

Manual for Scoring Socioeconomic Status for Research on Health Behavior

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THE NECESSITY for dealing with socioeconomic status (SES) in several aspects of public health research and evaluation calls for the improvement and periodic updating of methods and instruments for measuring SES. This manual suggests both a conceptual approach and methodological procedures for scoring attributes of social status in samples or populations in the United States.

Public health research and evaluation have not benefited from recent developments in measuring socioeconomic status because of the lack of standardizations on health behavior. The most widely used measure continues to be the two-factor index of status position (ISP) developed by Hollingshead more than a decade ago (1, 2).

The ISP has become increasingly inappropriate and difficult to apply for a number of reasons. It was standardized on a single New England community (New Haven, Conn.) and never specifically validated on a large scale with preventive health behavior as the criterion variable. The occupational scale provided by Hollingshead (1) has become dated by obsolescence of

some titles, emergence of new occupational titles, and shifting of status attributes associated with some occupations. The educational level of the male head of household, the second factor in the ISP, has been found less associated with most measures of family health decisions and actions than the education of the female head of household (3). The need for corrections for ethnic status and income status has been increasingly felt as these variables have assumed greater importance in health planning.

The indices suggested in this manual were developed from stepwise regression analyses on data from a statewide sample (N=1,592) of California families with at least one child under 5 years of age (4, 5). The survey was conducted for the Los Angeles County Health Department, under the direction of Dean Manheimer and Glen Mellinger. The criterion or dependent variable in the regression analyses was a composite index of nine types of preventive health behavior (5).

The socioeconomic status indices, therefore, are intended to optimize the prediction of family health actions from socioeconomic information. As such, the indices may be used as sampling attributes in experimental or survey design, as preliminary screening criteria in public health programs, and as test variables in the statistical control of SES in the analysis and evaluation of relationships or effects of program or other independent variables on health behavior. These are the most common uses of the

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ISP and other measures of SES not specifically standardized or validated on health data.

The indices of SES described in this manual should therefore improve the sampling and screening of populations and the evaluation of programs and methods in public health. These indices are not, however, intended to apply to residents of institutions or to adolescent or aged populations, and they should be further validated in populations most unlike California's.

Logic of the SES Scale

An index of socioeconomic status need not be confined to a set of discrete social "classes" from I to V (as in the Hollingshead classes) or any other fixed range of values. The only essential feature of any index of socioeconomic status is that it places individuals, families, or neighborhoods on a hierarchy according to their social status relative to others in the same community. The hierarchy may range from 0 to 99, from 1 to 3, or any other set of ordinal values, depending on the degree of discrimination required for the study and the degree of precision warranted by the data.

The alternative scoring and weighing systems provided in the procedures outlined in this manual yield comparable scales of socioeconomic status. A given person would receive approximately the same standardized or percentile score by each method, that is, he would be ranked about the same among all individuals or families scored. Thus, the choice of alternate scoring procedures among those provided in this manual will not markedly change the relative placement of individuals.

Socioeconomic status is defined in this system as the relative position of a person, family, or neighborhood in a hierarchy which maximally reflects differences in health behavior. Thus, socioeconomic status is not regarded as an attribute in and of itself, but rather as a composite of characteristics which reflect the expected level of preventive health behavior in the persons, family, or neighborhood scored.

Expected behavior may be interpreted both in the statistical sense and in terms of social norms. People of a given social status are expected by their peers to behave in a given way (social norms) and thereby tend toward a statistically expected category or level of behavior.

For example, a mother with low SES is under less social pressure from her friends and neighbors to seek immunizations for her children than is a middle class mother. Families with lower socioeconomic status consequently tend toward lower scores on immunization scales than do families with middle socioeconomic status.

Variations in normal preventive health behavior tend to be more highly correlated with income, education, and occupation than with other attributes (5). It is not unreasonable, therefore, to assume that the SES characteristics of people are the best predictors of the particular social norms to which they adhere. Under this assumption, it becomes social norms of preventive health behavior that are being measured with an index of socioeconomic status which was derived and validated on health behavior data.

Different social norms of various socioeconomic status groups are sometimes qualitative differences (that is, differences in kind of behavior prescribed with respect to different health matters) and sometimes merely differences in degree to which a single societal norm is sanctioned at different SES levels. This discussion is intended to clarify the conceptual basis for the socioeconomic status index. The formulation in terms of social norms of preventive health behavior gives the index functional meaning for public health, both as a predictive instrument and as an analytic tool.

Scoring Status Attributes

The investigator may collect or have access to data on status attributes such as (a) education, in number of years of school completed, (b) gross family income, (c) occupation of main earner, and (d) ethnic group. The first three of these, or the first and either of the second two, may be given scores on comparable (standardized) scales and then combined to form a composite score of socioeconomic status. Adjustment for ethnic status can be achieved by separate scoring of ethnic groups.

Reference to any Bureau of the Census publication which includes socioeconomic data is suggested for definitions of education, income, and occupation and procedures for obtaining these data in interviews (6). Most samples or

populations scored will yield approximately normal distributions on each of the attributes and therefore also on the composite SES scores.

Education. The first step is to code education—preferably the education of the female head of household—according to the nationally standardized scores provided in table 1. For data previously collected under less definitive categories, scores representing an average of those for the corresponding categories in table 1 should be given. For example, if the available data on education do not provide single-year categories of schooling completed, then the single-year scores must be averaged from table 1 to obtain estimated education scores. A category

Table 1. Scores for coding education by number of years of school completed

Scores		Category	Total years
Males	Females		
College			
69	73	5 or more.....	17+
63	66	4.....	16
61	63	3.....	15
59	61	2.....	14
57	60	1.....	13
55	56	(¹).....	(¹)
High school			
52	53	4.....	12
48	48	3.....	11
46	46	2.....	10
45	44	1.....	9
Elementary school			
42	41	8.....	8
39	36	7.....	7
36	34	5 and 6.....	5 or 6
33	32	3 and 4.....	3 or 4
31	30	1 and 2.....	1 or 2
29	28	None.....	0

¹ 1 year of special trade school, secretarial college, or other vocational education beyond high school.

SOURCE: Percentile scores computed from 1969 U.S. Bureau of the Census distributions (7), then standardized with means=50 and standard deviations=10. The score for special trade school or other vocational training beyond high school is an estimated value intended to give less than 1 year of college credit to most vocational trainees. Those who have completed more than 1 year of strictly vocational training beyond high school graduation should be scored according to the equivalent number of college years minus 1.

for women with 1-3 years of high school would be scored $(44+46+48) \div 3 = 46.0$ or 46. For a collapsed scale, recommended categories and their scores are as follows:

- Elementary school=35
- 1-3 years' high school=46
- High school graduate=53
- 1-3 years' college=62
- 4 or more years' college=69

Education of the female head of household is recommended instead of male head because the educational level of the woman of the house, namely the mother, has been found in most public health and sociological research to be more highly correlated with family health behavior patterns than the education of the male head of household (8). Of course, if the household consists of a single man or a widower with children, then the education of the man is used.

When a person's educational information is missing, an attempt should be made to estimate educational level on the basis of all other available information, including occupation, income, age, formal affiliations, and membership in organizations. After narrowing the range of possible scores to a set of educational levels, select the mean level within that range as the estimated education score for that person.

Income. Table 2 provides standardized scores for annual family income levels before taxes. The same rules concerning the estimation of scores for persons with missing information in the scoring of education also apply to scoring of income. Reference to area wage surveys published by the U.S. Bureau of Labor Statistics may be helpful in estimating income when occupation is known.

Some provision should be made for regional variations in socioeconomic characteristics. Income levels are most likely to reflect regional differences, both in earnings and in spending power. Use of the region-specific income scores is therefore recommended for all but nationwide samples.

Occupation. Table 3 provides an abbreviated list of scores for occupational groups to be used when responses have been precoded into gross categories or where minimal information is available. It is preferable, however, to obtain more detailed information concerning the occu-

pation and industry of the main earner and to use the scoring system provided in the standardized scores list.

This list of occupational categories is organized in the same way as table 3 and follows the classification scheme of the U.S. Bureau of the Census. The scores in the standardized list correspond to occupational categories used in the tabulation of census results (9), normalized and standardized from national income and education distributions associated with each occupation. Specific occupational titles and titles by industry difficult to locate or not included in this list may be classified by referring to the Census Bureau's Alphabetical Index of Occupations and Industries (10). Unemployed workers should be scored according to their usual occupation.

This occupational scoring system was selected over seven others on the basis of its higher correlation with preventive health behavior. All eight occupational scales were tested for their simple correlations with the composite index and with each of nine component health actions (5).

Missing data scores may be estimated by the procedures outlined for scoring missing education, using table 3 in the same way as table 1. If a specified occupation cannot be located in the standardized list, a score for the general

Table 3. Average scores for categories of major occupational groups

Scores	Section of standardized scores list	Major occupational groups
63	A	Professional and technical workers.
59	B	Managerial workers, officials, and proprietors, except farm.
56	C	Clerical, sales, and kindred workers.
52	D	Craftsmen, foremen, and skilled workers.
49	E	Operatives and semiskilled workers.
46	F	Service workers; farmowners, tenants, and managers.
42	G	Laborers, except farm and mine.
34	H	Farm laborers and foremen.
53	I	Members of the Armed Forces.

SOURCE: Weighted averages from standardized scores for detailed occupation-industry titles (see standardized scores). Scores for members of the Armed Forces apply to those married and living off bases or with families on military bases.

classification not elsewhere classified (NEC) should be used. For example, a professional or technical worker not found in section A of the standardized list should be classified professional, technical, and kindred workers NEC and scored 62. If the main earner is a college student, he should be scored according to the profession for which he is studying.

Table 2. Scores for categories of family income

Annual income category	Scores by region				
	North-east	North-central	South	West	United States
\$50,000 or more	79	81	81	78	79
\$25,000 to \$49,999	71	72	73	70	72
\$15,000 to \$24,999	63	64	65	62	64
\$12,000 to \$14,999	57	58	60	57	58
\$10,000 to \$11,999	54	54	57	53	54
\$9,000 to \$9,999	51	51	54	50	52
\$8,000 to \$8,999	49	49	52	48	50
\$7,000 to \$7,999	47	47	50	46	48
\$6,000 to \$6,999	44	44	48	44	46
\$5,000 to \$5,999	42	42	46	42	43
\$4,000 to \$4,999	40	40	44	40	41
\$3,500 to \$3,999	38	38	42	38	40
\$3,000 to \$3,499	37	37	40	37	38
\$2,500 to \$2,999	35	35	39	35	37
\$2,000 to \$2,499	33	34	37	33	35
\$1,500 to \$1,999	31	31	35	31	33
\$1,000 to \$1,499	29	29	33	29	31
Less than \$1,000	25	25	28	26	26

SOURCE: Percentile ranks computed from 1969 U.S. Bureau of the Census distributions (8), then standardized with means = 50 and standard deviations = 10.

STANDARDIZED SCORES FOR SPECIFIC OCCUPATIONS

A. PROFESSIONAL AND TECHNICAL WORKERS

<i>Occupation</i>	<i>Score</i>	<i>Occupation</i>	<i>Score</i>
Accountants and auditors.....	63	Lawyers and judges.....	73
Actors	59	Librarians	56
Airplane pilots and navigators.....	66	Musicians and music teachers.....	56
Architects	69	Natural scientists NEC :	
Artists and art teachers.....	61	Chemists	65
Athletes	58	Other natural scientists.....	66
Authors	62	Nurses, professional.....	¹ 64
Chiropractors	63	Nurses, student professional.....	¹ 59
Clergymen	54	Optometrists	¹ 81
College presidents, professors, and instructors NEC	66	Osteopaths	¹ 83
Dancers and dancing teachers.....	50	Personnel and labor relations workers.....	65
Dentists	¹ 83	Pharmacists	¹ 75
Designers	63	Photographers	57
Dietitians and nutritionists.....	¹ 62	Physicians and surgeons.....	¹ 83
Draftsmen	59	Public relations and publicity writers.....	66
Editors and reporters.....	64	Radio operators.....	58
Engineers, technical:		Recreation and group workers.....	55
Aeronautical	69	Religious workers.....	52
Chemical	69	Social and welfare workers, except group.....	59
Civil	66	Social scientists.....	66
Electrical	68	Sports instructors and officials.....	59
Industrial	65	Surveyors	53
Mechanical	66	Teachers NEC.....	60
Metallurgical and metallurgists.....	68	Technicians, medical and dental.....	¹ 64
Mining	68	Technicians, testing, electronic and electrical..	58
NEC	66	Technicians, other engineering and physical sciences	58
Entertainers NEC.....	49	Technicians NEC.....	56
Farm and home management advisers.....	62	Therapists and healers NEC.....	¹ 70
Foresters and conservationists.....	55	Veterinarians	¹ 81
Funeral directors and embalmers.....	60	Professional, technical, and kindred workers NEC	62

B. MANAGERIAL WORKERS, OFFICIALS, AND PROPRIETORS, EXCEPT FARM *

<i>Occupation</i>	<i>Score</i>	<i>Occupation</i>	<i>Score</i>
Buyers and department heads, store.....	60	Officials, lodge, society, or union.....	58
Buyers and shippers, farm products.....	51	Postmasters	58
Conductors, railroad.....	55	Purchasing agents and buyers NEC.....	62
Credit men.....	60	Managers, officials, and proprietors NEC, sala- ried :	
Floormen and floor managers, store.....	54	Construction	61
Inspectors, public administration :		Manufacturing	65
Federal public administration and postal service	59	Transportation	60
State public administration.....	55	Communications, utilities, and sanitary serv- ices	63
Local public administration.....	56	Wholesale trade.....	61
Managers and superintendents, building.....	45	Retail trade :	
Officers, pilots, pursers, and engineers, ship.....	55	Food and dairy products stores.....	56
Officials and administrators NEC, public admin- istration :		Eating and drinking places.....	53
Federal public administration and postal service	64	General merchandise and limited-price variety stores.....	60
State public administration.....	60	Apparel and accessories stores.....	58
Local public administration.....	57		

See footnotes on page 824.

<i>Occupation</i>	<i>Score</i>	<i>Occupation</i>	<i>Score</i>
Furniture, housefurnishings, and equipment stores	60	Wholesale trade.....	60
Motor vehicles and accessories.....	58	Retail trade:	
Gasoline service stations.....	51	Food and dairy products stores.....	49
Hardware, farm equipment, and building material	58	Eating and drinking places.....	51
Other retail trade.....	58	General merchandise and limited-price variety stores.....	53
Banking and other finance.....	64	Apparel and accessories stores.....	60
Insurance and real estate.....	65	Furniture, housefurnishings, and equipment stores	60
Business services.....	66	Motor vehicles and accessories.....	60
Automobile repair services and garages.....	55	Gasoline service stations.....	51
Miscellaneous repair services.....	59	Hardware, farm equipment, and building material	58
Personal services.....	56	Other retail trade.....	56
All other industries (including NR).....	63	Banking and other finance.....	68
Managers, officials, and proprietors NEC, self-employed:		Insurance and real estate.....	65
Construction	57	Business services.....	62
Manufacturing	60	Automobile repair services and garages.....	52
Transportation	56	Miscellaneous repair services.....	52
Communications, utilities, and sanitary services	59	Personal services.....	53
		All other industries (including NR).....	56

C. CLERICAL, SALES, AND KINDRED WORKERS

<i>Occupation</i>	<i>Score</i>	<i>Occupation</i>	<i>Score</i>
CLERICAL AND KINDRED WORKERS			
Agents NEC.....	60	Stenographers	56
Attendants and assistants, library.....	49	Stock clerks and storekeepers.....	49
Attendants, physicians' and dentists' offices.....	¹ 60	Telegraph messengers.....	44
Baggagemen, transportation.....	51	Telegraph operators.....	55
Bank tellers.....	54	Telephone operators.....	53
Bookkeepers	54	Ticket station and express agents.....	57
Cashiers	48	Typists	51
Collectors, bill and account.....	52	Clerical and kindred workers NEC.....	54
Dispatchers and starters, vehicle.....	54	SALES AND KINDRED WORKERS	
Express messengers and railway mail clerks.....	56	Advertising agents and salesmen.....	61
File clerks.....	50	Auctioneers	54
Insurance adjusters, examiners, and investigators	60	Demonstrators	51
Mail carriers.....	55	Hucksters and peddlers.....	45
Messengers and office boys.....	44	Insurance agents, brokers, and underwriters.....	60
Office machine operators.....	54	Newsboys	38
Payroll and timekeeping clerks.....	55	Real estate agents and brokers.....	60
Postal clerks.....	56	Stock and bond salesmen.....	64
Receptionists	50	Salesmen and sales clerks NEC:	
Secretaries	57	Manufacturing	61
Shipping and receiving clerks.....	49	Wholesale trade.....	58
		Retail trade.....	50
		Other industries (including NR).....	57

D. CRAFTSMEN, FOREMEN, AND SKILLED WORKERS

<i>Occupation</i>	<i>Score</i>	<i>Occupation</i>	<i>Score</i>
Bakers	47	Decorators and window dressers	53
Blacksmiths	43	Electricians	56
Boilermakers	51	Electrotypers and stereotypers.....	57
Bookbinders	52	Engravers, except photoengravers.....	55
Brickmasons, stonemasons, and tile workers.....	49	Excavating, grading, and road machinery operators	53
Cabinetmakers	49	Foremen NEC:	
Carpenters	46	Construction	53
Cement and concrete finishers.....	44	Manufacturing:	
Compositors and typesetters.....	56		
Cranemen, derrickmen, and hoistmen.....	48		

See footnotes on page 824.

<i>Occupation</i>	<i>Score</i>	<i>Occupation</i>	<i>Score</i>
Metal industries.....	57	Mechanics and repairmen:	
Machinery, except electrical.....	58	Air conditioning, heating, and refrigeration...	53
Electrical machinery, equipment, and supplies.....	59	Airplane.....	56
Transportation equipment.....	60	Automobile.....	48
Other durable goods.....	54	Office machine.....	55
Textiles, textile products, and apparel.....	52	Radio and television.....	52
Other nondurable goods (including unspecified manufacturing).....	57	Railroad and car shop.....	48
Railroads and railway express service.....	51	NEC.....	50
Transportation, except railroad.....	56	Millers, grain, flour, feed, and similar products...	43
Communications, utilities, and sanitary services.....	58	Millwrights.....	52
Other industries, including NR.....	55	Molders, metal.....	46
Forgemen and hammermen.....	49	Motion picture projectionists.....	50
Furriers.....	52	Opticians and lens grinders.....	54
Glaziers.....	52	Painters, construction and maintenance.....	44
Heat treaters, annealers, and temperers.....	50	Paperhangers.....	41
Inspectors, scalars, and graders, log and lumber.....	48	Pattern and model makers, except paper.....	64
Inspectors NEC:		Photoengravers and lithographers.....	58
Construction.....	54	Piano and organ tuners and repairmen.....	49
Railroads and railway express agencies.....	50	Plasterers.....	47
Transportation (except railroad), communications, and other public utilities.....	55	Plumbers and pipefitters.....	53
Other industries, including NR.....	55	Pressmen and plate printers, printing.....	55
Jewellers, watchmakers, and gold and silver-smiths.....	51	Publishers.....	59
Job setters, metal.....	52	Rollers and roll heads, metal.....	49
Linemen and servicemen, telephone, telegraph, and power.....	57	Roofers and slaters.....	42
Locomotive engineers.....	54	Shoemakers and repairers, except factory.....	38
Locomotive firemen.....	56	Stationary engineers.....	57
Loom fixers.....	41	Stonecutters and stone carvers.....	43
Machinists.....	53	Structural metal workers.....	52
		Tailors.....	41
		Tinsmiths, coppermiths, and sheet metal workers.....	53
		Toolmakers, diemakers, and setters.....	56
		Upholsterers.....	46
		Craftsmen and kindred workers NEC.....	52
		Former members of the Armed Forces.....	47

E. OPERATIVES AND SEMISKILLED WORKERS

<i>Occupation</i>	<i>Score</i>	<i>Occupation</i>	<i>Score</i>
Apprentices:		Checkers, examiners, and inspectors, manufacturing.....	53
Automobile mechanics.....	45	Conductors, bus and street railway.....	51
Bricklayers and masons.....	48	Deliverymen and routemen.....	50
Carpenters.....	48	Dressmakers and seamstresses, except factory...	42
Electricians.....	51	Dyers.....	41
Machinists and toolmakers.....	51	Filers, grinders, and polishers, metal.....	49
Mechanics, except automobile.....	49	Fruit, nut, and vegetable graders and packers...	24
Plumbers and pipefitters.....	49	Furnacemen, smeltermen, and pourers.....	47
Building trades NEC.....	46	Graders and sorters, manufacturing.....	43
Metalworking trades NEC.....	50	Heaters, metal.....	49
Printing trades.....	49	Knitters, loopers, and toppers, textile.....	44
Other specified trades.....	48	Laundry and drycleaning operatives.....	44
Trade not specified.....	49	Meatcutters, except slaughtermen and packing-house workers.....	51
Asbestos and insulation workers.....	53	Milliners.....	48
Assemblers.....	49	Mine operatives and laborers NEC:	
Attendants, automobile service and parking.....	45	Coal mining.....	40
Blasters and powdermen.....	45	Crude petroleum and natural gas extraction...	51
Boatmen, canalmen, and lockkeepers.....	47	Mining and quarrying, except fuel.....	43
Brakemen, railroad.....	54		
Busdrivers.....	48		
Chainmen, rodmen, and axmen, surveying.....	46		

See footnotes on page 824.

<i>Occupation</i>	<i>Score</i>	<i>Occupation</i>	<i>Score</i>
Motormen, mine, factory, logging camp, or other industry	43	Watches, clocks, and optical devices.....	49
Motormen, street, subway, or elevated railroad... 51		Miscellaneous manufacturing industries.....	43
Oilers and greasers, except automobile..... 46		<i>Nondurable goods</i>	
Packers and wrappers NEC..... 44		Food and kindred products:	
Painters, except construction and maintenance... 46		Meat products.....	46
Photographic process workers..... 52		Dairy products.....	49
Power station operators..... 56		Canning and preserving fruits, vegetables, and seafoods	39
Sailors and deckhands..... 47		Grainmill products.....	44
Sawyers	37	Bakery products.....	45
Sewers and stitchers, manufacturing..... 40		Confectionery and related products.....	43
Spinners, textile..... 39		Beverage industries.....	48
Stationary firemen..... 46		Miscellaneous food preparations and kindred products	42
Switchmen, railroad..... 54		Not specified food industries.....	45
Taxicab drivers and chauffeurs..... 43		Tobacco manufactures.....	40
Truck and tractor drivers..... 45		Textile mill products:	
Weavers, textile..... 40		Knitting mills.....	42
Welders and flame cutters..... 49		Dyeing and finishing textiles, except wool and knit goods.....	41
OPERATIVES AND KINDRED WORKERS NEC		Floor covering, except hard surface.....	40
Manufacturing Industries		Yarn, thread, and fabric mills.....	38
<i>Durable goods</i>		Miscellaneous textile mill products.....	41
Lumber and wood products, except furniture:		Apparel and other fabricated textile products:	
Logging	40	Apparel and accessories.....	43
Sawmills, planing mills, and millwork.....	41	Miscellaneous fabricated textile products.....	42
Miscellaneous wood products.....	40	Paper and allied products:	
Furniture and fixtures.....	40	Pulp, paper, and paperboard mills.....	50
Stone, clay, and glass products:		Paperboard containers and boxes.....	48
Glass and glass products.....	50	Miscellaneous paper and pulp products.....	49
Cement, concrete, gypsum, and plaster products	44	Printing, publishing, and allied industries.....	50
Structural clay products.....	40	Chemicals and allied products:	
Pottery and related products.....	46	Synthetic fibers.....	48
Miscellaneous nonmetallic mineral and stone products	47	Drugs and medicines.....	54
Metal industries:		Paints, varnishes, and related products.....	48
Blast furnaces, steelworks, and rolling and finishing mills.....	48	Miscellaneous chemical and allied products.....	53
Other primary iron and steel industries.....	46	Petroleum and coal products:	
Primary nonferrous industries, including unspecified metal.....	49	Petroleum refining.....	57
Cutlery, handtools, and other hardware.....	46	Miscellaneous petroleum and coal products.....	46
Fabricated structural metal products.....	48	Rubber and miscellaneous plastic products:	
Miscellaneous fabricated metal products.....	48	Rubber products.....	50
Not specified metal industries.....	49	Miscellaneous plastic products.....	47
Machinery, except electrical:		Leather and leather products:	
Farm machinery and equipment.....	48	Leather, tanned, curried, and finished.....	42
Office, computing, and accounting machines... 52		Footwear, except rubber.....	42
Miscellaneous machinery.....	50	Leather products, except footwear.....	42
Electrical machinery, equipment, and supplies... 51		Not specified manufacturing industries.....	42
Transportation equipment:		Nonmanufacturing Industries, Including NR:	
Motor vehicles and equipment.....	49	Construction	45
Aircraft and parts.....	53	Railroads and railway express.....	46
Ship and boat building and repairing.....	45	Transportation, except railroads.....	49
Railroad and miscellaneous transportation equipment	44	Communications, utilities, and sanitary services	51
Professional and photographic equipment and watches:		Wholesale and retail trade.....	44
Professional equipment and supplies.....	51	Business and repair services.....	46
Photographic equipment and supplies.....	55	Personal services.....	40
		Public administration.....	48
		All other industries, including NR.....	43

See footnotes on page 824.

F. SERVICE WORKERS AND FARM MANAGERS

<i>Occupation</i>	<i>Score</i>	<i>Occupation</i>	<i>Score</i>
SERVICE WORKERS			
PRIVATE HOUSEHOLD WORKERS			
Babysitters, private household.....	41	Counter and fountain workers.....	44
Housekeepers, private household:		Elevator operators.....	40
Living in.....	37	Hairdressers and cosmetologists.....	51
Living out.....	24	Housekeepers and stewards.....	48
Laundresses, private household:		Janitors and sextons.....	39
Living in.....	21	Kitchen workers NEC.....	39
Living out.....	22	Midwives.....	1 50
Private household workers:		Porters.....	38
Living in.....	25	Practical nurses.....	1 57
Living out.....	24	Protective service workers:	
SERVICE WORKERS, EXCEPT PRIVATE HOUSEHOLD		Firemen, fire protection.....	55
Attendants, hospital and other institutions.....	46	Guards, watchmen, and doorkeepers.....	44
Attendants, professional and personal service		Marshals and constables.....	47
NEC.....	47	Policemen and detectives:	
Attendants, recreation and amusement.....	42	Public.....	55
Barbers.....	44	Private.....	52
Bartenders.....	47	Sheriffs and bailiffs.....	53
Boarding and lodginghouse keepers.....	46	Watchmen (crossing) and bridge tenders.....	40
Bootblacks.....	22	Ushers, recreation and amusement.....	43
Chambermaids and maids.....	25	Waiters.....	46
Charwomen and cleaners.....	40	Service workers NEC.....	43
Cooks.....	44	FARMERS AND FARM MANAGERS	
		Farmers (owners and tenants).....	38
		Farm managers.....	49

G. LABORERS, EXCEPT FARM AND MINE ²

<i>Occupation</i>	<i>Score</i>	<i>Occupation</i>	<i>Score</i>
Carpenters' helpers.....	25	Primary nonferrous industries.....	44
Fishermen and oystermen.....	26	Fabricated structural metal products.....	42
Garage laborers, car washers, and car greasers..	42	Cutlery, hand tools, and other hardware.....	42
Gardeners.....	25	Miscellaneous fabricated metal products.....	43
Longshoremen and stevedores.....	44	Not specified metal industries.....	42
Lumbermen, raftsmen, and woodchoppers.....	23	Machinery, except electrical:	
Teamsters.....	22	Farm machinery and equipment.....	43
Truckdrivers' helpers.....	38	Office, computing, and accounting machines..	46
Warehousemen NEC.....	50	Miscellaneous machinery.....	43
LABORERS NEC		Electrical machinery, equipment, and supplies..	46
Manufacturing Industries		Transportation equipment:	
<i>Durable goods</i>		Motor vehicles and motor vehicle equipment..	46
Lumber and wood products, except furniture:		Aircraft and parts.....	47
Sawmills, planing mills, and millwork.....	26	Ship and boat building and repairing.....	40
Miscellaneous wood products.....	26	Railroad and miscellaneous transportation	
Furniture and fixtures.....	38	equipment.....	41
Stone, clay, and glass products:		Professional and photographic equipment and	
Glass and glass products.....	45	watches:	
Cement, concrete, gypsum, and plaster		Professional equipment and supplies.....	46
products.....	40	Photographic equipment and supplies.....	51
Structural clay products.....	40	Watches, clocks, and optical devices.....	40
Pottery and related products.....	40	Miscellaneous manufacturing industries.....	41
Miscellaneous nonmetallic mineral and stone			
products.....	40	<i>Nondurable goods</i>	
Metal industries:		Food and kindred products:	
Blast furnaces, steelworks, and rolling and		Meat products.....	42
finishing mills.....	44	Dairy products.....	45
Other primary iron and steel industries.....	41	Canning and preserving fruits, vegetables, and	
		seafoods.....	26

See footnotes on page 824.

<i>Occupation</i>	<i>Score</i>	<i>Occupation</i>	<i>Score</i>
Grainmill products.....	40	Petroleum and coal products:	
Bakery products.....	43	Petroleum refining.....	50
Confectionery and related products.....	40	Miscellaneous petroleum and coal products..	40
Beverage industries.....	42	Rubber and miscellaneous plastic products....	46
Miscellaneous food preparations and kindred products	38	Leather and leather products.....	42
Not specified food industries.....	40	Not specified manufacturing industries.....	37
Tobacco manufactures.....	26	Nonmanufacturing Industries, Including NR:	
Textile mill products:		Construction	39
Yarn, thread, and fabric mills.....	26	Railroad and railway express.....	40
Other textile mill products.....	38	Transportation, except railroad.....	42
Apparel and other fabricated textile products..	40	Communications, utilities, and sanitary services	39
Paper and allied products:		Wholesale and retail trade.....	42
Pulp, paper, and paperboard mills.....	45	Business and repair services.....	40
Paperboard containers and boxes.....	44	Personal services.....	21
Miscellaneous paper and pulp products.....	44	Public administration.....	43
Printing, publishing, and allied industries.....	46	All other industries, including NR.....	26
Chemicals and allied products:		Occupation not reported.....	46
Synthetic fibers.....	42	Present members of the Armed Forces (see detailed list in Section I if rank is known) ..	53
Drugs and medicines.....	48		
Paints, varnishes, and related products.....	42		
Miscellaneous chemicals and allied products..	42		

H. FARM LABORERS AND FOREMEN

<i>Occupation</i>	<i>Score</i>	<i>Occupation</i>	<i>Score</i>
Farm foremen.....	43	Farm laborers, unpaid family workers.....	41
Farm laborers, wageworkers.....	21	Farm service workers, self-employed.....	42

I. MEMBERS OF THE ARMED FORCES

<i>Pay scale and rank</i>	<i>Score</i>	<i>Pay scale and rank</i>	<i>Score</i>
COMMISSIONED OFFICERS			
Special: Fleet admiral, general of the Army, and general of the Air Force.....	68	E-7: Chief petty officer, gunnery sergeant, sergeant first class, specialist, and master sergeant	51
O-10: Admiral and general.....	67	E-6: Petty officer first class, staff sergeant, specialist, and technical sergeant.....	46
O-9: Vice admiral and lieutenant general.....	66	E-5: Petty officer second class, sergeant, specialist, and staff sergeant.....	45
O-8 and O-7: Rear admiral and major general..	65	E-4: Petty officer third class, corporal, specialist, and airman first class.....	44
O-7: Commodore and brigadier general.....	64	E-3: Seaman, lance corporal, private first class, and airman second class.....	43
O-6: Captain and colonel.....	63	E-2: Seaman apprentice, private first class, private, and airman third class.....	42
O-5: Commander and lieutenant colonel.....	62	E-1: Seaman recruit, private, and airman.....	41
O-4: Lieutenant commander and major.....	61		
O-3: Lieutenant and captain.....	60		
O-2: Lieutenant junior grade, first lieutenant, and lieutenant.....	59		
O-1: Ensign and second lieutenant.....	58		
WARRANT OFFICERS			
W-4, W-3, and W-2: Chief warrant officer.....	55		
W-1: Warrant officer.....	54		
ENLISTED PERSONNEL			
E-9: Master chief petty officer, sergeant major, master gunnery sergeant, and chief master sergeant	53		
E-8: Senior chief petty officer, first sergeant, master sergeant, and senior master sergeant..	52		

¹ Selected occupations with primary health orientations are given scores 1 standard deviation (10 points) higher than would otherwise be ascribed on the basis of census data.

² Mineworkers are included in the major group of operatives and semiskilled workers.

ABBREVIATIONS: NEC is not elsewhere classified; NR is not reported.

The Census Bureau does not distinguish among present members of the Armed Forces. If military rank is known, the scores in section I of the standardized list are suggested.

Computing SES Scores

The statistical methods used in developing the SES scoring systems suggested in this manual were similar to those used by Hollingshead, except that a composite index of preventive health behavior was used as the criterion variable here, whereas Hollingshead used subjectively ascribed "social class" from systematic case studies as the criterion.

The variables in the composite index of family preventive health behavior in this analysis were selected on the basis of factor analysis and included nine measures.

1. Adequacy of child's diphtheria-pertussis-tetanus immunizations.
2. Adequacy of child's poliomyelitis immunizations.
3. Child's smallpox vaccination.
4. Number of well-child visits to physician or clinic prior to child's first birthday.
5. Month of mother's first prenatal visit.
6. Time since mother's last routine dental visit for preventive care.
7. Adequacy of mother's poliomyelitis immunization status.
8. Possession of a fever thermometer in the home.
9. Presence of some medical reference book, such as "Baby and Child Care" by Spock or a medical encyclopedia, in the home.

Stepwise multiple regression analysis resulted in the standardized weights used to compute various scores.

The choice of scoring system among the alternatives to be discussed may be based primarily on data available but ideally should also be based on certain other considerations. These considerations will be discussed along with the description of each method.

Socioeconomic status scores by all methods will be roughly comparable. The range of possible scores by each of the weighting systems is approximately 30 to 85. To obtain scores between 0 and 55, subtract 30 from the summed products for each person scored. This adjust-

ment procedure merely shifts the scale downward and does not affect its statistical properties.

The three-factor index. Optimum prediction of preventive health behavior in a general population (multiple $R=0.500$ vs. $R=0.438$ by a modified Hollingshead ISP) will be obtained by combining all three status attributes with the following weights: $SES=0.5 \times \text{education score} + 0.3 \times \text{income score} + 0.3 \times \text{occupation score}$.

For example, a California family in which the mother has 8 years of education (score 41), the main earner is a postal clerk (score 56), and the family income is \$6,000 per year (score 44), would obtain an SES score as shown:

$$\begin{aligned} 0.5 \times 41 &= 20.5 \quad (\text{education}) \\ 0.3 \times 44 &= 13.2 \quad (\text{income}) \\ 0.3 \times 56 &= 16.8 \quad (\text{occupation}) \end{aligned}$$

$$\text{SES score} = \underline{50.5}$$

Two-factor indices of SES. If either income or education is dropped from the computation of socioeconomic status scores, there is less than a 4 percent loss in the predictive validity (R^2) of the SES index for reflecting variations in preventive health behavior. The multiple correlation coefficient for the two-factor index with preventive health behavior was 0.485 in the California sample. The regression weights are essentially the same for either income or occupation when combined singly with education of the female head of household.

$SES = (0.7 \times \text{education}) + (0.4 \times \text{income or occupation})$.

Applied to the previous example, the results are

<i>Education and income</i>	or	<i>Education and occupation</i>
$0.7 \times 41 = 28.7$		$0.7 \times 41 = 28.7$
$0.4 \times 44 = 17.6$		$0.4 \times 56 = 22.4$

$$\text{SES score} = \underline{46.3} \text{ or } 46 \quad \text{SES score} = \underline{51.1} \text{ or } 51$$

Compared with the education and occupation two-factor index, the education and income two-factor index tends to be slightly more highly correlated with preventive health behavior as measured by the variables in the composite index of family preventive health behavior. Occupation, however, is more closely related than

income to preventive dental care and well-baby visits. If these particular health variables are under study, it would be advisable to use the education-occupation SES index as a sampling attribute, predictor variable, or test variable. Income, on the other hand, is highly correlated with prenatal care and poliomyelitis immunizations so that the education-income index would be recommended in studies focusing on these types of behavior.

The main use of socioeconomic status scores in health research or evaluation will be to partition the variance in health behavior accounted for by socioeconomic factors so that the remaining variability in behavior can be analyzed independently in relation to other variables. For this purpose, the best SES variables will be those most highly correlated with the behavior being investigated.

Separate scoring of white and nonwhite subgroups. It has been noted that a major weakness of conventional socioeconomic status indices, particularly the Hollingshead index, in public health research and evaluation is their failure to account for ethnic status (11). The foregoing procedures for scoring SES optimize prediction for the population at large, but it is found in separate analyses of white and nonwhite persons, families, or neighborhoods, that the relative importance of status attributes is quite different for the nonwhite population.

While education of mother is the predominant factor in the preventive health behavior of the white majority, family income proves to be more important in accounting for variations in the preventive health behavior of the nonwhite population. It is suggested, therefore, that SES measurement in public health would be improved even further by separate scoring of ethnic groups or of high and low income neighborhoods.

$SES(\text{nonwhite}) = (0.36 \times \text{education}) + (0.42 \times \text{income}) + (0.25 \times \text{occupation}).$

$SES(\text{white}) = (0.59 \times \text{education}) + (0.27 \times \text{income}) + (0.25 \times \text{occupation}).$

Corresponding two-factor indices would use the following weights.

$SES(\text{nonwhite}) = (0.5 \times \text{education}) + (0.6 \times \text{income}).$

$SES(\text{white}) = (0.7 \times \text{education}) + (0.4 \times \text{income}).$

The following multiple correlation coefficients between each of the nonwhite scoring systems and the composite index of preventive health behavior were obtained for the California nonwhite sample.

Three-factor index $R=0.445$

Two-factor index $R=0.438$

Hollingshead ISP $R=0.401$

It should be noted in these comparisons with the Hollingshead ISP that an indeterminate advantage was given to the Hollingshead index by substituting education of female head of household in place of male head.

Summary

The socioeconomic status (SES) indices suggested in this manual were developed from stepwise regression analysis on data from a statewide sample ($N=1,592$) of California families with at least one child under 5 years of age. The dependent variable was a composite index of nine types of preventive health behavior. The independent variables were education, income, and occupation. The methods can be applied either to households or to census tracts and larger units of observation.

The SES indices are intended to optimize the prediction of family health actions from socioeconomic information. They are not intended to apply to institutionalized, adolescent or aged populations, and they should be validated further in populations most unlike California's.

Variations in normal preventive health behavior usually are more highly correlated with income, education, and occupation than with other attributes. Formulation of SES in terms of social norms of preventive health behavior makes the index functional for public health, both as a predictive instrument and as an analytic tool in sampling, selection of target groups, and in statistical control.

Standardized scores are used to code education, gross family income, and occupation of the main earner on comparable scales. Education of the female head of household is recommended because the educational level of the woman of the house has been found to be more highly correlated with family health behavior than the education of the male head of the household.

Use of region-specific income scores is recommended for all but nationwide samples. Nationally standardized scores for occupations are given in a list based on a classification scheme of the U.S. Bureau of the Census. Statistical methods used to develop the SES weighting system were similar to those used by Hollingshead but with a much larger and more representative sample and with more comprehensive and contemporary measures of income, education, and occupation.

The optimum prediction of preventive health behavior can be obtained by combining the education, income, and occupational scores weighted differently for white and nonwhite persons, groups, or residents of census tracts.

Regression weights are essentially the same for either income or occupation when combined singly with education of the female head of household. The education and income two-factor index is highly correlated with preventive health behavior. Occupation, however, is more closely related than income to preventive dental care and well-baby visits. Income is more highly correlated with prenatal care and poliomyelitis immunizations.

The main use of SES scores will be to partition variance in health behavior explained by socioeconomic factors so that other contributing variables, such as knowledge and attitudes, can be analyzed independently. The best SES index, therefore, will be a composite of those variables most highly correlated with the behavior being investigated.

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Tearsheet Requests

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Conference Calendar

October 15-16, 1970. Telecommunication Conference, Madison, Wis., University of Wisconsin.

October 26-27, 1970. Forty-sixth Annual Conference for Veterinarians, Columbia, Mo., University of Missouri School of Veterinary Medicine.

November 5-7, 1970. Nutritional and Environmental Problems in the Inner City, Nashville, Tenn., Me-

harry Medical College.

November 14-18, 1970. Sixteenth Annual Meeting of the American Association for Inhalation Therapy, New Orleans, Jung Hotel.

November 19-20, 1970. Special Lectures Series on Conflicts in Water Resources Planning—What Are the Remedies?, Austin, Tex., Chariot Inn Motor Hotel.

February 15-16, 1971. Virus and

water quality: Occurrence and control. Thirteenth Water Quality Conference. Urbana, Ill.

March 29-April 2, 1971. Third International Congress of Psychosomatic Medicine in Obstetrics and Gynaecology, London.

April 5-6, 1971. American Association of Planned Parenthood Physicians, Kansas City, Mo., Hotel President.