

A FACTOR ANALYSIS APPROACH TO THE CONSTRUCTION AND VALIDATION OF  
A SOCIOECONOMIC STATUS SCALE FOR OPEN-COUNTRY FAMILIES  
IN OKLAHOMA

By

ERMIT FREDERICK SHARP

Bachelor of Science

Oklahoma Agricultural and Mechanical College

Stillwater, Oklahoma

1948

Submitted to the Department of Sociology and Rural Life

Oklahoma Agricultural and Mechanical College

in partial fulfillment of the requirements

for the Degree of

MASTER OF SCIENCE

1951

OKLAHOMA  
AGRICULTURAL & MECHANICAL COLLEGE  
LIBRARY  
JUN 6 1951

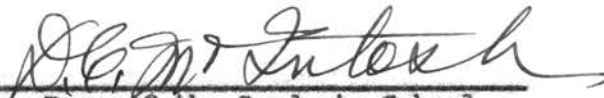
A FACTOR ANALYSIS APPROACH TO THE CONSTRUCTION AND VALIDATION OF  
A SOCIOECONOMIC STATUS SCALE FOR OPEN-COUNTRY FAMILIES  
IN OKLAHOMA

EMMIT FREDERICK SHARP  
MASTER OF SCIENCE  
1951

THESIS AND ABSTRACT APPROVED:

  
Thesis Adviser

  
Faculty Representative

  
Dean of the Graduate School

## TABLE OF CONTENTS

	Page
CHAPTER I INTRODUCTION	
1. The Problem . . . . .	1
2. Purpose . . . . .	3
3. Hypothesis . . . . .	3
4. Source and Nature of Data . . . . .	4
5. Methodology . . . . .	6
(1) Definition . . . . .	6
(2) Theoretical Framework for Use of Factor Analysis . . . . .	7
(3) Weighting Considerations . . . . .	8
CHAPTER II REVIEW OF LITERATURE	
1. Introduction . . . . .	9
2. Indexes Constructed by the Method of Internal Consistency . . . . .	9
3. Indexes Constructed by Various Techniques of Factor Analysis . . . . .	13
4. Summary . . . . .	17
CHAPTER III PRELIMINARY ANALYSIS OF DATA	
1. Introduction . . . . .	18
2. Correlation of Items . . . . .	19
3. Extraction of the First Common Factor . . . . .	21
4. The First Common Factor as a Definition of Socioeconomic Status . . . . .	26
5. Comparison of Weighting Systems . . . . .	28
CHAPTER IV CONSTRUCTION AND STANDARDIZATION OF A SHORT SCALE	
1. Selection of Items . . . . .	32
2. Distribution of the Items of the Scale . . . . .	34
3. Range of the Scale . . . . .	34
4. Standardization of the Scale . . . . .	35
(1) Validity . . . . .	35
(2) Reliability . . . . .	37

5. Conclusions Regarding Validity and Reliability . . . . . 38

CHAPTER V SUMMARY AND CONCLUSIONS

1. Summary . . . . . 42

2. Conclusions . . . . . 44

3. Further Research Needs . . . . . 45

SELECTED BIBLIOGRAPHY . . . . . 47

APPENDIX A . . . . . 49

APPENDIX B . . . . . 50

APPENDIX C . . . . . 51

## CHAPTER I INTRODUCTION

1. The Problem

Differentiations among levels of socioeconomic status within a population form a significant part of sociological research. The ability to identify and measure such differences is important not only for studies dealing directly with socioeconomic status, but also for statistical control in analysis of other types of sociological data. Regional comparisons of fertility, for example, assume much additional meaning if the factor of socioeconomic status can be held constant.

There are many indexes of socioeconomic status, but apparently only two standardized multiple-factor scales specifically designed for use with farm families. The first of these is William H. Sewell's farm family socioeconomic status scale published in 1940.<sup>1</sup> The second, a short form of the first, was published by Sewell in 1943.<sup>2</sup> While these scales provide useful indexes of socioeconomic status, they possess certain limitations which indicate that advantages might be gained by application of new approaches and new techniques to the problem of scale construction and validation.

In presenting his first scale, Sewell indicated certain needs for further research:

Although field experience has shown that the present scale is easily applicable, its usefulness will be considerably enhanced if its length may be reduced without sacrifice in its validity and reliability. At the present time the writer is making an exhaustive study of this problem. Preliminary results indicate that the social participation items may be

---

<sup>1</sup> William H. Sewell, The Construction and Standardization of a Scale for the Measurement of the Socio-Economic Status of Oklahoma Farm Families, Stillwater: Oklahoma Agricultural Experiment Station Technical Bulletin 9, 1940.

<sup>2</sup> William H. Sewell, "A Short Form of the Farm Family Socioeconomic Status Scale," Rural Sociology, 8 (June, 1943), 161-169.

dropped without any sacrifice in so far as the present Oklahoma sample is concerned. However, a definite conclusion on this point must be withheld pending further evidence both for Oklahoma and other areas.

A further problem of practical and technical importance is to determine whether the items of the scale measure a single common factor. Preliminary analysis indicates that they do; but more detailed analyses both of the separate items and of the indexes based on samples from this and other areas, must be made before an adequate answer may be given to this question.

Another problem of considerable importance will be to develop a more adequate system of weights for the scale items. Recently, techniques have been developed for weighting items according to the extent to which they measure a common factor. It will, perhaps, be worth while to attempt to utilize these at some time in the future. It may also be necessary to devise new sets of weights for other cultural areas.<sup>3</sup>

From the above quotation, one may ascertain three problem areas with which this study is concerned: (1) the need for a scale shorter in length than the original Sewell scale, (2) the need to test for the presence of a single factor common to all of the items, and (3) the possibility of developing more adequate item weights. The last two of these problem areas are applicable to the short scale as well as to the original one. There is some reason to believe that other techniques for the selection of items for a short scale might be preferable to those originally used.<sup>4</sup> Sewell mentioned one other problem in the use of his scales by stating, "A scale, such as the present one, based entirely on cultural traits of one type or another, must of necessity be revised from time to time to compensate for changes in the rural culture."<sup>5</sup> Such a revision for an Oklahoma population has recently been made by John C. Belcher.<sup>6</sup> This

---

<sup>3</sup> Sewell, The Construction and Standardization of a Scale for the Measurement of the Socio-Economic Status of Oklahoma Farm Families, pp. 53-54.

<sup>4</sup> Genevieve Knupfer and Robert K. Merton, "Discussion," Rural Sociology, 8 (June, 1943), 169-170.

<sup>5</sup> Sewell, The Construction and Standardization of a Scale for the Measurement of the Socio-Economic Status of Oklahoma Farm Families, p. 54.

<sup>6</sup> John C. Belcher, Evaluation and Restandardization of Sewell's Socio-Economic Scale, Unpublished Study, Oklahoma Agricultural and Mechanical College, Department of Sociology and Rural Life, 1950.

revision followed the procedure established by Sewell and the results are utilized in the present study.

Closely related to the concept of socioeconomic status is that of plane or level of living. A standardized multiple-factor scale for the measurement of the latter among Ohio farm people was published by A. R. Mangus and Howard R. Cottam in 1941.<sup>7</sup> This scale is similar to Sewell's in construction and is subject to the same general methodological limitations as his short form.

## 2. Purpose

An underlying assumption in construction of previous scales for measurement of the socioeconomic status of farm families is that items included in such scales measure a single common factor, i.e., socioeconomic status. It is with this assumption that the present study is chiefly concerned. Its purposes are: (1) to construct a short scale for the measurement of the socioeconomic status of open-country families in Oklahoma, (2) to test empirically, in the construction of the scale, the presence of a single factor of socioeconomic status assumed in previous scales and (3) to establish methodologically the utility of the scale constructed.

## 3. Hypothesis

The hypothesis of this study, then, is that a factor analysis of items shown through internal consistency techniques to be associated with socioeconomic status will yield a single major factor. This factor may logically be assumed to be socioeconomic status. If present data support this hypothesis a basis is provided for construction of a scale for its measurement. On the other hand,

---

<sup>7</sup> A. R. Mangus and Howard R. Cottam, Level of Living, Social Participation, and Adjustment of Ohio Farm People, Columbus: Ohio Agricultural Experiment Bulletin 624, 1941.

empirical rejection of this single factor hypothesis would indicate that there are types of socioeconomic status. Each, then, should be identified and measurement should proceed from the assumption of their differences.

#### 4. Source and Nature of Data

In the spring and summer of 1947, Robert T. McMillan conducted a rural life survey in Oklahoma. This study included 825 open-country families in four selected counties under sampling procedure designed to reflect information for the open-country population of the State as a whole.<sup>8</sup> These data provide the essential material for the present study.

In evaluating the applicability of McMillan's sample for use in the present study, criteria previously established by Sewell have been accepted.<sup>9</sup> The requirements set for the selection of the test population in Sewell's work were: (1) "... it should be representative of the state as a whole in as many characteristics as possible" and (2) "... it should contain within its boundaries as many levels of socioeconomic status as possible..." In regard to the first of these requirements comparisons were made of data from McMillan's sample and from the 1945 Census of Agriculture.<sup>10</sup> The two sources were compared for distribution of farm operators by tenure, distribution of farm operators by age classifications, and proportions of farms at varying distances from all-weather roads. Close relationships were found when Census

---

<sup>8</sup> The counties selected were Pittsburg, Mayes, Comanche and Blaine. Three of these, Pittsburg, Comanche and Blaine, are adjacent to Haskell, Cotton and Craig counties respectively--the counties used by Sewell, The Construction and Standardization of a Scale for the Measurement of the Socio-Economic Status of Oklahoma Farm Families, pp. 22-23, in the construction of his scale. The fourth county, Mayes, lies adjacent to Craig County from which Sewell (Ibid., p. 47) obtained his standardization sample.

<sup>9</sup> Ibid., p. 22.

<sup>10</sup> These data were computed in the previously cited Belcher study. Op. cit., p. 2.



data for the four sample counties used by McMillan and census data for the state as a whole were checked against data from McMillan's sample. This agreement indicates that the sample probably is closely representative of both the combined rural-farm populations of the four counties and the total rural-farm population of the state.

Since level of living is known to be closely associated with socioeconomic status, Hagood's 1945 county level of living index was used in testing the extent to which the sample conforms to the second requirement.<sup>11</sup> When counties of the state were arranged in quartiles on the basis of this index, it was found that one of the sample counties fell in each of the four quartiles. This supports premises that the sample includes the total range of socioeconomic status levels within the state and that it distinguishes them as quartile test groups should do.

The original Sewell scale consisting of thirty-six items was included in McMillan's survey. In revision of the scale on the basis of McMillan's data, Belcher, employing the techniques used by Sewell, found that eight items no longer met requirements established by Sewell for item validation. These items were eliminated from the scale. One additional item on the schedule (use of a frozen food locker or presence of a deep-freeze unit in the home) was found to be indicative of socioeconomic status and was included in the revised scale.

Since the present scale is to be standardized for unbroken white families, 165 schedules in McMillan's data for families not meeting these requirements have been eliminated. The responses of the remaining 660 families in the sample to the twenty-nine items included in the revised scale constitute the data for the present study.

---

<sup>11</sup> Margaret Jarman Hagood, Farm Operator Family Level of Living Indexes for Counties of the United States, 1940 and 1945, Washington: United States Department of Agriculture, Bureau of Agricultural Economics, 1947.

In addition to the question of sample adequacy in the present use of McMillan's data, a question may arise concerning the reliability of schedule responses to the socioeconomic status scale questions. While little is known of the actual field work of the 1947 survey, the nature of the scale questions is such as to make accurate responses readily obtainable and to permit a priori confidence in these data.

### 5. Methodology

(1) Definition. The terms "socioeconomic status", "level of living", and "plane of living" have been loosely used, often interchangeably. Socioeconomic status, in its most definitive use, differs from plane or level of living in being more inclusive. F. Stuart Chapin has defined socioeconomic status as "...the position that an individual or family occupies with reference to the prevailing average standards of cultural possessions, effective income, material possessions and participation in the group activities of the community".<sup>12</sup> Mangus and Cottam define level of living as including the first three of these components but not social participation.<sup>13</sup> Margaret Jarman Hagoood and Louis J. Ducoff define level of living as "...the level of current consumption or utilization of goods and services, with services being broadly interpreted to include both publicly furnished and privately secured services which contribute to well-being or provide satisfactions".<sup>14</sup> This definition is in agreement essentially with Mangus and Cottam's usage. For purposes of this study,

---

<sup>12</sup> F. Stuart Chapin, *Measurement of Social Status*, Minneapolis: University of Minnesota Press, 1935, p. 3.

<sup>13</sup> Mangus and Cottam, Op. Cit., p. 9.

<sup>14</sup> Margaret Jarman Hagoood and Louis J. Ducoff, "What Level of Living Indexes Measure", American Sociological Review, 9 (February, 1940), 78.

a differentiation will be made between socioeconomic status and plane or level of living in accordance with the above definitions. Level of living is defined to include cultural possessions, effective income, and material possessions and socioeconomic status is defined to include these three components plus a fourth, social participation.

(2) Theoretical Framework for Use of Factor Analysis. The present problem demands the combining and weighting of a set of variables on assumption of their ability to indicate variations in a sought dependent variable, i.e., socioeconomic status. Since no direct measure of the dependent variable is available, common multiple and partial correlation techniques cannot be used. Thus the need is for a means of computing the dependent variable as well as the relationships of the other variables to it. Factor analysis provides a technique by which this can be accomplished.

Factor analysis, like all statistical procedures, is concerned with the simplification of data. It is a technique for analysis of intercorrelations from a set of variables with the essential information being retained in a set of categories or "factors" which are fewer in number than the original variables. The foundation for the technique is the premise that a set of factors can be extracted, each common to one or more variables, which can be used to interpret the intercorrelations of the variables. Factor loadings are computed for items on each factor extracted. The square of a factor loading is approximately equal to the proportion of the variance of a variable accounted for by that common factor.<sup>15</sup>

---

<sup>15</sup> A treatment of the major methods of factor analysis may be found in Dael Wolfle, Factor Analysis to 1940, Chicago: University of Chicago Press, 1940, and Karl J. Holzinger and Harry H. Harman, Factor Analysis, Chicago: University of Chicago Press, 1941.

A factor, then, is a result of any cause or group of causes which will produce a systematic set of intercorrelations among a group of variables. In the present problem, a group of variables shown through internal consistency techniques to be associated with socioeconomic status is to be analyzed. The hypothesis is that a single statistical factor will account for the correlations of these variables. It is assumed that, considering the nature of the variables, such a factor would be a sufficiently close approximation of socioeconomic status to serve as a criterion for the selection and weighting of items to be retained in a short socioeconomic status scale.

(3) Weighting Considerations. A direct measure of socioeconomic status constructed in accordance with the accepted definition would consist of all items which make up the four components, weighted in accordance with their importance as determinants of status. Since the construction of such a measure is not feasible, some other procedure must be followed. The alternative is to construct an index of socioeconomic status rather than a direct measure. The items should be weighted in accordance with their ability to represent the factor to be measured rather than with their importance as determinants of it, since each of the items may be highly correlated with a number of others which, though important to socioeconomic status, may not be included in the index.<sup>16</sup> In the present study, the items are to be weighted on the basis of their association with the common factor as indicated by their factor loadings.

---

<sup>16</sup> For a discussion of this and other assumptions implicit in the weighting of scale items, see Walter C. McKain, Jr., "The Concept of Plane of Living and the Construction of a Plane of Living Index," Rural Sociology, 4 (September, 1939), 337-343.

## CHAPTER II REVIEW OF LITERATURE

1. Introduction

The primary concern of this study is with certain methodological aspects of determining socioeconomic status levels. A comprehensive review of the literature appearing in this field before 1940 is available.<sup>1</sup> The present review, therefore, is concerned only with subsequent developments. The pertinent studies appearing since 1940 may be divided into two groups on the basis of methodology employed: (1) studies utilizing the method of "internal consistency" and (2) studies which have made use of some type of factor analysis.

2. Indexes Constructed by the Method of Internal Consistency

The primary index appearing in this field is the farm family socioeconomic status scale published by Sewell in 1940.<sup>2</sup> It has been widely used in measurement of socioeconomic status of farm families. Also, its construction has provided a methodological precedent for many later studies using the internal consistency method. The first step in construction of this index was the collection of more than two hundred items thought to be indicative of socioeconomic status. All items thought to be peculiar to a particular regional area, ill-defined or

---

<sup>1</sup> William H. Sewell, The Construction and Standardization of a Scale for the Measurement of the Socio-Economic Status of Oklahoma Farm Families, Stillwater: Oklahoma Agricultural Experiment Station Technical Bulletin 9, 1940, pp. 7-18.

<sup>2</sup> Ibid. A criticism of the basic theories and premises involved in the construction of this and similar scales is found in Genevieve Knupfer, Indices of Socioeconomic Status: A Study of Some Problems of Measurement, (Unpublished Ph. D. dissertation), New York: Columbia University Library, 1946.

confusing were eliminated. The 123 remaining items were submitted to a group of rural specialists for classification into categories representing the four components of socioeconomic status as defined by Chapin. These classified items were included in a 1937 survey and administered to farm families in three selected counties of Oklahoma. From this survey, 800 schedules, representing unbroken white families, were selected for use in the construction of the scale.

The next step was to assign arbitrary scores of one for possession and zero for non-possession to each of the 123 items. By this procedure total scores were obtained for each schedule. The 800 schedules were, then, arranged in quartiles and percentage occurrence computed for the separate items in each of the quartiles. Items showing significant differences (critical ratios of two or more) between all consecutive quartiles and between extreme quartiles were considered to have sufficient differentiating capacity for inclusion in the scale. Forty-one items were found to meet this standard. Five were later eliminated because of problems encountered in definition or in obtaining reliable responses. Of the thirty-six remaining items, fifteen were from the group which had been classified as material possessions, thirteen from the cultural possessions group and eight from the social participation group. The component of effective income was not represented in the final scale since the only item in this category was eliminated because of difficulty in obtaining accurate responses.

The next problem was to select a technique for weighting items retained in the scale. The sigma technique was used for this purpose. The use of this method postulates that the importance of items as determinants of status is in inverse ratio to their frequency of occurrence. Weights were computed by this technique for both possession and non-possession of each of the items, with the sum of item weights constituting the socioeconomic status rating for a family.

Extensive tests indicated the scale to be a valid and reliable measure of the socioeconomic status of families in the Oklahoma population.

In 1943 Sewell published a short scale which consisted of fourteen items from the original scale which field experience had shown to be easiest to enumerate.<sup>3</sup> The fourteen items were reanalyzed for sample groups from Kansas, Louisiana, and Oklahoma using the techniques established in the construction of the original scale. The items proved to provide valid differentiators of socioeconomic status and were combined into a scale for further testing.

When scores from the short scale were correlated with those from the original scale, the resulting validity coefficients were .94 for an Oklahoma sample, .95 for a Kansas sample, and .95 for a Louisiana sample. Split-half reliability coefficients, when corrected by the Spearman-Brown formula, were .81 for Oklahoma, .81 for Louisiana and .87 for Kansas. Although the short scale resulted in a sacrifice of reliability, it was considered to be adequate and useful for studies where use of the longer scale seemed inadvisable.

A revision of the original scale was made by Belcher in the spring of 1950.<sup>4</sup> The purpose of this revision was to adjust for effects of cultural change on the ability of scale items to denote status levels; the techniques were those used by Sewell in the construction of the original scale. The data, as in the present study, were from McMillan's 1947 survey.

The study revealed that eight items no longer met requirements established by Sewell for item validation. These items, room-person ratio, living room floor covering, shades and curtains or drapes on living room windows, radio,

---

<sup>3</sup> William H. Sewell, "A Short Form of the Farm Family Socioeconomic Status Scale," Rural Sociology, 8 (June, 1943), 161-169.

<sup>4</sup> John C. Belcher, Evaluation and Restandardization of Sewell's Socio-Economic Scale, Unpublished study, Oklahoma Agricultural and Mechanical College, Department of Sociology and Rural Life, 1950.



telephone, automobile, wife's education, husband's education and membership of wife in extension or PTA group, were eliminated from the revised scale. One additional item, the use of a frozen food locker or the presence of a deep-freeze unit in the home, was found to be indicative of socioeconomic status and included in the revised scale.

A correlation of .98 between scores from the original and revised scale indicated that, while certain items had suffered a loss in differentiating capacity, the original scale as a whole had suffered no significant loss of validity in so far as the Oklahoma sample was concerned. No tests of the reliability of the scale were made.

A. R. Mangus and Howard R. Cottam, in 1941, made use of the internal consistency method in the construction of a level of living scale for Ohio farm people.<sup>5</sup> Development of the scale was incidental to a rather comprehensive standard of living study and the original scale constructed served a more or less specialized function in this study. However, a short scale of fourteen items was developed for general use with Ohio farm people.

This study, in general, employed the same approach as those previously reviewed. There are, however, certain variations in technique which might be noted. The schedules were arranged in halves rather than quartiles for testing the differentiating capacity of the items and a minimum critical ratio of three was required for the differences between groups. A second variation is to be found in the weighting of the scale items. One set of weights was computed on the basis of the diagnostic capacity of items as indicated by critical ratios of differences between successive quartiles, between halves,

---

<sup>5</sup> A. R. Mangus and Howard R. Cottam, Level of Living, Social Participation, and Adjustment of Ohio Farm People, Columbus: Ohio Agricultural Experiment Station Bulletin 624, 1941, and Howard R. Cottam, Methods of Measuring Level of Living, Social Participation and Adjustment of Ohio Farm People, Columbus: Ohio Agricultural Experiment Station Bulletin 139 (Mimeographed), 1941.



and between extreme quartiles. A second set was computed by the sigma technique. The final weight for an item was derived by multiplying the two weights and adding a constant to their product. The resulting scale was found to be both a valid and reliable measure of the level of living of Ohio farm people.

### 3. Indexes Constructed by Various Techniques of Factor Analysis

Several studies have been made which used factor analysis to arrive at a weighted composite index of either socioeconomic status or level of living. The most of these studies, however, have been concerned with construction of county rather than family indexes. The only exception found is a revision of the 1933 Chapin Social Status Scale by Louis Guttman.<sup>6</sup> This study, published in 1942, was based on a sample of 67 Minneapolis Negro families.

The first step in this study was assembling a set of social variables thought to comprise social status. These variables, occupation, income, social participation and education, together with the 1933 Chapin scale, were analyzed by the Thurstone Centroid technique to test the hypothesis that they had status as a single common factor. A single common factor was found to account for the major share of the intercorrelations of the variables and was considered to be essentially the factor of social status. The scale proved to be the closest of the variables to this factor, having a common factor loading of .89.

Having arrived at a factor representing social status and concluding the scale was an efficient measure of this factor, the next step was to reweight the scale items in order to improve this efficiency. The Thurstone technique

---

<sup>6</sup> Louis Guttman, "A Revision of Chapin's Social Status Scale," American Sociological Review, 7 (June, 1942), 363-367.

was used to analyze the twenty-one items of the scale and the four defining variables listed above. Six common factors were extracted from this group of twenty-five variables. The axes of these factors were rotated until the first of the six coincided with the center of gravity of the four defining variables in common factor space. The resulting common factor was essentially the common factor of social status.

Guttman, using a technique developed in an earlier study, computed coefficients of regression of this factor on the twenty-one items of the scale. The coefficient for an item, when multiplied by the 1933 scale weight for that item, yielded the revised weight. A multiple correlation coefficient of .95 between the common factor and the items of the revised scale indicated that the scale afforded a valid measure of the common factor.

The remaining studies to be reviewed in this section involve the use of the Hotelling Component Analysis technique of factor analysis in the construction of composite indexes. Hagood, together with Nadia Danilevsky and Corlin O. Beum, first used this technique in the delineation of subregions of Ohio.<sup>7</sup> To demonstrate the use of the technique, the authors utilized three characteristics for the delineation of Ohio subregions from a previous study by Lively and Almack. These characteristics were gross cash income per farm, rural plane of living index and rural population fertility ratio. Two distance characteristics, vertical and horizontal distance from an arbitrarily selected point of origin on the state map, were added in order to make the subregions contiguous areas.

The analysis involved the intercorrelation of the characteristics and the

---

<sup>7</sup> Margaret Jarman Hagood, Nadia Danilevsky and Corlin O. Beum, "An Examination of the Use of Factor Analysis in the Problem of Subregional Delineation," Rural Sociology, 6 (September, 1941), 216-233.

extraction of the first common factor by the Hotelling iterative method. Using the resulting first factor loadings as weights, index values were computed for each county. The counties were then grouped into quartiles with each quartile representing one of the four subregions of the state as defined by the study. The groupings, with the exception of seven counties, formed four contiguous areas.

Hagood, in 1943, applied the Hotelling technique to the construction of a 1940 rural-farm level of living index for counties of the United States.<sup>8</sup> A preliminary list of fourteen suggested components of level of living for which census data were available were analyzed for the counties of Iowa, North Carolina, the two states combined, and a 200 county sample of the United States. The criteria for the selection of items to be retained in the final index were as follows: (1) components selected for the final index should have fairly high weights on preliminary indexes constructed for each of the four areas listed above and (2) components selected should not be so highly intercorrelated that they practically duplicated each other. Five components which conformed to these criteria were selected for the final index. The weights assigned to these components were on the basis of their first factor loadings for the 200 county sample of the United States. The index values, to provide a norm for comparison, were then coded to give a value of 100 for the United States as a whole.

Hagood developed, in addition to the above index, a 1940 rural-nonfarm index using similar methods. This index, together with a system for combining the two indexes into a composite rural index, was presented in a later article.<sup>9</sup>

---

<sup>8</sup> Margaret Jarman Hagood, "Development of a 1940 Rural-Farm Level of Living Index for Counties," Rural Sociology, 8 (June, 1943), 171-180.

<sup>9</sup> Margaret Jarman Hagood, "Rural Level of Living Indexes," Rural Sociology, 8 (September, 1943), 202-293.

The composite index was derived by adding the product of the coded rural-farm index and the proportion of the rural population of a county which was rural-farm to the product of the coded rural-nonfarm index and the proportion of the rural population of the country which was rural-nonfarm.

Hagood, in 1947, presented a 1945 farm operator family level of living index for counties of the United States together with a comparable index for 1940.<sup>10</sup> Since the methodology employed in the selection and weighting of items for these indexes was the same as in Hagood's earlier studies, no detailed review will be presented.

A further use of the Hotelling technique is to be found in an article published by Abbott L. Ferriss in 1948, in which county level of living indexes were constructed for Mississippi and North Carolina.<sup>11</sup> This study involves a slightly different approach in that level of living was divided into components of self-sufficing resources, material possessions, and agricultural income. The Hotelling techniques was used to construct preliminary indexes of each of these components and then to combine the components into a general index of level of living. Such an approach results not only in a saving of time and labor required for computing intercorrelations but also in component indexes which may be of value to the researcher.

Attempts by Ferriss to validate the index were inconclusive. This, however, may be due to a lack of criteria by which to establish validity. When the index was correlated with Hagood's 1940 rural-farm level of living index, the coefficients were .76 for Mississippi and .60 for North Carolina.

---

<sup>10</sup> Margaret Jarman Hagood, "Construction of County Indexes for Measuring Change in Level of Living of Farm Operator Families, 1940-45," Rural Sociology, 12 (June, 1947), 139-150.

<sup>11</sup> Abbott L. Ferriss, "Rural-Farm Level of Living Indexes for Two Southeastern States," Social Forces, 26 (May, 1948), 420-430.

However, since the Hagood index was constructed for the United States as a whole, there is some question of its complete validity for any particular regional area. A second attempt at validation consisted of comparing sub-regions of the two states as indicated by the index with those delineated by ecological studies. While the relatively high agreement found indicated that the index might be valid, such evidence cannot be regarded as conclusive.

#### 4. Summary

The studies reviewed in this chapter fall into two categories when viewed from the standpoint of methodology. The indexes constructed by the internal consistency method include existing farm family socioeconomic status scales. Those constructed by factor analysis techniques include several county level of living indexes and one instance in which factorial methods were applied to revision of an urban social status scale. No instance was found, however, in which factor analysis had been applied to work with rural scales. Considering the success of the techniques in the construction of similar measuring devices, their application to the construction and validation of a scale for use with open-country families appears feasible.

## CHAPTER III PRELIMINARY ANALYSIS OF DATA

1. Introduction

Chapin has defined socioeconomic status as "... the position that an individual or family occupies with reference to the prevailing average standards of cultural possessions, effective income, material possessions and participation in the group activities of the community."<sup>1</sup> This definition, which is accepted for the present study, implies that socioeconomic status may be inferred from four components which may be regarded as representative of a single area or class of behavior.

The data for the study consist of schedule responses, by a sample of 660 families, to the twenty-nine items of the revised scale.<sup>2</sup> When these items are classified in categories representing the four components of socioeconomic status, six are found to fall under cultural possessions, sixteen under material possessions, and the remaining seven under social participation.<sup>3</sup> Since no items directly representative of the component of effective income are included, it must be assumed that this component is

---

<sup>1</sup> F. Stuart Chapin, Measurement of Social Status, Minneapolis: University of Minnesota Press, 1933, p. 3.

<sup>2</sup> It might be well to clarify, at this point, the terms to be used with reference to the two Sewell scales and to the Belcher revision of the original Sewell scale, since repeated references will be made to these scales throughout the remainder of the text of this study. "Original scale" will be used to refer to the original Sewell scale, "short scale" will be used to refer to the Sewell short scale, and "revised scale" will be used to refer to the Belcher revision of the original Sewell scale. Copies of the original, short, and revised scales appear in the appendix of this study.

<sup>3</sup> These classifications are those used by Sewell, The Construction and Standardization of a Scale for the Measurement of the Socio-Economic Status of Oklahoma Farm Families, Stillwater: Oklahoma Agricultural Experiment Station Technical Bulletin 9, 1940, pp. 62-68, in the construction of his original scale. The item concerning the use of a frozen food locker or the presence of a deep-freeze unit in the home was not included in the Sewell scale and has been classified under material possessions.

adequately represented by items in the remaining three categories.

A more adequate representation of the four components, especially that of effective income, is, of course, desirable. The present study, however, is limited in that it must make use of data collected for other purposes. The selection of items, then, is restricted to those for which information is available. This limitation assumes less importance when it is remembered that each of the items, in the process of being selected for inclusion in the revised scale, has been shown to be a valid indicator of socioeconomic status. The complete revised scale has also been shown to be a valid measure of this phenomenon.

The present analysis is concerned with the extraction, from the inter-correlations of the items available, of a statistical factor which can logically be defined as socioeconomic status. If such a factor is found, it is proposed to weight the items on the basis of their ability to represent this factor. Scores from the resulting scale will then be compared with scores from the revised scale to determine if the weighting systems produce significantly different results.

## 2. Correlation of Items

The basic data for factor analysis are provided by a matrix of inter-correlations of the items to be analyzed. Thus the first phase of the present analysis was to compute intercorrelations for the twenty-nine items of the revised scale. The first step in this procedure was to cross-tabulate all possible pairings of the items in two-by-two frequency tables for correlation.<sup>4</sup>

---

<sup>4</sup> To facilitate the correlation process and produce comparable coefficients, the multiple-response items were tabulated as dichotomous variables. The point of division of these items was identical with that used by Sewell, The Construction and Standardization of a Scale for the Measurement of the Socio-Economic Status of Oklahoma Farm Families, Appendix A, pp. 62-66, in the construction of his original scale.



A question arose at this point as to which of the available techniques for the estimation of correlation from such tables should be used. The assumptions underlying the use of each of the various techniques were studied, with the result that tetrachoric  $r$ , or  $r_t$ , was selected as the technique most nearly valid for use with the present data.<sup>5</sup>

The use of this technique assumes that the total frequency is large, that variables being correlated are continuously distributed, that they are normally distributed and that the relationship between them is linear. Under assumed conditions,  $r_t$  is numerically equivalent to the Pearson product-moment

---

<sup>5</sup> The rationale for the selection of  $r_t$  may be summed up in a brief discussion of the nature of the variables to be correlated, in connection with the assumptions required for the use of other techniques. It is assumed that the yes-no or possession-nonpossession response categories for the items represent arbitrary classifications rather than true dichotomies. It is hardly probable that all yes or all no responses to an item represent equal degrees of attainment with reference to that item. In other words, it is postulated that, if each of the variables were classified according to some independent index of quality, a continuous uni-modal distribution would result.

Since both fourfold  $r$  and Yule's  $Q$  are designed for the correlation of variables which are characterized by true dichotomies or point distributions, the use of either of these techniques in the present problem cannot be justified. Both biserial  $r$  and point biserial  $r$  are designed for situations in which one of the variables is dichotomized and the other continuously measurable. Point biserial  $r$  is further limited for use with the present data in that it is designed for use in cases where the dichotomized variable is characterized by a true dichotomy. While it is possible to modify these techniques for use with two dichotomized variables, such a procedure would be questionable.

The remaining techniques which are considered are tetrachoric  $r$  and the coefficient of contingency. Because of inaccuracy of the coefficient of contingency when used with small tables,  $r_t$  appeared to be the preferable technique. The degree to which the present data conform to assumptions required for the use of this technique is treated in the text of this chapter.

For detailed discussions of the above techniques, see J. P. Guilford, Fundamental Statistics in Psychology and Education, (second edition) New York: McGraw-Hill Book Company, Inc., 1950, pp. 328-345; Margaret Jarman Hagood, Statistics for Sociologists, New York: Henry Holt and Company, 1941, pp. 495-519; Truman Lee Kelly, Fundamentals of Statistics, Cambridge: Harvard University Press, 1947, pp. 379-388; Thomas Carson McCormick, Elementary Social Statistics, New York: McGraw-Hill Book Company, Inc., 1941, pp. 208-217; and Charles C. Peters and Walter R. Van Voorhis, Statistical Procedures and their Mathematical Bases, New York: McGraw-Hill Book Company, Inc., 1940, pp. 362-393.



coefficient and may be regarded as an approximation of it. Of course, reservations must be made in the interpretation of the coefficients, if the above assumptions cannot be justified.

An examination of the present data will reveal the extent to which it conforms to the above requirements. The requirement of a large total frequency is met. It has been pointed out (footnote 5) that a continuous uni-modal distribution may be rationalized from what is known of the data. It may be further rationalized that, for a relatively homogeneous farm population, such a distribution would approach normality. Although knowledge of the nature of the variables is insufficient to justify an assumption of linear relationships, this assumption may be disposed of with little risk.<sup>6</sup>

The computation of the tetrachoric coefficient by formula is a long and arduous process. Fortunately, however, a set of diagrams is available from which coefficients with two-place accuracy may be taken.<sup>7</sup> These diagrams were used in arriving at the coefficients for the present study.

A matrix of the intercorrelations of the variables is presented in Table 1. In view of the assumptions which have been made in regard to the data and because of the difficulty of computation, no standard errors for the coefficients have been presented.

### 3. Extraction of the First Common Factor

The second phase of the analysis was the extraction of the first common

---

<sup>6</sup> This assumption is implied in the use of any linear correlation technique. Because of the difficulty of computing curvilinear coefficients, linear techniques are often employed when data is known to be characterized by curvilinear relationships. See McCormick, Op. cit., p. 214.

<sup>7</sup> L. Chesire, M. Saffir and L. L. Thurstone, Computing Diagrams for the Tetrachoric Correlation Coefficient, Chicago: The University of Chicago Press, 1933.

Table 1 Intercorrelations of the Twenty-nine Items of the Revised Scale

Item No.*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1.		.53	.67	.67	.61	.33	.32	.60	.64	.65	.64	.73	.63	.46	.50	.50	.55	.65	.36	.43	.44	.47	.32	.27	.30	.62	.34	.34	.32
2.	.53		.63	.64	.73	.59	.50	.34	.41	.64	.43	.43	.44	.37	.27	.39	.45	.36	.29	.24	.16	.13	.14	.21	.14	.39	.13	.03	.07
3.	.67	.63		.99	.75	.64	.63	.53	.46	.61	.55	.64	.59	.35	.43	.37	.47	.50	.33	.30	.34	.37	.35	.32	.33	.45	.35	.31	.35
4.	.67	.64	.99		.70	.63	.60	.55	.46	.61	.57	.60	.59	.33	.34	.37	.46	.53	.33	.33	.33	.36	.23	.34	.30	.47	.33	.23	.32
5.	.61	.73	.75	.70		.66	.66	.50	.50	.94	.55	.67	.67	.52	.55	.54	.51	.50	.43	.42	.35	.33	.23	.29	.22	.53	.22	.23	.20
6.	.33	.59	.64	.63	.66		.90	.64	.64	.73	.73	.72	.73	.54	.55	.60	.50	.60	.34	.37	.33	.51	.23	.23	.24	.63	.32	.26	.23
7.	.32	.50	.63	.60	.66	.90		.63	.77	.69	.61	.71	.72	.67	.62	.59	.60	.53	.42	.51	.43	.43	.25	.27	.22	.62	.20	.22	.17
8.	.60	.34	.53	.55	.50	.64	.63		.63	.60	.55	.60	.67	.56	.57	.49	.53	.51	.26	.33	.47	.37	.25	.24	.20	.50	.23	.23	.19
9.	.64	.41	.46	.46	.50	.64	.77	.63		.54	.47	.63	.59	.63	.46	.43	.50	.49	.26	.40	.42	.43	.21	.15	.20	.54	.19	.15	.13
10.	.65	.64	.61	.61	.94	.73	.69	.60	.54		.65	.64	.65	.55	.61	.60	.55	.56	.42	.40	.42	.36	.29	.37	.30	.61	.30	.26	.25
11.	.64	.43	.55	.57	.55	.73	.61	.55	.47	.65		.30	.73	.31	.53	.51	.55	.61	.43	.44	.43	.42	.45	.24	.42	.90	.29	.44	.41
12.	.73	.43	.64	.60	.67	.72	.71	.60	.63	.64	.30		.96	.65	.64	.32	.57	.61	.42	.52	.45	.55	.30	.22	.20	.63	.27	.27	.22
13.	.63	.44	.59	.59	.67	.73	.72	.67	.59	.65	.73	.96		.57	.63	.66	.55	.62	.46	.52	.53	.54	.23	.27	.20	.63	.27	.23	.23
14.	.46	.37	.35	.33	.52	.54	.67	.56	.63	.55	.31	.65	.57		.47	.60	.50	.37	.33	.34	.33	.37	.14	.13	.14	.40	.22	.14	.12
15.	.50	.27	.43	.34	.55	.55	.62	.57	.46	.61	.53	.64	.63	.47		.55	.64	.43	.36	.45	.41	.43	.26	.30	.24	.51	.24	.24	.22
16.	.50	.39	.37	.37	.54	.60	.59	.49	.43	.60	.51	.32	.66	.60	.55		.69	.57	.42	.37	.43	.47	.33	.37	.30	.60	.30	.33	.35
17.	.55	.45	.47	.46	.51	.50	.60	.53	.50	.55	.55	.57	.55	.50	.64	.69		.33	.40	.54	.43	.56	.27	.33	.15	.56	.23	.31	.21
18.	.65	.36	.50	.53	.50	.60	.53	.51	.49	.56	.61	.61	.62	.37	.43	.57	.33		.43	.45	.37	.47	.39	.41	.34	.54	.37	.30	.24
19.	.36	.29	.33	.33	.43	.34	.42	.26	.26	.42	.43	.42	.46	.33	.36	.42	.40	.43		.43	.43	.34	.13	.27	.19	.50	.25	.20	.22
20.	.43	.24	.30	.33	.42	.37	.51	.33	.40	.40	.44	.52	.52	.34	.45	.37	.54	.45	.43		.45	.41	.24	.25	.21	.43	.23	.24	.25
21.	.44	.16	.34	.33	.35	.33	.43	.47	.42	.42	.43	.45	.53	.33	.41	.43	.43	.37	.43	.45		.46	.23	.16	.25	.45	.23	.30	.29
22.	.47	.13	.37	.36	.33	.51	.43	.37	.43	.36	.42	.55	.54	.37	.43	.47	.56	.47	.34	.41	.46		.22	.27	.22	.46	.25	.16	.18
23.	.32	.14	.35	.23	.23	.23	.25	.25	.21	.29	.45	.30	.23	.14	.26	.33	.27	.39	.13	.24	.23	.22		.75	.97	.23	.64	.93	.36
24.	.27	.21	.32	.34	.29	.23	.27	.24	.15	.37	.24	.22	.27	.13	.30	.37	.33	.41	.27	.25	.16	.27	.75		.73	.30	.33	.63	.59
25.	.30	.14	.33	.30	.22	.24	.22	.20	.20	.30	.42	.20	.20	.14	.24	.30	.15	.34	.19	.21	.25	.22	.97	.73		.25	.69	.95	.93
26.	.62	.39	.45	.47	.53	.63	.62	.50	.54	.61	.90	.63	.63	.40	.51	.60	.56	.54	.50	.43	.45	.46	.23	.30	.25		.27	.25	.25
27.	.34	.13	.35	.33	.22	.32	.20	.23	.19	.30	.29	.27	.27	.22	.24	.30	.23	.37	.25	.23	.23	.25	.64	.33	.69	.27		.74	.73
28.	.34	.03	.31	.23	.23	.26	.22	.23	.15	.26	.44	.27	.23	.14	.24	.33	.31	.30	.20	.24	.30	.16	.93	.63	.95	.25	.74		.97
29.	.32	.07	.35	.32	.20	.23	.17	.19	.13	.25	.41	.22	.23	.12	.22	.35	.21	.24	.22	.25	.29	.13	.36	.59	.93	.25	.73	.97	

\* Descriptions of items corresponding to these numbers are as follows:

- |                                  |   |  |
|----------------------------------|---|--|
| 1. Construction of house         | 11. Lighting facilities                 | 21. Approximate number of books in home    |
| 2. Room-person ratio             | 12. Water piped into house              | 22. Husband's life insured                 |
| 3. Separate dining room          | 13. Kitchen sink                        | 23. Husband attends church                 |
| 4. Separate kitchen              | 14. Linoleum on kitchen floor           | 24. Husband a church member                |
| 5. Separate living room          | 15. Power washer                        | 25. Husband attends Sunday School          |
| 6. Living room floors finished   | 16. Refrigerator                        | 26. Husband a member of a farm cooperative |
| 7. Living room woodwork finished | 17. Deep-freeze unit or town locker     | 27. Wife a church member                   |
| 8. Living room wall construction | 18. Furniture insured                   | 28. Wife attends church                    |
| 9. Living room walls decorated   | 19. Family takes daily newspaper        | 29. Wife attends Sunday School             |
| 10. Living room lounge           | 20. Number of magazines taken regularly |  |

factor from the matrix of intercorrelations. Since it is anticipated that only the first factor will be needed to explain the intercorrelations of the items, and since it can be shown that all major factorial techniques yield very similar values for first factor loadings, the choice of a particular technique of factor analysis does not appear to be a critical point in the study. The Hotelling component analysis technique was selected because a rather clear-cut rationale has been developed for its use as a weighting device for similar indexes.<sup>8</sup> Also, a simple exposition of the computational procedure for this technique is available.<sup>9</sup>

The computation procedure may be explained rather briefly. The largest entry in each column of the intercorrelation matrix is placed in the corresponding blank diagonal cell. The columns are then summed and the resulting column sums divided by the largest column sum to obtain preliminary weights. These weights are multiplied by the entries in corresponding rows of the matrix to form a new matrix. Another set of preliminary weights are computed from the second matrix by the same procedure as described above. These weights are, in turn, multiplied by entries in the corresponding rows of the original matrix to form a third matrix. This process is repeated until weights are obtained which do not change with successive "iterations." Factor loadings are obtained from these weights by dividing the largest column sum in the final

---

<sup>8</sup> A number of studies employing this technique have been cited in the review of literature. In addition, S. S. Wilks, "Weighting Systems for Linear Functions of Correlated Variables When There is No Independent Variable," Psychometrika, 3 (March, 1933), 23-43; and Robert J. Wherry, "An Approximation Method for Obtaining a Maximized Multiple Criterion," Psychometrika, 5 (June, 1940), 109-115, in technical treatments of weighting devices, have recommended it as the most accurate of the various techniques.

<sup>9</sup> Margaret Jarman Hagood, Nadia Danilevsky and Corlin O. Beum, "An Examination of the Use of Factor Analysis in the Problem of Subregional Delineation," Rural Sociology, 6 (September, 1941), 216-233.

matrix by the sum of the squared weights. The square root of the quotient is the factor loading of the item with the largest column sum. This factor loading is multiplied by the remaining column weights to obtain factor loadings of the remaining variables.

The first factor loadings as computed by this technique are presented in Table 2. These loadings indicate that the items are all positively associated with the first common factor. The next step was to determine if this were the only important factor accounting for the intercorrelations of the items. If only one major factor is indicated, it may be assumed that this is, essentially, the factor of socioeconomic status. If a single factor is found to be inadequate in explaining the intercorrelations, further examination of the single-factor hypothesis is demanded.

The amount of correlation between any two items accounted for by a common factor is indicated by the product of the loadings of the items for that factor. It is possible, therefore, to determine the extent to which the first factor explains the correlations between any two items. The expected correlations were computed for all possible pairings of items. These values were subtracted for the correlations in the original matrix. The absolute values of the resulting residuals are presented in Table 3. It may be seen from this table that the first common factor provides a rather good approximation of the actual correlations of the variables. The chief exception to this is found among the social participation items dealing with church and Sunday school. The large residuals found among these items indicate an additional factor or factors as dominant in accounting for their intercorrelations. In interpreting this finding, it must be remembered that participation in any one aspect of a religious organization usually brings about considerable pressure for participation in the remaining activities of the

TABLE 2

LOADINGS OF THE TWENTY-NINE ITEMS OF THE REVISED SCALE  
ON THE FIRST COMMON FACTOR

Item Description	Factor Loading
1. Construction of house	.821
2. Room : person ratio	.580
3. Separate dining room	.756
4. Separate kitchen	.742
5. Separate living room	.785
6. Living room floors finished	.837
7. Living room woodwork finished	.840
8. Living room wall construction	.711
9. Living room walls decorated	.694
10. Living room lounge	.819
11. Lighting facilities	.803
12. Water piped into house	.868
13. Kitchen sink	.849
14. Linoleum on kitchen floor	.622
15. Power washer	.688
16. Refrigerator	.742
17. Deep-freeze unit or town locker	.707
18. Furniture insured	.708
19. Family takes daily newspaper	.522
20. Number of magazines taken regularly	.569
21. Approximate number of books in home	.558
22. Husband's life insured	.579
23. Husband attends church	.521
24. Husband a church member	.497
25. Husband attends Sunday school	.491
26. Husband a member of a farm cooperative	.754
27. Wife a church member	.493
28. Wife attends church	.504
29. Wife attends Sunday school	.479

Table 3 Absolute Values of Residuals of Observed Intercorrelations After the Intercorrelation Accounted for by the First Common Factor had been Subtracted

Item No.*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1.		.054	.049	.061	.034	.143	.130	.016	.070	.022	.019	.017	.017	.051	.065	.109	.030	.069	.069	.037	.018	.005	.108	.138	.103	.001	.065	.074	.073
2.	.054		.192	.210	.275	.105	.013	.072	.007	.165	.036	.023	.052	.009	.129	.040	.040	.051	.013	.090	.164	.206	.162	.078	.145	.047	.106	.212	.208
3.	.049	.192		.429	.157	.007	.005	.008	.065	.009	.057	.016	.052	.120	.090	.191	.064	.035	.065	.130	.082	.068	.044	.056	.041	.120	.023	.071	.012
4.	.061	.210	.429		.118	.027	.023	.022	.055	.002	.026	.044	.040	.132	.170	.181	.065	.005	.057	.092	.084	.070	.107	.029	.064	.089	.036	.094	.035
5.	.024	.275	.157	.118		.003	.001	.058	.045	.297	.080	.011	.004	.032	.010	.042	.045	.056	.020	.027	.088	.075	.179	.100	.165	.062	.167	.166	.176
6.	.143	.105	.007	.027	.003		.197	.045	.059	.044	.058	.007	.019	.019	.026	.020	.092	.007	.097	.106	.087	.025	.206	.136	.171	.001	.093	.162	.171
7.	.130	.013	.005	.023	.001	.197		.083	.187	.002	.065	.019	.007	.148	.042	.033	.006	.065	.018	.032	.039	.006	.188	.147	.192	.013	.214	.203	.232
8.	.016	.072	.008	.022	.058	.045	.083		.137	.018	.021	.017	.066	.118	.081	.038	.077	.007	.111	.025	.073	.042	.120	.113	.149	.036	.121	.128	.151
9.	.070	.007	.065	.055	.045	.059	.187	.137		.028	.087	.028	.001	.248	.017	.035	.009	.001	.102	.005	.033	.028	.152	.195	.141	.017	.152	.200	.152
10.	.022	.165	.009	.002	.297	.044	.002	.018	.028		.008	.071	.045	.041	.047	.008	.029	.020	.008	.066	.057	.114	.137	.037	.102	.008	.104	.153	.142
11.	.019	.036	.057	.026	.080	.058	.065	.021	.087	.008		.103	.048	.189	.022	.086	.018	.041	.011	.017	.018	.045	.032	.159	.026	.295	.106	.085	.025
12.	.017	.023	.016	.044	.011	.007	.019	.017	.028	.071	.103		.223	.110	.043	.176	.044	.005	.033	.026	.024	.047	.152	.211	.226	.006	.158	.167	.196
13.	.017	.052	.052	.040	.004	.019	.007	.066	.001	.045	.048	.223		.042	.096	.030	.050	.019	.017	.037	.056	.048	.162	.152	.217	.010	.149	.198	.177
14.	.051	.009	.120	.132	.032	.019	.148	.118	.208	.041	.189	.110	.042		.042	.138	.060	.070	.060	.014	.017	.010	.184	.179	.165	.069	.087	.173	.178
15.	.065	.129	.090	.170	.010	.026	.042	.081	.017	.047	.022	.043	.096	.042		.040	.154	.007	.001	.059	.026	.082	.098	.042	.098	.009	.099	.107	.110
16.	.109	.040	.191	.181	.042	.020	.033	.038	.035	.008	.086	.176	.030	.138	.040		.165	.045	.033	.052	.016	.040	.057	.001	.064	.041	.066	.006	.005
17.	.030	.040	.064	.065	.045	.092	.006	.077	.009	.029	.018	.044	.050	.060	.154	.165		.121	.031	.138	.085	.151	.098	.021	.197	.027	.119	.046	.129
18.	.069	.051	.035	.005	.056	.007	.065	.007	.001	.020	.041	.005	.019	.070	.007	.045	.121		.060	.047	.025	.060	.021	.058	.008	.006	.021	.057	.099
19.	.069	.013	.065	.057	.020	.097	.018	.111	.102	.008	.011	.033	.017	.060	.001	.033	.031	.060		.183	.139	.038	.092	.011	.066	.106	.007	.063	.030
20.	.037	.090	.130	.092	.027	.106	.032	.025	.005	.066	.017	.026	.037	.014	.059	.052	.138	.047	.183		.132	.081	.056	.033	.069	.001	.001	.047	.023
21.	.018	.164	.082	.084	.088	.087	.039	.073	.033	.037	.018	.034	.056	.017	.026	.016	.085	.025	.139	.132		.137	.011	.117	.024	.029	.045	.019	.023
22.	.005	.206	.068	.070	.075	.025	.006	.042	.028	.114	.045	.047	.048	.010	.082	.040	.151	.060	.038	.081	.137		.082	.018	.064	.023	.035	.132	.097
23.	.108	.162	.044	.107	.179	.206	.188	.120	.152	.137	.032	.152	.162	.184	.098	.057	.098	.021	.092	.056	.011	.082		.491	.714	.113	.383	.717	.610
24.	.138	.078	.056	.029	.100	.136	.147	.113	.195	.037	.159	.211	.152	.179	.042	.001	.021	.058	.011	.033	.117	.018	.491		.486	.075	.635	.380	.352
25.	.103	.145	.041	.064	.165	.171	.192	.149	.141	.102	.026	.226	.217	.165	.098	.064	.197	.008	.066	.069	.024	.064	.714	.486		.120	.448	.703	.745
26.	.001	.047	.120	.088	.062	.001	.013	.036	.017	.008	.295	.026	.010	.069	.009	.041	.027	.006	.106	.001	.029	.023	.113	.075	.120		.102	.130	.111
27.	.065	.106	.023	.036	.167	.093	.214	.121	.152	.104	.106	.158	.149	.087	.099	.066	.119	.021	.007	.001	.045	.035	.383	.635	.448	.102		.492	.494
28.	.074	.212	.071	.094	.166	.162	.203	.128	.200	.153	.035	.167	.198	.173	.107	.006	.046	.057	.063	.047	.019	.132	.717	.380	.703	.130	.492		.729
29.	.073	.208	.012	.035	.176	.171	.232	.151	.152	.142	.025	.196	.177	.178	.110	.005	.129	.099	.030	.023	.023	.097	.610	.352	.745	.111	.494		.729

\* See footnote to Table 1 for descriptions of items corresponding to these numbers.

organization. The explanation offered, then, is not that a multi-factor theory of socioeconomic status is indicated but that the items represent a religious aspect of social participation. Status is not the dominant factor in explaining intercorrelations of these items. Some support for this hypothesis is given by the remaining social participation item, "Husband a member of a farm cooperative," which is adequately reflected by the common factor. The high residuals of the religious items are regarded as due to a spurious or extraneous factor which does not represent a separate aspect of socioeconomic status.

In addition to the above instance, several large residuals are found which affected isolated pairs of items. These, for the most part, may be explained in much the same manner as the residuals found among the social participation items. One example is found in the case of the items "Separate dining room" and "Separate kitchen." This residual is explained by the fact that, when not separate, the functions associated with these rooms are usually served by the same room. In a like manner, the residual between "Lighting facilities" and "Husband a member of a farm cooperative" is easily explained by the fact that families received credit for cooperative membership if the family head participated in the Rural Electrification Administration--the only source of electricity for many open-country families.

#### 4. The First Common Factor as a Definition of Socioeconomic Status

An analysis has been made of a group of twenty-nine items which have been demonstrated previously by internal consistency techniques to be valid indicators of socioeconomic status. It may be postulated that, if socioeconomic status is a single factor, the factor accounting for the major share of the intercorrelations of such a group of items is socioeconomic status. Such a



factor has been extracted in the preceding analysis. This factor, then, is considered to be, essentially, socioeconomic status.

The assumption of internal consistency scales that socioeconomic status is a single factor is supported by this analysis. The present evidence cannot be regarded as conclusive because of inadequate representation of the four components which, according to the accepted definition, comprise socioeconomic status. It is, however, supported by the results of other studies.<sup>9</sup>

##### 5. Comparison of Weighting Systems

The twenty-nine items of the revised scale have been analyzed and a factor extracted from their intercorrelations which is considered to be socioeconomic status. It is proposed to weight the items on the basis of their ability to represent this factor, as indicated by their factor loadings. Scores from the resulting scale will then be compared with scores from the revised scale to determine if the common-factor and the sigma weighting technique produce significantly different results. The common-factor technique is expressed algebraically by the following equation:<sup>10</sup>

$$S = a_1z_1 + a_2z_2 + a_3z_3 - \dots \dots \dots a_iz_i + \dots \dots \dots a_nz_n \quad (1)$$

Where:

S is equal to the total socioeconomic status score of a family,

$a_i$  is equal to the loading of item  $i$  for the common factor, and

$z_i$  is equal to the standard score of item  $i$ .

---

<sup>9</sup> In a factor analysis of indexes of the four components of socioeconomic status, Sewell, The Construction and Standardization of a Scale for the Measurement of the Socio-Economic Status of Oklahoma Farm Families, Appendix F, p. 84, found that a single factor was adequate to explain the intercorrelations of the indexes. Louis Guttman, "A Revision of Chapin's Social Status Scale," American Sociological Review, 7 (June, 1942), 363-369, also found a single factor from a battery of social variables associated with status.

<sup>10</sup> Hagood, Danilevsky and Baum, op. cit., 6, 222.



When the factor loadings from Table 2 are substituted into equation (1), the following equation results:

$$\begin{aligned}
 S = & .821 z_1 + .580 z_2 + .756 z_3 + .742 z_4 + .785 z_5 + .837 z_6 + .840 z_7 + \\
 & .711 z_8 + .694 z_9 + .819 z_{10} + .803 z_{11} + .868 z_{12} + .849 z_{13} + \\
 & .622 z_{14} + .688 z_{15} + .742 z_{16} + .707 z_{17} + .708 z_{18} + .522 z_{19} + \\
 & .569 z_{20} + .558 z_{21} + .579 z_{22} + .521 z_{23} + .497 z_{24} + .491 z_{25} + \\
 & .754 z_{26} + .493 z_{27} + .504 z_{28} + .479 z_{29} \quad (2)
 \end{aligned}$$

Having arrived at equation (2) expressing the relationship of each of the items to the common factor, the next step was to devise weights which could be used independently of this equation. Since each of the items is represented by only two response categories, the standard score for any item can assume only two values. Following the formula,  $\frac{X_i - m_i}{s_i}$ , standard scores were computed for each item with arbitrary values of  $\frac{1}{2}$  one for possession and zero for non-possession being substituted for the X-values in the equation. Preliminary weights were obtained by multiplying the standard scores by the factor loadings shown in equation (2). To increase the magnitude of the preliminary weights and make them all positive in sign, a constant of two was added to each and the resulting sum multiplied by the same constant. The resulting values when rounded to the nearest whole number gave the final item weights for possession and non-possession. The computation of these weights is illustrated in Table 4.

Scores on the above scale were computed for each of the 660 families of the construction sample. A coefficient of .99 was obtained when these scores were correlated with the scores for the same families on the revised scale. This extremely high correlation suggests that refinements in item weighting for scales with relatively large numbers of items might contribute

TABLE 4

## COMPUTATION OF ITEM WEIGHTS

Item No.	Loading	z-value (Poss.)	z-value (Non-Poss.)	Preliminary Wt. (Poss.)	Preliminary Wt. (Non-Poss.)	Final Wt. (Poss.)	Final Wt. (Non-Poss.)
1.	.821	0.7845	-1.2746	0.644	-1.046	5	2
2.	.580	0.6703	-1.4919	0.389	-0.865	5	2
3.	.756	1.4678	-0.6813	1.110	-0.515	6	3
4.	.742	1.4781	-0.6765	1.097	-0.502	6	3
5.	.785	0.7225	-1.3840	0.567	-1.086	5	2
6.	.837	1.0726	-0.9323	0.898	-0.780	6	2
7.	.840	0.6547	-1.5275	0.550	-1.283	5	1
8.	.711	0.7895	-1.2666	0.561	-0.901	5	2
9.	.694	0.4764	-2.0989	0.331	-1.457	5	1
10.	.819	0.7779	-1.2855	0.637	-1.053	5	2
11.	.803	0.6765	-1.4781	0.543	-1.187	5	2
12.	.868	1.8559	-0.5388	1.611	-0.468	7	3
13.	.849	1.4678	-0.6813	1.246	-0.578	6	3
14.	.622	0.5650	-1.7698	0.351	-1.101	5	2
15.	.688	0.7895	-1.2666	0.543	-0.871	5	2
16.	.742	0.5078	-1.9693	0.377	-1.461	5	1
17.	.707	1.7367	-0.5758	1.228	-0.407	6	3
18.	.708	1.4249	-0.7018	1.009	-0.497	6	3
19.	.522	0.9119	-1.0966	0.476	-0.572	5	3
20.	.569	0.8954	-1.1168	0.510	-0.636	5	3
21.	.558	0.7354	-1.3598	0.410	-0.759	5	2
22.	.579	1.3748	-0.7274	0.796	-0.421	6	3
23.	.521	1.1373	-0.8792	0.593	-0.458	5	3
24.	.497	1.055	-0.9474	0.525	-0.471	5	3
25.	.491	1.3568	-0.7370	0.666	-0.362	5	3
26.	.754	1.0471	-0.9550	0.790	-0.720	6	3
27.	.493	0.7763	-1.2882	0.383	-0.635	5	3
28.	.504	0.9550	-1.0471	0.481	-0.528	5	3
29.	.479	1.1513	-0.8685	0.552	-0.416	5	3

little or nothing to the final measurement.<sup>11</sup> To further investigate this hypothesis, the twenty-nine items were assigned arbitrary weights of one for possession and zero for non-possession and the 660 families rated on the basis of the resulting scale. Scores from this scale were then correlated first with scores from the common factor scale and second with scores from the revised scale. The coefficients in each case were .99.

---

<sup>11</sup> The results of previous studies support this hypothesis. Alice M. Leahy, The Measurement of Urban Home Environment, Minneapolis: University of Minnesota Press, 1936, pp. 41-49, found that intercorrelation coefficients among sets of scores produced by the sigma technique, simple scoring and the difference method were all .98 or above. Sewell, The Construction and Standardization of a Scale for the Measurement of the Socio-Economic Status of Oklahoma Farm Families, footnote 23, p. 43, repeated this experiment in the construction of his scale and obtained very similar results. Similar results were also obtained by Howard R. Cottam, Methods of Measuring Level of Living, Social Participation and Adjustment of Ohio Farm People, Columbus: Ohio Agricultural Experiment Station Bulletin 139 (Mimeographed), 1941, p. 10, in the correlation of scores produced by the sigma technique and those produced by a technique which assigned weights on the basis of critical ratios of the differences between different groupings of the items.

## CHAPTER IV CONSTRUCTION AND STANDARDIZATION OF A SHORT SCALE

1. Selection of Items

The analysis in the preceding chapter resulted in the extraction of a common factor which is considered to be, essentially, socioeconomic status. A set of item weights was computed, based on the ability of items to represent the common factor. The problem of constructing a short scale, then, is reduced to one of selecting a small number of items which can adequately measure this factor.

The first criterion of selection was the factor loadings which indicate the association of items with the factor, and, thereby, their ability to represent the factor. Seventeen items having the highest factor loadings were selected for preliminary consideration from the original group of twenty-nine. An examination of the matrix of intercorrelations revealed that certain items among the seventeen were duplicating measures. An example of this is found in the case of the items "Separate dining room" and "Separate kitchen." A coefficient of .99 between these two items and their very similar correlations with other items in the group indicated them to be, for all practical purposes, duplicating each other. "Separate dining room" was found to have a slightly higher factor loading and was retained in the scale to represent the pair of items. Similar instances were found in the case of "Living room floors finished" and "Living room woodwork finished" and in the case of "Kitchen sink" and "Running water." "Living room floors finished" and "Running water" were retained in the scale.

The above eliminations reduced the preliminary group of seventeen items to fourteen. These fourteen items with their corresponding weights, computed in the preceding chapter, are presented in Table 5. Further analysis will reveal whether these items provide a valid and reliable measure of socioeconomic status.

TABLE 5

## PRELIMINARY SHORT SCALE

---



---

1.	Construction of house: Brick, stucco, etc., or painted frame . . .	5	
	Unpainted frame or other . . . . .	2	
2.	Separate dining room?	Yes . . 6	No . . 3
3.	Separate living room?	Yes . . 5	No . . 2
4.	Living room floors finished?	Yes . . 6	No . . 2
5.	Living room wall construction: Plaster or wallboard . . . . .	5	
	Ceiling, building paper or none . . . . .	2	
6.	Living room walls decorated?	Yes . . 5	No . . 1
7.	Living room lounge: Divan, davenport, studio couch, daybed or couch . . . . .	5	
	Bed, cot or none . . . . .	2	
8.	Lighting facilities: Electric, gas, mantle or pressure . . . . .	5	
	Oil lamps, other or none . . . . .	2	
9.	Water piped into house?	Yes . . 7	No . . 3
10.	Power washer?	Yes . . 5	No . . 2
11.	Refrigerator: Mechanical or ice . . . . .	5	
	None . . . . .	1	
12.	Furniture insured?	Yes . . 6	No . . 3
13.	Deep freeze or town locker?	Yes . . 6	No . . 3
14.	Husband member of a farm cooperative?	Yes . . 6	No . . 2

---

## 2. Distribution of the Items of the Scale

An examination of the distribution of the items in the scale with reference to their classification in categories corresponding to the four components of socioeconomic status reveals that the scale is heavily weighted with material possessions. Of the fourteen items in the scale, eleven are classified as material possessions, two as cultural possessions and the remaining one under social participation. Belcher, in his revision of the original Sewell scale, found that material possessions were the most stable of the items in the scale.<sup>1</sup> Of the fifteen material possession items in the original scale, none has been invalidated by cultural change, as compared to seven of thirteen cultural possession items and one of eight social participation items. The preponderance of the more stable material possessions in the present scale might be an advantage if the scale is found to provide valid and reliable measure of socioeconomic status.

## 3. Range of the Scale

An important characteristic of a scale is its ability to differentiate among status levels in the extreme high and low areas of the total range of status levels. Nine percent of the families in the 660 family construction sample were found to be rated either maximum or minimum on the present scale as compared to only one percent for the Sewell short scale. This difference is highly significant and indicates the Sewell scale to be superior to the present one in that respect.

---

<sup>1</sup> John C. Belcher, Evaluation and Restandardization of Sewell's Socio-Economic Scale, Unpublished study, Oklahoma Agricultural and Mechanical College, Department of Sociology and Rural Life, 1950, pp. 5-7.

#### 4. Standardization of the Scale

The standardization of a scale is accomplished through the demonstration of its validity and reliability as a measure of a given trait or characteristic within a particular population. It is desired to standardize the present scale as a measure of the socioeconomic status for the open-country families of Oklahoma.

(1) Validity. Validity is the ability of a scale to measure that which it purports to measure. The most common criteria of a scale's validity are high correlations between its scores for a group of families and scores for the same families by other scales whose validity has been established. A group of tests utilizing this technique are presented below.

The first test of the scale's validity consisted of correlating its scores with scores on the original Sewell scale for the 660 families in the construction sample. This correlation yielded a coefficient of .93. Similar tests based on the same sample yielded a coefficient of .94 between its scores and scores on the revised scale and a coefficient of .96 between its scores and scores on the common-factor scale presented in the preceding chapter. Tests using the Sewell short scale as the validating criterion yielded coefficients of .87 for the construction sample and .80 for a sample of 205 open-country families in Lincoln County, Oklahoma.<sup>2</sup>

The results of the above tests indicate the scale to be a valid measure of the socioeconomic status of open-country families in Oklahoma. The limitations of such a validation technique become obvious, however, when it is

---

<sup>2</sup> The 205 schedules used in this study are from the unbroken white families interviewed in an open-country sample survey of Lincoln County. This survey was conducted under the supervision of John C. Belcher and Robert A. Rohwer of the Department of Sociology and Rural Life of Oklahoma A. & M. College during the summer of 1950.

remembered that the present scale is derived from the original Sewell scale which, together with other scales derived from it, is used as the validating criterion. The validity of the present scale, then, is established only so long as the validity of the original scale is unquestioned.

A second limitation of such a validation technique is that it furnishes no basis for comparison of the validity of various scales. In other words, a coefficient of .87 between scores from the present scale and scores from the Sewell short scale indicates a high degree of association but it does not indicate which of the scales provides the more valid measure of socioeconomic status. There is a need, then, for an independent criterion of socioeconomic status by which to gauge the relative validity of the various scales.

The first step in establishing this criterion was to select a battery of variables which adequately represent the four components of socioeconomic status as defined by Chapin. If socioeconomic status is assumed to be a single factor, and if a single factor is found which adequately accounts for the intercorrelations of the items in such a battery, then this factor can be assumed to provide a sufficiently close approximation to the status factor to serve as a criterion for validation.

Three scales for which comparative statistics were desired, the Sewell short scale, the present short scale and the common-factor scale developed in the preceding chapter,<sup>3</sup> were selected as the first three of the defining variables. In addition, one variable representing each of the four components

---

<sup>3</sup> When scores from this scale were correlated with scores from the original and revised scales for the 660 families of the construction sample, the respective coefficients were .98 and .99. These extremely high coefficients indicate that all three scales provide very similar measures. The validity of the original and revised scales, then, can be inferred from the validity of the common-factor scale which is directly tested.



was selected for the analysis. These variables were average school grade completed by husband and wife, interviewer's estimate of value of dwelling, social participation index score,<sup>4</sup> and gross income per annum unit.<sup>5</sup> These variables represent the components of cultural possessions, material possessions, social participation and effective income in that order.

Intercorrelations of these items were computed for the 660 families of the construction sample and the first common factor was extracted by the Hotelling procedure. It was found that the first common factor provided a relatively good approximation of the intercorrelations of the above variables.<sup>6</sup> The loadings of the three scales for this factor were .948 for the Sewell short scale, .922 for the present short scale and .952 for the common-factor scale. Loadings for other variables were .572 for education, .628 for value of dwelling, .618 for social participation and .590 for income per annum unit. The loadings of the scales for the common factor indicate that all three scales provide relatively valid measures of socioeconomic status as defined by the selected variables.

(2) Reliability. Reliability is the consistency with which a scale measures a characteristic. The second step in the standardization of the scale was the testing of its reliability as a measure of socioeconomic status. Several techniques are used in the testing of a scale's reliability, the most

---

<sup>4</sup> This is an index of formal social participation which assigns arbitrary scores of one for membership in an organization, two for attendance of one-fourth or more of regularly scheduled meetings, three for committee membership and four for holding office in the organization. An additional three points are given for service on a jury, school board or agricultural committee. Five points are given for service as a neighborhood group leader. The score used is the average score for both husband and wife.

<sup>5</sup> The figure used includes food and fuel furnished by farm and imputed rent value when home was owned or furnished with a rented farm.

<sup>6</sup> See Tables 6 and 7.

common of which are the simultaneous scoring, the test-retest and the split-half techniques. Because of the inability of the writer to perform the field work necessary for the simultaneous scoring and test-retest techniques, only the split-half technique is used in the present study. Briefly, the split-half technique consists of dividing the items of a scale into two separate parts, each consisting of alternate items from the original scale, and correlating the scores from the resulting scales.

The correlation of the split-half scores for the 660 families in the construction sample yielded a coefficient of .80. A similar correlation for the 205 family Lincoln County sample yielded a coefficient of .72. When corrected for attenuation by the Spearman-Brown formula,<sup>7</sup> these coefficients became .89 and .84 respectively. These coefficients are well above the minimum of .80 usually required for coefficients obtained by this technique and compare favorably with those obtained by Sewell for his short scale.<sup>8</sup> These data, then, indicate the scale to be a reliable measure of the socioeconomic status of families within the populations represented by the samples. For this evidence to be regarded as conclusive, however, it should be supported by the results of other tests of the scale's reliability.

##### 5. Conclusions Regarding Validity and Reliability

The preceding data indicate the scale to be a valid and reliable measure of the socioeconomic status of open-country families in Oklahoma. It cannot

---

<sup>7</sup> This formula may be found in H. Sorenson, Statistics for Students of Psychology and Education, New York: McGraw-Hill Book Co., Inc., 1936, p. 342.

<sup>8</sup> The corrected coefficients obtained by Sewell for his short scale were .81 for the Oklahoma sample, .81 for the Louisiana sample and .87 for the Kansas sample. See William H. Sewell, "A Short Form of the Farm Family Socioeconomic Status Scale," Rural Sociology, 8 (June, 1943), 161-169.

TABLE 6

## INTERCORRELATION COEFFICIENTS OF THE SEVEN DEFINING VARIABLES

Variable Number*	<u>Coefficients</u>						
	1.	2.	3.	4.	5.	6.	7.
1.		.871	.908	.611	.600	.565	.496
2.	.871		.959	.423	.605	.407	.493
3.	.908	.959		.449	.602	.541	.484
4.	.611	.423	.449		.326	.333	.328
5.	.600	.605	.602	.326		.313	.199
6.	.565	.407	.541	.333	.313		.602
7.	.496	.493	.484	.328	.199	.602	

\* Description of the variables corresponding to these numbers are as follows:

1. Sewell short scale
2. Present short scale
3. Common-factor scale
4. Average education of husband and wife
5. Value of dwelling
6. Social participation index score
7. Income per main unit

TABLE 7

RESIDUALS OF THE INTERCORRELATION COEFFICIENTS OF THE SEVEN DEFINING VARIABLES  
 AFTER THE INTERCORRELATIONS ACCOUNTED FOR BY  
 THE FIRST COMMON FACTOR HAD BEEN SUBTRACTED

Variable Number*	<u>Residuals</u>						
	1.	2.	3.	4.	5.	6.	7.
1.		-.003	.006	.069	.006	-.021	-.063
2.	-.003		.081	-.104	.027	-.163	-.051
3.	.006	.081		-.096	.005	-.047	-.078
4.	.069	-.104	-.096		-.033	-.020	-.009
5.	.006	.027	.005	-.033		-.074	-.171
6.	-.021	-.163	-.047	-.020	-.074		.235
7.	-.063	-.051	-.078	-.009	-.171	.235	

\* For description of variables, see footnote to Table 6.

be concluded on the basis of these data, however, that the scale provides a measuring device which is superior to existing scales. Considering the greater range of the Sewell short scale and the fact that it has already achieved wide-spread acceptance and has been standardized for many populations other than Oklahoma farm people, no recommendations for the adoption of the present scale can be made.

## CHAPTER V SUMMARY AND CONCLUSIONS

1. Summary

The purposes of this study were: (1) to construct a short scale for the measurement of the socioeconomic status of open-country families in Oklahoma, (2) to test empirically, in the construction of this scale, the assumption of previous scales that socioeconomic status is a single factor measured by each of the items included in these scales, and (3) to establish methodologically the utility of the scale constructed.

Data for the study were from a 1947 survey of 825 families in four selected counties of Oklahoma. An examination of the sample secured from this survey indicated it to be sufficiently representative of the state as a whole and inclusive of a sufficient range of socioeconomic status levels to be adequate for the present study.

The thirty-six items of the original Sewell scale were included in the schedule prepared for this survey. In a revision of this scale, Belcher found that eight of the thirty-six items no longer met the statistical standards established by Sewell for item validation. These items were eliminated and one additional item on the schedule was found to be indicative of socioeconomic status. This item was, therefore, included in the revised scale. The schedule responses of 660 unbroken white families to the twenty-nine items of the revised scale provided the data for this study.

The statistical approach selected was that of factor analysis. No other research technique seemed adequate for accomplishing the purposes of the study. A review of pertinent literature revealed no instance in which the technique had been employed in the construction, reconstruction or validation of scales for use with farm families. The approach had been used,

however, in construction of similar measuring devices and in reconstruction of an urban social status scale. The review of literature, then, indicated the use of factor analysis in the present study to be feasible.

To test the hypothesis that the twenty-nine items of the revised scale had socioeconomic status as a single common factor, tetrachoric coefficients were computed for all possible pairings of the items. The first common factor was extracted from the resulting matrix of intercorrelations. Upon examination, it was found that, in general, the intercorrelations as reproduced from the first common factor closely approximated the observed intercorrelations of the items. Also, all of the items were found to have relatively high positive loadings for the common factor. This factor was considered to be, essentially, the factor of socioeconomic status.

The next step in the analysis was to compare scores from the revised scale with scores from a scale comprised of the same items weighted according to their ability to represent the first common factor. A coefficient of .99 was obtained for the correlation between these sets of scores. When these two sets of scores were correlated with scores from a third scale comprised of the same items with weights of one for possession and zero for non-possession, the resulting coefficients were, in each case, .99 or over. From this evidence, it was concluded that, at least in the case of scales with relatively large numbers of items, little or no advantage is gained from refinements in weighting techniques.

The short scale was constructed by eliminating from the common-factor scale those items with the lowest factor loadings and those indicated by their intercorrelations to be duplicating measures. The weights for the fourteen remaining items were those used in the common-factor scale. The resulting scale was found to be a valid and reliable measure of the socio-



economic status of open-country families in Oklahoma. The evidence of validity and reliability, however, did not indicate the scale to be superior to the Sewell short scale and no recommendations were made for its adoption in preference to the Sewell scale.

## 2. Conclusions

Data for this study, in general, support the hypothesis that socioeconomic status may be represented by a single statistical factor. This conclusion is based on the fact that both the battery of items from the revised scale and the battery of defining variables used for validation yielded first common factors which successfully accounted for the major portion of the intercorrelations of the variables in the respective batteries.

A comparison of scores resulting from the application of different weighting techniques to the same group of items indicates that no significant advantages are gained from the application of more refined weighting techniques to scales comprised of relatively large numbers of items. This conclusion is supported by similar findings in other studies. It is not known, however, whether this conclusion is valid for scales comprised of comparatively few items.

The evidence presented in this study does not indicate the scales constructed to be superior to the scales from which they were derived. The long scale constructed in this study was found to yield essentially the same results as the original Sewell scale and the Belcher revision of the original scale. When compared on the basis of a common-factor criterion, the Sewell short scale proved to be a more valid instrument than the short scale constructed in this study. Since there is no absolute criterion by which comparative validity can be established, the validation data for the present study must be construed as evidence supporting the validity of the Sewell scales and the revised scale.

### 3. Further Research Needs

One limitation of the present study is that the selection of items for analysis was limited to those for which data were available from a survey made in 1947. This resulted in the analysis of a battery of items heavily weighted with material possessions. The component of effective income was not directly represented in the battery, and, with one exception, the component of social participation was represented only by religious participation items. A possible area of further research would be to determine whether the findings of the present study would be supported by an analysis of a group of items in which the four components of socioeconomic status were more equitably represented.

A single factor was extracted in the present study which provided a rather close approximation of the intercorrelations of the items analyzed. This factor was interpreted as essentially a general factor of socioeconomic status. It may well be that such a measure is too broad to be serviceable in some types of specialized research. Perhaps it would be possible to make a multi-factor interpretation of socioeconomic status which would provide data to satisfy such specialized needs as well as provide a general index of socioeconomic status. The Thurstone Centroid technique of factor analysis which produces correlated factors lends itself readily to such an interpretation. It is felt, however, that subtle distinctions between types of socioeconomic status should wait for a more adequate definition of the concept.<sup>1</sup>

---

<sup>1</sup> Weaknesses of the present definition include, first, a lack of a linkage between the definition of socioeconomic status as the relative position of an individual or family with reference to the four components, and the concept of socioeconomic status as a product of the attitudes of people with which the individual or family is in contact. Second, there is a need for a clear definition of the universes from which the four components are supposedly drawn.

An important problem to be faced in the construction of socioeconomic status scales is the lack of an absolute criterion by which to determine validity. The present study has used the first common factor from a group of variables which, individually, have been used as indicators of socioeconomic status. It is felt that the common factor or factors from such a group of items gives a good representation to the concept of socioeconomic status. A careful examination of both the theoretical and technical aspects of the use of such an empirical definition is needed.

The scale constructed in this study appears to be valid at the present time. There is no assurance, however, that it will remain so for any definite period since it is comprised of items which may be invalidated by cultural change. There is a periodic need for revision, reconstruction, or replacement of such scales to insure against loss of validity.

The present scale has been constructed as a measure of the socioeconomic status of open-country families in Oklahoma. It is believed by some that a similar scale may be possible for open-country or farm families of the United States as a whole. A possible area of research would be to determine whether a group of items might be selected which would function equally well as indicators of socioeconomic status in all areas of the country. Such a project would call for a great deal of research and involve the cooperation of researchers in all sections of the United States.

## SELECTED BIBLIOGRAPHY

- Belcher, John C. Evaluation and Restandardization of Sewell's Socioeconomic Scale. (Unpublished study) Stillwater: Oklahoma Agricultural and Mechanical College, Department of Sociology and Rural Life, 1950.
- Cottam, Howard R. Methods of Measuring Level of Living, Social Participation and Adjustment of Ohio Farm People. Columbus: Ohio Agricultural Experiment Station Bulletin 139 (mimeographed), 1941.
- Ferriss, Abbott L. "Rural-Farm Level of Living Indexes for Two Southeastern States." Social Forces, 26 (May, 1948), 420-430.
- Guliford, J. P. Fundamental Statistics in Psychology and Education. (Second edition) New York: McGraw-Hill Book Company, Incorporated, 1950.
- Guttman, Louis. "A Revision of Chapin's Social Status Scale." American Sociological Review, 7 (June, 1942), 363-369.
- Hagood, Margaret Jarman. "Construction of County Indexes for Measuring Change in Level of Living of Farm Operator Families, 1940-45." Rural Sociology, 12 (June, 1947), 139-150.
- Hagood, Margaret Jarman. "Development of a 1940 Rural-Farm Level of Living Index for Counties." Rural Sociology, 8 (June, 1943), 171-180.
- Hagood, Margaret Jarman. Farm Operator Family Level of Living Indexes for Counties of the United States. Washington: United States Department of Agriculture, Bureau of Agricultural Economics, 1947.
- Hagood, Margaret Jarman. "Rural Level of Living Indexes." Rural Sociology, 8 (September, 1943), 292-293.
- Hagood, Margaret Jarman. Statistics for Sociologists. New York: Henry Holt and Company, 1941.
- Hagood, Margaret Jarman, Nadia Danilevsky, and Corlin O. Beum. "An Examination of the Use of Factor Analysis in the Problem of Subregional Delineation." Rural Sociology, 6 (September, 1941), 216-233.
- Hagood, Margaret Jarman and Louis J. Ducoff. "What Level of Living Indexes Measure." American Sociological Review, IX (February, 1944), 78-84.
- Holzinger, Karl J., and Harry H. Harman. Factor Analysis: A Synthesis of Factorial Methods. Chicago: The University of Chicago Press, 1941.
- Kelly, Truman Lee. Fundamentals of Statistics. Cambridge: Harvard University Press, 1947.
- Knupfer, Genevieve. Indices of Socioeconomic Status: A Study of Some Problems of Measurement. (Unpublished Ph. D. dissertation) New York: Columbia University Library, 1946.

- Knupfer, Genevieve, and Robert K. Merton. "Discussion." Rural Sociology, 8 (June, 1943), 169-170.
- Leahy, Alice M. The Measurement of Urban Home Environment. Minneapolis: University of Minnesota Press, 1936.
- Mangus, A. R., and Howard R. Cottam. Level of Living, Social Participation, and Adjustment of Ohio Farm People. Columbus: Ohio Agricultural Experiment Station Bulletin 624, 1941.
- McCormick, Thomas Carson. Elementary Social Statistics. New York: McGraw-Hill Book Company, Incorporated, 1941.
- McKain, Walter C., Jr. "The Concept of Plane of Living and the Construction of a Plane of Living Index." Rural Sociology, 4 (September, 1939), 337-343.
- Peters, Charles C., and Walter R. Van Voorhis. Statistical Procedures and their Mathematical Bases. New York: McGraw-Hill Book Company, Incorporated, 1940.
- Sewell, William H. "A Short Form of the Farm Family Socioeconomic Status Scale." Rural Sociology, 8 (June, 1943), 161-169.
- Sewell, William H. "Rejoinder." Rural Sociology, 8 (June, 1943), 170.
- Sewell, William H. The Construction and Standardization of a Scale for the Measurement of the Socio-Economic Status of Oklahoma Farm Families. Stillwater: Oklahoma Agricultural Experiment Station Technical Bulletin 9, 1940.
- Sorenson, H. Statistics for Students of Psychology and Education. New York: McGraw-Hill Book Company, Incorporated, 1936.
- Thurstone, L. L. Multiple-Factor Analysis: A Development and Expansion of "The Vectors of Mind". Chicago: The University of Chicago Press, 1940.
- Wherry, Robert J. "An Approximation Method for Obtaining a Maximized Multiple Criterion." Psychometrika, 5 (June, 1940), 109-115.
- Wilks, S. S. "Weighting Systems for Linear Functions of Correlated Variables When There is No Independent Variable." Psychometrika, 3 (March, 1938), 23-43.
- Wolfle, Dael. Factor Analysis to 1940. Chicago: The University of Chicago Press, 1940.

## APPENDIX A

Sewell's Farm Family Socioeconomic Status ScaleScale Items

1. Construction of house: Brick, Stucco, etc., or painted frame (5); Unpainted frame or other (3)
2. Room-person ratio: Number of rooms  $\div$  number of persons.  
Ratio: Below 1.00 (3); 1.00-1.99 (5); 2.00-2.99 (7); 3.00 and up (9)
3. Separate dining room: Yes (6); No (3)
4. Separate kitchen: Yes (6); No (3)
5. Separate living room: Yes (6); No (3)
6. Living room floors finished: Yes (7); No (4)
7. Living room woodwork finished: Yes (5); No (2)
8. Living room wall construction: Plaster (6); Wallboard (5); Ceiling (4); Building paper or no inside wall (2)
9. Living room walls decorated: Yes (5); No (2)
10. Living room floor covering: Rugs or carpets (6); Linoleum or bare floors (3)
11. Shades and curtains or drapes on living room windows: Yes (5); No (2)
12. Living room lounge: Divan, davenport, or studio couch (6); Day bed or couch (5); Bed, cot, or none (3)
13. Lighting facilities: Electric (8); Gas, mantle, or pressure (6); Oil lamps, others or none (3)
14. Water piped into house: Yes (8); No (4)
15. Kitchen sink: Yes (7); No (4)
16. Linoleum on kitchen floor: Yes (5); No (2)
17. Power washer: Yes (6); No (3)
18. Refrigerator: Mechanical (8); Ice (6); Other or none (3)
19. Radio: Yes (6); No (3)
20. Telephone: Yes (6); No (3)
21. Automobile (other than truck): Yes (5); No (2)
22. Furniture insured: Yes (7); No (4)
23. Family takes a daily newspaper: Yes (6); No (3)
24. Number of magazines regularly taken: 0-1 (3); 2-3 (5); 4-5 (7); 6 and up (8)
25. Approximate number of books in the home: 0-7 (3); 8-49 (5); 50-99 (7); 100 and up (8)
26. Wife's education (grades completed): 0-7 (2); 8 (4); 9-11 (6); 12 (7); 13 and up (8)
27. Husband's education (grades completed): 0-7 (3); 8 (5); 9-11 (6); 12 (7); 13 and up (8)
28. Husband's life insured: Yes (6); No (3)
29. Husband a church member: Yes (5); No (3)
30. Husband attends church ( $\frac{1}{4}$  of meetings): Yes (5); No (2)
31. Husband attends Sunday School ( $\frac{1}{4}$  of meetings): Yes (6); No (3)
32. Husband a member of a farm cooperative: Yes (8); No (4)
33. Wife a church member: Yes (5); No (2)
34. Wife attends church ( $\frac{1}{4}$  of meetings): Yes (5); No (2)
35. Wife attends Sunday School ( $\frac{1}{4}$  of meetings): Yes (6); No (3)
36. Wife a member of an extension or P.T.A. group: Yes (8); No (4)



## APPENDIX B

Belcher's Revision of Sewell's Farm Family Socioeconomic Status ScaleScale Items

1. Construction of house: Brick, stucco, etc., or painted frame (5); Unpainted frame or other (2)
2. Room-person ratio: Number of rooms  $\div$  number of persons.  
Ratio: Below 1.00 (2); 1.00-1.99 (4); 2.00-2.99 (6); 3.00 and up (8)
3. Separate dining room: Yes (6); No (3)
4. Separate kitchen: Yes (6); No (3)
5. Separate living room: Yes (5); No (2)
6. Living room floors finished: Yes (5); No (3)
7. Living room woodwork finished: Yes (5); No (2)
8. Living room wall construction: Plaster (6); Wallboard (4); Ceiling (3); Building paper or no inside wall (1)
9. Living room walls decorated: Yes (4); No (1)
10. Living room lounge: Divan, davenport, or studio couch (5); Day bed or couch (4); Bed, cot, or none (2)
11. Lighting facilities: Electric (6); Gas, mantle, or pressure (4); Oil lamps, others, or none (2)
12. Water piped into house: Yes (6); No (3)
13. Kitchen sink: Yes (6); No (3)
14. Linoleum on kitchen floor: Yes (5); No (2)
15. Power washer: Yes (5); No (2)
16. Refrigerator: Mechanical (6); Ice (4); Other or none (1)
17. Deep freeze unit or town locker: Yes (6); No (3)
18. Furniture insured: Yes (6); No (3)
19. Family takes a daily newspaper: Yes (5); No (3)
20. Number of magazines regularly taken: 0-1 (3); 2-3 (5); 4-5 (6); 6 and up (7)
21. Approximate number of books in the home: 0-7 (2); 8-49 (4); 50-99 (6); 100 and up (7)
22. Husband's life insured: Yes (6); No (3)
23. Husband a church member: Yes (5); No (3)
24. Husband attends church ( $\frac{1}{4}$  of meetings): Yes (6); No (3)
25. Husband attends Sunday School ( $\frac{1}{4}$  of meetings): Yes (6); No (3)
26. Husband a member of a farm cooperative: Yes (5); No (3)
27. Wife a church member: Yes (5); No (2)
28. Wife attends church ( $\frac{1}{4}$  of meetings): Yes (5); No (3)
29. Wife attends Sunday School ( $\frac{1}{4}$  of meetings): Yes (6); No (3)



## APPENDIX C

Short Form of Sewell's Farm Family Socioeconomic Status ScaleScale Items

1. Construction of house: Brick, stucco, etc., or painted frame (5); Unpainted frame or other (3)
2. Room-person ratio: Number of rooms  $\div$  number of persons. Ratio: Below 1.00 (3); 1.00-1.99 (5); 2.00 and up (7)
3. Lighting facilities: Electric (8); Gas, mantle, or pressure (6); Oil lamps, others or none (3)
4. Water piped into house: Yes (3); No (4)
5. Power washer: Yes (6); No (3)
6. Refrigerator: Mechanical (8); Ice (6); Other or none (3)
7. Radio: Yes (6); No (3)
8. Telephone: Yes (6); No (3)
9. Automobile (other than truck): Yes (5); No (2)
10. Family takes daily newspaper: Yes (6); No (3)
11. Wife's education (grades completed): 0-7 (2); 8 (4); 9-11 (6); 12 (7); 13 and up (8)
12. Husband's education (grades completed): 0-7 (3); 8 (5); 9-11 (6); 12 (7); 13 and up (8)
13. Husband attends church or Sunday School ( $\frac{1}{4}$  of meetings): Yes (5); No (2)
14. Wife attends church or Sunday School ( $\frac{1}{4}$  of meetings): Yes (5); No (2)

THESIS TITLE: A Factor Analysis Approach to the Construction and Validation of a Socioeconomic Status Scale for Open-Country Families in Oklahoma

NAME OF AUTHOR: Emmitt Frederick Sharp

THESIS ADVISER: John C. Belcher

The content and form have been checked and approved by the author and thesis adviser. "Instructions for Typing and Arranging the Thesis" are available in the Graduate School office. Changes or corrections in the thesis are not made by the Graduate School office or by any committee. The copies are sent to the bindery just as they are approved by the author and faculty adviser.

NAME OF TYPIST: Irlene W. Sykora

\* \* \* \* \*