agricultural products by governments; a selected bibliography. December 1927.
- No. 24. The poultry industry; a selected list of references on the economic aspects of the industry, 1920-1927. February 1928.
- No. 25. Taxation and the farmer; a selected and annotated bibliography. June 1928.
- No. 26. Labor requirements of farm products in the United States; a list of references to material published since 1922. April 1929.
- No. 27. Agricultural relief; a selected and annotated bibliography. June 1929. (Superseded by No. 50)
- No. 28. The strawberry industry in the United States; a selected list of references on the economic aspects of the industry. September 1929.
- No. 29. Valuation of real estate, with special reference to farm real estate. November 1929. (Superseded by No. 60)

- No. 30. Large scale and corporation farming; a selected list of references. November 1929. (Supplemented by No. 69)
- No. 31. California; an index to the State sources of agricultural statistics. Part I. - Fruits, vegetables and nuts; an index to the official sources. Sections 1 and 2. January 1930; Part II. - Crops other than fruits, vegetables and nuts; an index to the official sources. June 1930; Part III. - Livestock and livestock products; an index to the official sources. January 1931; Part IV. - Land, farm property, irrigation, and miscellaneous items; an index to the official sources. April 1931; Part V. - An index to some unofficial sources. February 1930.
- No. 32. Rural standards of living; a selected bibliography. August 1930. (Superseded by Miscellaneous Publication 116)
- No. 33. Wheat; cost of production, 1923-1930. References relating to the United States and some foreign countries. January 1931.
- No. 34. Business and banking periodicals reviewing the business situation. August 1931.
- No. 35. Switzerland; a guide to official statistics on agriculture, population, and food supply. March 1932.
- No. 36. The grape industry; a selected list of references on the economic aspects of the industry in the United States, 1920-1931. March 1932.
- No. 37. Advantages and disadvantages of country life. May 1932.
- No. 38. List of State official serial publications containing material on agricultural economics. July 1932. Supply exhausted.
- No. 39. Greece; a guide to official statistics of agriculture, population, and food supply. October 1932.
- No. 40. Barter and scrip in the United States. February 1933.
- No. 41. The domestic allotment plans for the relief of agriculture. February 1933.
- No. 42. Measures taken by foreign countries to relieve agricultural indebtedness. March 1933. Supply exhausted.
- No. 43. Part-time farming; a brief list of recent references. February 1933. (Superseded by no. 77)
- No. 44. Uses for cotton; selected references in the English language. November 1932.

- No. 45. State measures for the relief of agricultural indebtedness in the United States, 1932 and 1933. March 1933.
- No. 46. Group and chain farming in the United States, January 1930-March 1933; with some references to group farming in foreign countries. March 1933. (Superseded by No. 69)
- No. 47. Farm mortgages in the United States; selected references...January 1928-April 1933. May 1933.
- No. 48. Price analysis; selected references on supply and demand curves and related subjects, January 1928-June 1933. September 1933.
- No. 49. Rumania; a guide to official statistics of agriculture, population and food supply. October 1933.
- No. 50. Agricultural relief; a selected and annotated bibliography. August 1933.
- No. 51. Business and agriculture, 1920-1933; a partial bibliography of material on the interdependence of business and agriculture. November 1933.
- No. 52. The American farm problem. April 1934.
- No. 53. State measures for the relief of agricultural indebtedness in the United States, 1933 and 1934. June 1934.
- No. 54. Measures of major importance enacted by the 73d Congress, March 9 to June 16, 1933 and January 3 to June 18, 1934. November 1934.
- No. 55. List of periodicals containing prices and other statistical and economic information on fruits, vegetables and nuts. January 1935.
- No. 56. Consumption of fruits and vegetables in the United States; an index to some sources of statistics. January 1935.
- No. 57. Economic development of the cotton-textile industry in the United States, 1910-1935. September 1935.
- No. 58. Price studies of the U. S. Department of Agriculture showing demand-price, supply-price, and price-production relationships. October 1935.
- No. 59. Farm tenancy in the United States, 1925-1935; a beginning of a bibliography. November 1935. (Superseded by No. 70)
- No. 60. Valuation of real estate, with special reference to farm real estate. December 1935. (Supersedes No. 29)
- No. 61. Financing American cotton production and marketing in the United States. November 1935.

- No. 62. Livestock financing in the United States; selected references to material published 1915-1935. December 1935. (Supersedes No. 7)
- No. 63. Government control of cotton production in the United States, 1933-1935; a selected list of references. January 1936.
- No. 64. Agricultural labor in the United States, 1915-1935; a selected list of references. December 1935. (Supplemented by No. 72)
- No. 65. Farm youth in the United States; a selected list of references to literature issued since October 1926. June 1936. (Supplements No. 17)
- No. 66. Measures of major importance enacted by the 74th Congress, January 3 to August 26, 1935 and January 3 to June 20, 1936. July 1936.
- No. 67. Crop and livestock insurance; a selected list of references to literature issued since 1898. November 1936.
- No. 68. Incidence of the processing taxes under the Agricultural Adjustment Act; a selected list of references. January 1937.
- No. 69. Large scale and corporation farming; a selected list of references. April 1937. (Supplements No. 30; supersedes No. 46)
- No. 70. Farm tenancy in the United States, 1918-1936; a selected list of references. June 1937. (Supersedes No. 59; supplemented by No. 85)
- No. 71. List of periodicals containing prices and other statistical and economic information on dairy products. October 1937.
- No. 72. Agricultural labor in the United States, 1936-1937; a selected list of references. March 1938. (Supplements No. 64)
- No. 73. Income; selected references on the concept of income and methods of obtaining income statistics. May 1938.
- No. 74. The soybean industry; a selected list of references on the economic aspects of the industry in the United States, 1900-1938. October 1938.
- No. 75. The tobacco industry; a selected list of references on the economic aspects of the industry, 1932-June 1938. September 1938.
- No. 76. Agricultural relief measures relating to the raising of farm prices - 75th Congress, January 5, 1937 to June 16, 1938. February 1939.
- No. 77. Part-time farming in the United States; a selected list of references. February 1939. (Supersedes No. 43)
- No. 78. Rural psychology; a partial list of references. March 1939.

- No. 79. Price fixing by government in the United States, 1926-1939; a selected list of references on direct price fixing of agricultural products by the Federal and State governments. July 1939. (See also No. 18)
- No. 80. The peanut industry; a selected list of references on the economic aspects of the industry, 1920-1939. November 1939.
- No. 81. Transportation of agricultural products in the United States, 1920-June 1939; a selected list of references relating to the various phases of railway, motor, and water carrier transportation. Part I. General transportation and transportation of agricultural products. November 1939; Part II. Highway, rail, and water transportation. November 1939; Part III. Index to Parts I and II. November 1939.
- No. 82. The world food supply; a partial list of references, 1925-1939. December 1939.
- No. 83. Land classification; a selected bibliography. March 1940.
- No. 84. Agricultural relief measures relating to the raising of farm prices - 74th Congress, January 3, 1935 to June 20, 1936. April 1940.
- No. 85. Farm tenancy in the United States, 1937-1939; a selected list of references. April 1940. (Supplements No. 70)
- No. 86. Price fixing by government in foreign countries, 1926-1939; a selected list of references on direct price fixing of agricultural products by foreign governments. July 1940. (See also No. 18)
- No. 87. Corn in the development of the civilization of the Americas; a selected and annotated bibliography. September 1940.
- No. 88. Cotton linters; selected references in English, 1900-July 1940. October 1940.
- No. 89. Anthropology and agriculture; selected references on agriculture in primitive cultures. November 1940.
- No. 90. The sampling method in social and economic research; a partial list of references. January 1941.

