DOCUMENT RESUME

ED 070 801 UD 013 112

AUTHOR	Hamill, Peter V. V.; And Others
TITLE	Height and Weight of Children: Socioeconomic Status, United States. Vital and Health Statistics, Series 11, Number 119.
INSTITUTION	National Center for Health Statistics (DHEW), Rockville, Md.
PUB DATE	Oct 72
NOTE	91p.
AVAILABLE FROM	Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 ($1.00)
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	Age Differences; Body Height; Body Weight; *Economic Factors; *Elementary School Students; Income; *National Surveys; Parent Education; *Physical Characteristics; Racial Differences; Rural Urban Differences; Sex Differences; *Social Differences; Socioeconomic Status; Statistical Analysis

ABSTRACT

This is the second report on height and weight of U.S. children, six to 11 years old, from Cycle II of the Health Examination Survey. The first report analyzed and discussed data on height and weight by age, sex, race, and geographic region. This second report carries the analysis and discussion of height and weight data further by considering some measurable socioeconomic variables. Cycle II of the Health Examination Survey, conducted from July 1963 to December 1965, involved selection and examination of a probability sample of noninstitutionalized children in the U.S. aged six to eleven years. This program succeeded in examining 96 percent of 7,417 children selected for the sample. The examination had two focuses: on factors related to healthy growth and development as determined by a physician, a nurse, a dentist, and a psychologist, and on a variety of somatic and physiologic measurements performed by specially trained technicians. Several separate interviews in the weeks preceding the examination performed a variety of functions. They identified the child eligible for the sample; they obtained demographic information and some family health and selected family socioeconomic information; and they obtained the child's developmental and early medical history and current information about his health status. (Author/JM)

W

Data from the
NATIONAL HEALTH SURVEY

Series 11
Number 119

Height and Weight of Children:

Socioeconomic Status

United States

Variations in height and weight measurements by annual family income, parents' educational level, and urban-rural classification for children 6 through 11 years of age in the United States, 1963-65, are presented and discussed.

DHEW Publication No. (HSM) 73-1601

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

Health Services and Mental Health Administration
National Center for Health Statistics
Rockville, Md. October 1972

NATIONAL CENTER FOR HEALTH STATISTICS

DIVISION OF HEALTH EXAMINATION STATISTICS

COOPERATION OF THE BUREAU OF THE CENSUS

In accordance with specifications established by the National Health Survey, the Bureau of the Census , under a contractual agreement , participated in the design and selection of the sample, and carried out the first stage of the field interviewing and certain parts of the statistical processing.

Vital and Health Statistics - Series 11-No. 119

DHEW Publication No. (HSM) 73-1601
Library of Congress Catalog Card Number 70-190011

CONTENTS

	Page
Introduction	1
Examination Method	2
Height	2
Weight	2
Interview Method	3
Definition of Variables	3
Results	5
Analysis by Smallest 10 Percent of Children	10
Discussion	10
Shape of Relationship	10
Income Versus Educational Level	11
Other Variables	13
Urban-Rural Differences	13
Comparison With Other Populations	16
Secular Trend	20
Genetic Factors	25
Size and Health	25
References	28
List of Detailed Tables	30
Appendix I. Statistical Notes	71
The Survey Design	71
Replication and Training for the Measurement Process	72
Parameter and Variance Estimation	73
Standards of Reliability and Precision	73
Hypothesis Testing	73
Appendix II. Demographic Variables	79
Definitions of Demographic Coding Terms From HES Procedures Manual	79
Appendix III. Household Interview Questionnaire	83

SYMBOLS	
Data not available	---
Category not applicable	...
Quantity zero	-
Quantity more than 0 but less than 0.05	0.0
Figure does not meet standards of reliability or precision (more than 30 percent relative standard error)	*

HEIGHT AND WEIGHT OF CHILDREN: SOCIOECONOMIC STATUS

Peter V. V. Hamill, M.D., M.P.H., Francis E. Johnston, Ph.D., and Stanley Lemeshow, M.S.[illegible].H.[a]

INTRODUCTION

This is the second report on height and weight of U.S. children 6-11 years old from Cycle II of the Health Examination Survey. The first report analyzed and discussed data on height and weight by age, sex, race, and geographic region of the United States.[1] This second report carries the analysis and discussion of height and weight data further by considering some measurable socioeconomic variables.

Cycle I of the Health Examination Survey (HES), conducted from 1959 to 1962, obtained information on the prevalence of certain chronic diseases and on the distribution of a number of anthropometric and sensory characteristics in the civilian noninstitutionalized population of the continental United States aged 18-79 years. The general plan and operation of the survey and of Cycle I are described in two previous reports,[2,3] and most of the results are published in other PHS Publication 1000-Series 11 reports.

Cycle II of the Health Examination Survey, conducted from July 1963 to December 1965, involved selection and examination of a probability sample of noninstitutionalized children in the United States aged 6-11 years. This program succeeded in examining 96 percent of the 7,417 children selected for the sample. The examination had two focuses: on factors related to healthy growth and development as determined by a physician, a nurse, a dentist, and a psychologist and on a variety of somatic and physiologic measurements performed by specially trained technicians. The detailed plan and operation of Cycle II and the response results are described in PHS Publication 1000-Series 1-No. 5.[4]

The first report, *Height and Weight of Children, United States,* by Hamill, Johnston, and Grams, initiated a series presenting analyses and discussion of data on heights, weights, skinfolds, and 25 other body measurements performed in Cycle II by variables such as age, sex, race, geographic region, annual family income, and education of parent as well as IQ, self-concept, school achievement, and skeletal age. The first report served as both the initial presentation of data and the background for discussion. Both this second and the ensuing reports interpreting the other body measurements will contain only enough repetition of discussion to be an intelligible entity and will frequently refer to the first report, Series 11-No. 104. These reports on body measurements from Cycle II should be considered not as independent studies, but each one as a step or chapter in a lengthy multistage analysis and discussion of the data on physical growth and development of U.S. children 6-11 years old.

The present report focuses on the effects of socioeconomic factors, as measured in Cycle II of the HES, on the stature and weight of children. The report has been organized to accommodate various types of readers. The main text contains

[a]Medical Advisor, Children and Youth Programs, Division of Health Examination Statistics; Professor of Anthropology, Temple University, Philadelphia, Pennsylvania; and Analytical Statistician, Division of Health Examination Statistics, respectively.

just enough detail for continuity of presentation to the interested reader, while detailed tables, which follow the text, present the data and major analytic results of the study. Illustrative material such as documents and instructions and a rather long section describing the analytic tests used are included in the appendixes.

EXAMINATION METHOD

At each of the 40 preselected locations[b] throughout the United States, the children were brought to the centrally located mobile examination center for an examination which lasted about 2½ hours. Six children were examined in the morning and six in the afternoon. Except during vacations, they were transported to and from school and/or home.

When they entered the Examination Center, the children's oral temperatures were taken and a cursory screening for acute illness was made; if illness was detected, the child was sent home and reexamined at a later date. The examinees changed into shorts, cotton sweat socks, and a light sleeveless topper and proceeded to different stages of the examination, each one following a different route. There were six different stations where examinations were conducted simultaneously and the stations were exchanged, somewhat like musical chairs, so that at the end of 2½ hours each child would have had essentially the same examinations by the same examiners but in different sequence. Heights and weights of the different children were taken at successive half-hour intervals during the day, and the exact time of each examination was recorded so that possible diurnal or sequential effects could be analyzed.

Height

Height was measured in stocking feet, with feet together, back and heels against the upright bar of the height scale, head approximately in the Frankfurt horizontal plane ("look straight ahead"), and standing erect ("stand up tall" or "stand up real straight" with some assistance and demonstration when necessary).[c] However, upward pressure was not exerted by the examiner on the subjects' mastoid processes to purposefully "stretch everyone in a standard manner" as is recommended by some.[5] It is reported that supine length, that is the recumbent position which relieves gravitational compression of the intervertebral spaces, yields 2 centimeters (cm.) greater length (height) and that height with the "upward pressure technique" measures 1 centimeter more than with HES technique.[6]

The equipment consisted of a level platform to which was attached a vertical bar with a steel tape. Attached to the vertical bar perpendicularly was a horizontal bar which was brought down *snugly* on the examinee's head. Attached to another bar in *the same plane as the horizontal measuring bar* was a Polaroid camera which recorded the subject's identification number next to the pointer on the scale giving a precise reading. The camera, of course, not only gave a permanent record minimizing observer and recording error but, by sliding up and down with a horizontal bar and *always* being in the same plane, also completely eliminated parallax. That is, if the pointer had been in the space in front of the scale, it would have been read too high if the observer had looked up at the scale from below or too low if read down from above.

Weight

A Toledo self-balancing scale that mechanically printed the weight to tenths of pounds directly onto the permanent record was used. This direct printing was used to minimize observer and recording errors. The scale was calibrated with a set of known weights, and any necessary fine adjustments were made at the beginning of each new trailer location, i.e., approximately every month. The recorded weight was later transferred to a punched card to the nearest 0.5 pounds (lb.). The total weights of all clothing worn ranged from 0.24 to 0.66 lb.; this has not been deducted from weights presented in this re-

[b] See "The Survey Design" in appendix I.

[c] This is the standard erect position described by Krogman.[7]

port. (The weights, then, are 0.24 to 0.66 lb. above nude weight recorded to the nearest 0.5 lb.). The examination clothing used was the same throughout the year so there is no seasonal variation in the weight of clothing. These efforts in quality control appear justified by the excellent level of reproducibility (see discussion of replicate studies in the appendix.)

Interview Method

Several separate interviews in the weeks preceding the examination performed a variety of functions. They identified the child eligible for the sample; they obtained demographic information and some family health and selected family socioeconomic information; and they obtained the child's developmental and early medical history and current information about his health status. Additionally, the appointment for examination and arrangements for transportation were made.

The first interview was conducted by a member of the regular field team of the Bureau of the Census conducted under a contractual agreement with the Division of Health Examination Statistics. This interview identified all eligible children (EC), helped select sample children (SC) from all EC's, performed the household interview from which most of the demographic and socioeconomic data used in this report are obtained, and left a medical questionnaire with the parent to be completed. The interviewer explained that a representative of the Public Health Service would come to the house in about a week for the completed questionnaire.

About a week after the Census interviewer had left this medical history form with the parents of each eligible child, the representative from the Health Examination Survey (affectionately called an HER, and not inappropriately so because all were women) visited the household to pick up the form. That visit was designed to accomplish several things. If the questionnaire had not been completed, the HER attempted, usually successfully, to assist the parent to complete it. If it had been completed or partly completed, the HER reviewed it, quickly editing and correcting incomplete or patently inconsistent entries. The HER then administered an additional interview collecting information that could be obtained better by this means than by a self-administered questionnaire.

If the EC had been determined to be a sample child, the HER explained the plan and nature of the examination program. She obtained the written consent of the parent for the child's participation in the examination, for the survey to transport the child to and from the mobile examination center, and for the survey to obtain additional information from school personnel, from a physician's, dentist's, or hospital's records, and from other official sources such as State Registrars.[d]

A much more detailed description of the interviewing process, together with reproductions of all the questionnaires,[e] is contained in the report, PHS Publication 1000, Series 1-No.5, *Plan, Operation, and Response Results of a Program of Children's Examinations*. This section on "Interview Methods" and the following section on "Definition of Variables" have been included in the main text of this report rather than relegated to the appendix because of the crucial role played in this analysis by the socioeconomic variables chosen from the questionnaire's data.

The manner in which these data were initially collected and recorded and subsequently coded and punched greatly influenced how they could best be used analytically. The selection and definition of the following variables used in the analysis were in some cases completely "given" to the authors; in other cases there were several analytic alternatives of which the most appropriate was eventually chosen after preliminary analysis.

Definition of Variables

Measures of family income and the educational level of the parents, together with information about the location and various characteristics of the dwelling, were obtained as part of

[d] Information was obtained about each child from the school. Birth certificates were obtained in 95 percent of the cases from State Registrars. However, except for special handling of a particular child, additional information was not obtained routinely from physician's, dentist's, or hospital records.

[e] Because the household survey by the Census interviewer is of such pertinence to this report, the recording form is again reproduced as appendix III.

the household questionnaire performed by the Census interviewer.

"Income" is the combined annual family income from all members of the household. The respondent was asked: "Which of these income groups represent your total combined family income for the past 12 months, that is, your (husband, wife) etc.?" A card was then shown containing the following income groupings: less than $500; $500-$999; $1,000-$1,999; $2,000-$2,999; $3,000-$3,999; $4,000-$4,999; $5,000-$6,999; $7,000-$9,999; $10,000-$14,999; $15,000 or more. The respondent was instructed to "Include income from all sources, such as wages, salaries, rents from property, social security, or retirement benefits, help from relatives, etc." Whenever the population subgroups were large enough, these income categories were used unchanged in this report; it was decided that more information would be lost than any gains achieved by recombining except when the standards of reliability and precision (discussed on page 73 in appendix I) were not met. It was felt by our most experienced interviewers that incomes were "probably fairly accurately represented" but that if any consistent bias existed it would have been slight underreporting of total income and this was most likely to occur in the lowest income groups.[f]

"Education" is defined as the highest grade level attained by either of the parents (or guardian(s)) as reported by the respondent. As can be seen (page 80 in appendix II) from this manner of recording, the option of analyzing by "highest education of father" or "highest education of mother" was not available. The chief alternatives available were: (1) "highest level by either" (which was chosen) and (2) various ways of combining or attempting to average the levels of both.

The "urban-rural" contrast as used in this report is literally equivalent to "city-farm" dichotomy described as follows: Of the many ways of classifying the population of the United States by size and socioeconomic character of the location of their habitation—i.e., the big city boys versus the farm boys which was significant at the turn of the century, or suburban versus inner city children which is such a significant classification in problems of school boundaries today—the rational ordering of the HES data is heavily committed to a classification scheme using the "Standard Metropolitan Statistical Area" prescribed by the Statistical Policy and Management Information Systems Division (Executive Office of the President/Office of Management and Budget) in a 1967 report entitled *Standard Metropolitan Statistical Areas.*[8]

This commitment exists not only because of the intrinsic merits of this scheme but also because the multistage sampling design of the Health Examination Survey was devised with the cooperation of the Bureau of the Census using this stratification scheme in the selection of the sample. The Standard Metropolitan Statistical Area (SMSA) is defined in the introduction of the above report as: "Each standard metropolitan statistical area must contain at least one city of at least 50,000 inhabitants .... The standard metropolitan statistical area will then include the county of such a central city, and adjacent counties that are found to be metropolitan in character and economically and socially integrated with the county of the central city." As of May 1, 1967, there were 231 such areas.[g] All the inhabitants of the United States can, then, be grouped into either SMSA (primarily large cities and their surrounding areas) or not-SMSA (small cities, towns, villages, farms, and other rural localities).

In attempting to make sound epidemiologic sense within this scheme, two contrasting groups were selected for analysis from the many possible groupings: "central city" (i.e., everyone within the city limits) of SMSA versus "rural farm." Two qualifiers were added to adjust these variables for more accurate contrast: the population was restricted to whites only who then were divided into those having a total family income per annum above $3,000 and those below $3,000.

[f]Some validation studies have been attempted both in Cycle I on adults[3] and from some followup data from the Bureau of the Census. Because of noncomparability of designating terms, definitive conclusions could not be drawn. However, by general inference it is "judged" that the effect of this possible underreporting is probably insignificant for the present analysis, so no adjustment has been attempted.

[g]In addition, there were two super SMSA's entitled Standard Consolidation Areas, defined from among these 231: viz, New York-Northeastern New Jersey (14, 759,428 by 1960 census) and Chicago, Illinois-Northwestern Indiana (6, 794,461 by 1960 census).

"Age" is the chronologic[h] age at the time of examination as determined by birth certificate for 95 percent of the subjects. (The age reported by the parent was used for the remainder.) The age interval for Cycle II was 6.0-11.99 years at time of selection for examination.[i] The value used as a label for each age group in the graphs and tables is the integer referring to age at last birthday, while the value used for all calculations and as plot points is actually the mean age of the group. Hence, "8 year old" means all children 8.00 through 8.99 years with a mean value of 8.51 years for boys and 8.49 for girls (table 1, Report No.104). The method of reckoning age is the source of such frequent confusion when comparing different studies and one group of children with another that, despite the repetitiousness, the statement, "age at last birthday" will be included with every table and chart.[j] And note that even though there were 72 "12 year olds"[h] in the "11 year old" group, the mean ages are still 11.52 for boys and 11.54 for girls.

"Race" was recorded as "white," "Negro," and "other races." The white children comprised 85.69 percent of the total, the Negro children 13.87 percent, and children of "other races" only 0.45 percent. Because so few children were classified as "other races," data from them have not been analyzed separately. These data were included when "total" is used but are dropped when a white/Negro dichotomy is used.

As more fully explained in the appendix in the section on statistical notes, because of the complex nature of the sample and the associated weighting scheme, many desirable analytic techniques, such as multivariate analysis, were not used because the methodology has not yet been adapted to its complexities.

RESULTS

All sample sizes in the tables were *weighted sample sizes* (i.e., the estimated number of children in the population). However, tables 1 and 2 break down the *unweighted sample of 7,119 children* into age, sex, race, income, and education categories.

Table 3 and figure 1 present the mean height and mean weight for each of the 10 family income and eight education of parent groups for all boys and girls separately. The data suggest a positive relationship in all cases. That is, when the subjects are grouped by annual income (or by educational level) arranged consecutively from the lowest to the highest, it appears that height (or weight) increases. A similar impression of increasing trends was observed on visual inspection of each of the 12 age-sex categories.

Both to confirm these visual impressions and to examine these relationships in much more detail, a variety of analytic techniques were applied to the data, each of which is described rather fully in pages 73-78 of appendix I. The major findings from these analyses are presented in this section of the report. All the data are analyzed for the socioeconomic variables by each of the six age groups (6-11) and separately for boys and for girls which provides 12 basic population subgroups, consisting of approximately 600 children each, to test for consistency of findings. Additionally, height and weight are always analyzed separately, while recognizing their high correlation (i.e., the heavy dependency of the child's weight to his height).

When, within each of these 12 subgroups, the population is arranged further by the 10 income categories and the mean heights (and mean weights) (table 4) *of only the two extreme income groups*

[h] "Biologic age" or "maturational age" will be used in some future reports as discussed in Report No. 104.

[i] Although the date of examination determines the age used in these data, the age at the time of interview was the age criterion for inclusion in the sample. In 72 cases the children were less than 12.0 years when selected but when actually examined (days or a few weeks later) they had passed their 12th birthday. The oldest child was 12 years 36 days. In the adjustment and weighing procedures these 72 were included in the 11-year-old group.

[j] Many studies use "8 year olds" to mean all children 7.5 through 8.49 years. Although this method has the great virtue of the label and the value used (i.e., the mean of the group) being approximately the same, it is not the way the age of children is reckoned in everyday life. Furthermore, the logistics of the Health Examination Survey examined children from 6.0 through 11.99 years so that if the mean age were centered on the integer, a full half year of children would have been ungroupable at either extreme, viz, those under 6.5 and those over 11.5, unless one used a 2-year age grouping which is very unusual. Of course, adjustments for any age differences are made when comparisons with other studies are made in this report.

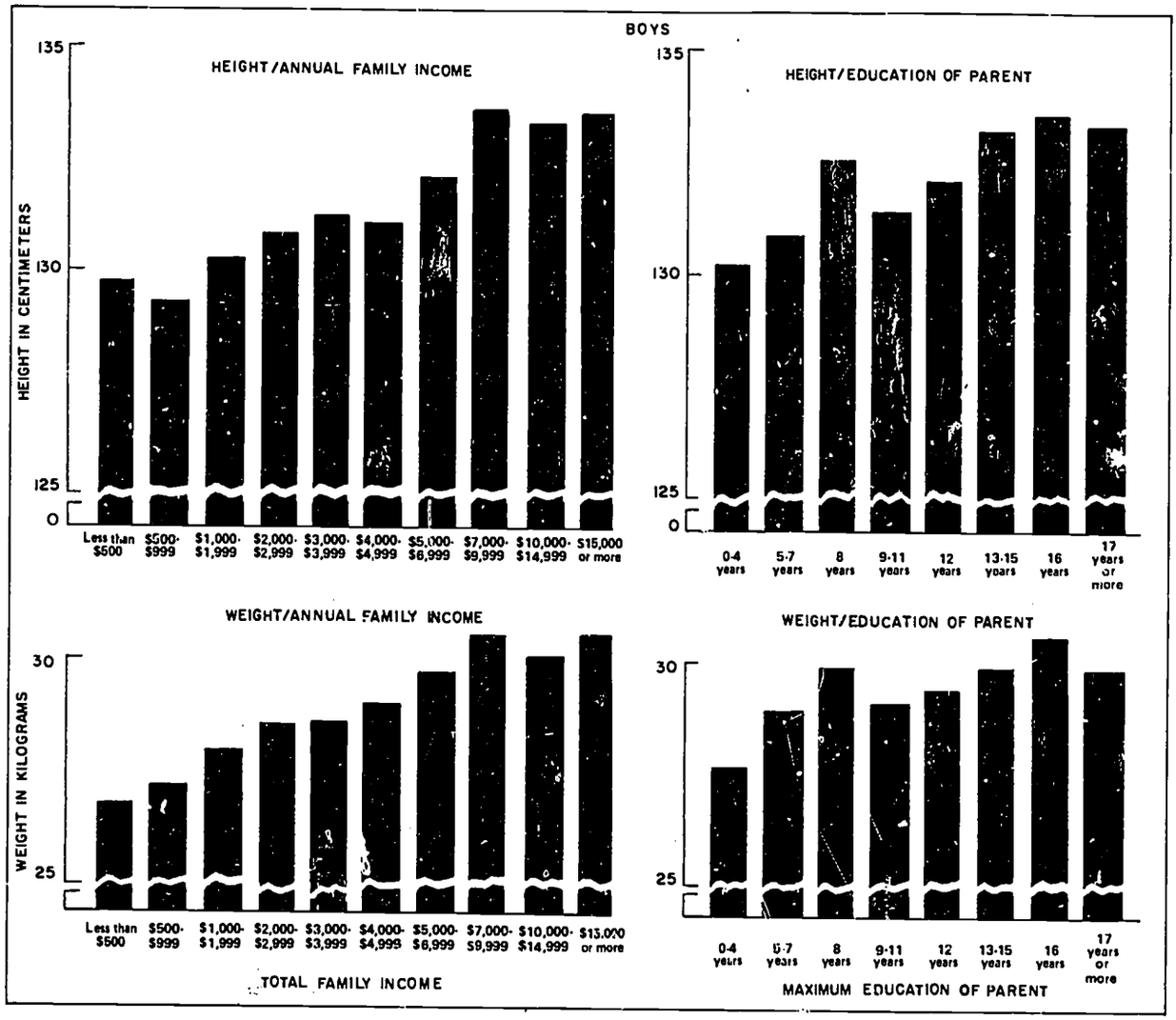

Figure 1. Mean height and weight for U.S. children 6 through 11 years, by annual family income and education of parent.

are compared (i.e., less than $500[k] versus $15,000 or more), in 11 of 12 times the higher income group had the greater height and all 12 times had the greater weight value; and, similarly, when the population was grouped by eight education categories (table 5) and only the two extreme educational groups were compared (i.e., "less than 5 years" of school versus "17 years or more"), the highest educational group had the greatest value all 12 times for height and 11 of the 12 times for weight. However, when each pair of these differences was separately tested parametrically, the magnitude of the difference in this sample size was rarely great enough to be significant at $p<.05$ (table 10). A similar analysis was done for whites alone (from data in tables 6,7) and for Negroes alone (tables 8, 9), although the results of such analysis are not shown in this report.

[k]When the mean for the group was too unstable by the criteria discussed on page 73 of appendix I, a pooled mean with the contiguous group was used. Whenever an asterisk appeared in table 4, the means were pooled. The educational groupings required no pooling.

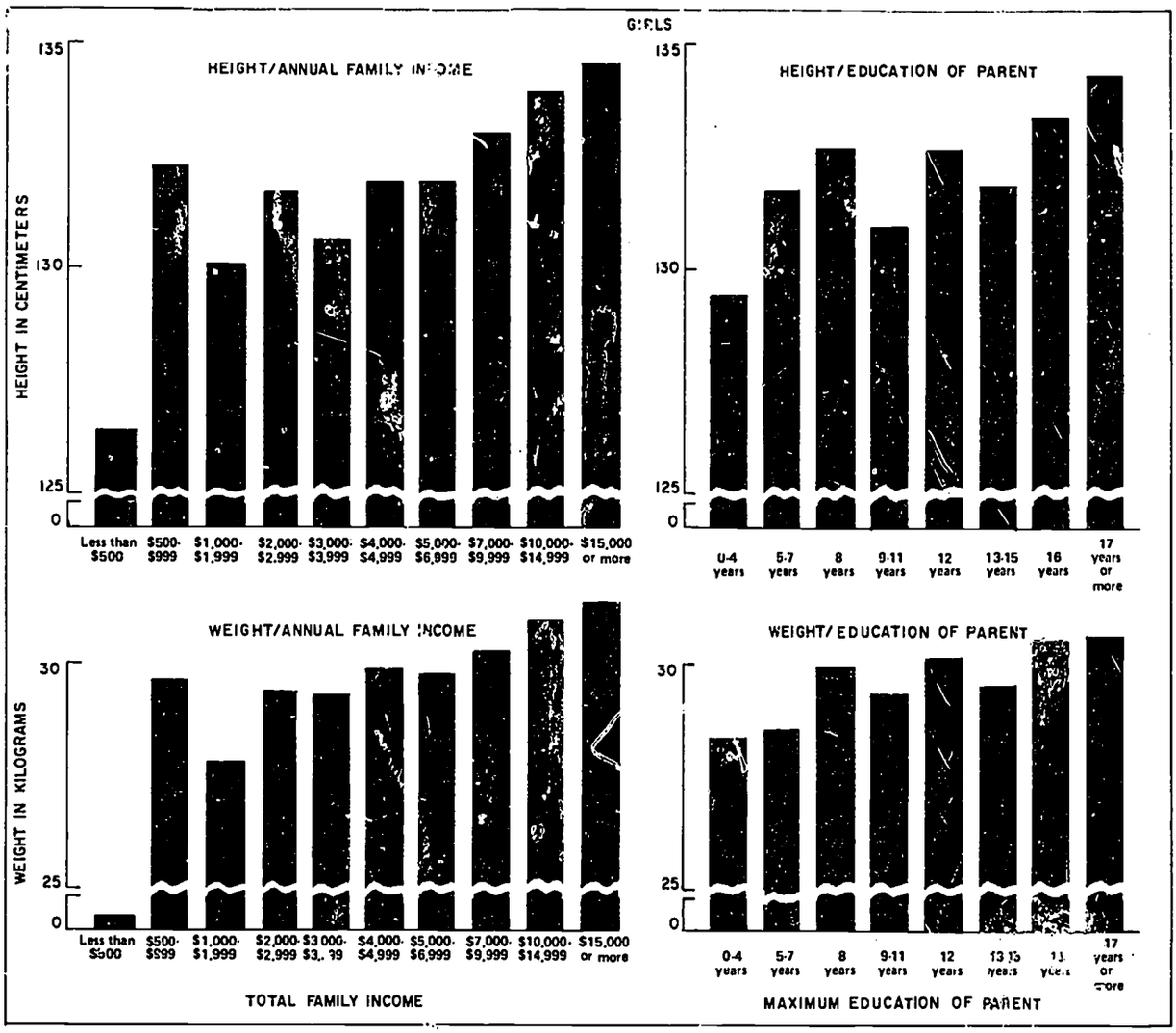

Figure I. Mean height and weight for U.S. children 6 through 11 years, by annual family income and education of parent—Con.

As described in pages 74-78 of appendix I, several nonparametric tests were selected as best suited for examining the relationships between height and weight and socioeconomic status.

One of these, Daniel's Test for Trend (page 74), tests the hypothesis that as income (and/or educational) level increases height (or weight) increases monotonically. Within each of the 12 age-sex categories the sample is first grouped by ascending income (or educational) groups and the mean height (or weight) for the group is assigned. These groups are then renumbered, or reranked, from one through 10 by increasing order of magnitude of the height (or weight). If there were a perfect monotonic relationship, the two rankings should correspond exactly. Failing this, the strength of this relationship may be expressed by using Spearman's coefficients of rank correlation as applied in Daniel's Test for Trend.

Using the .05 critical value for Spearman's Test as an operating criterion, there were 10 significant correlations among the 12 tests performed on the 12 age-sex groups for height and nine of 12 were significant by weight (table 11) where only one or two would be expected by chance alone if, in fact, there were no real relationship between family income and the height and weight of children. When this same procedure was performed using education (i.e., highest educational level attained by either parent) rather than income (table 12), the correlations were even slightly higher: viz, 11 of 12 by height and 10 of 12 by weight.

Even though this manner of testing the relationship between increasing socioeconomic status of the family and the mean size of the children does not produce a perfect match, the fit is so much better than could be expected to occur by chance alone (i.e., if, in fact, there were no real relationship between size of family income and size of children) that the statement "as mean family income increases so does the mean height and weight of the children"

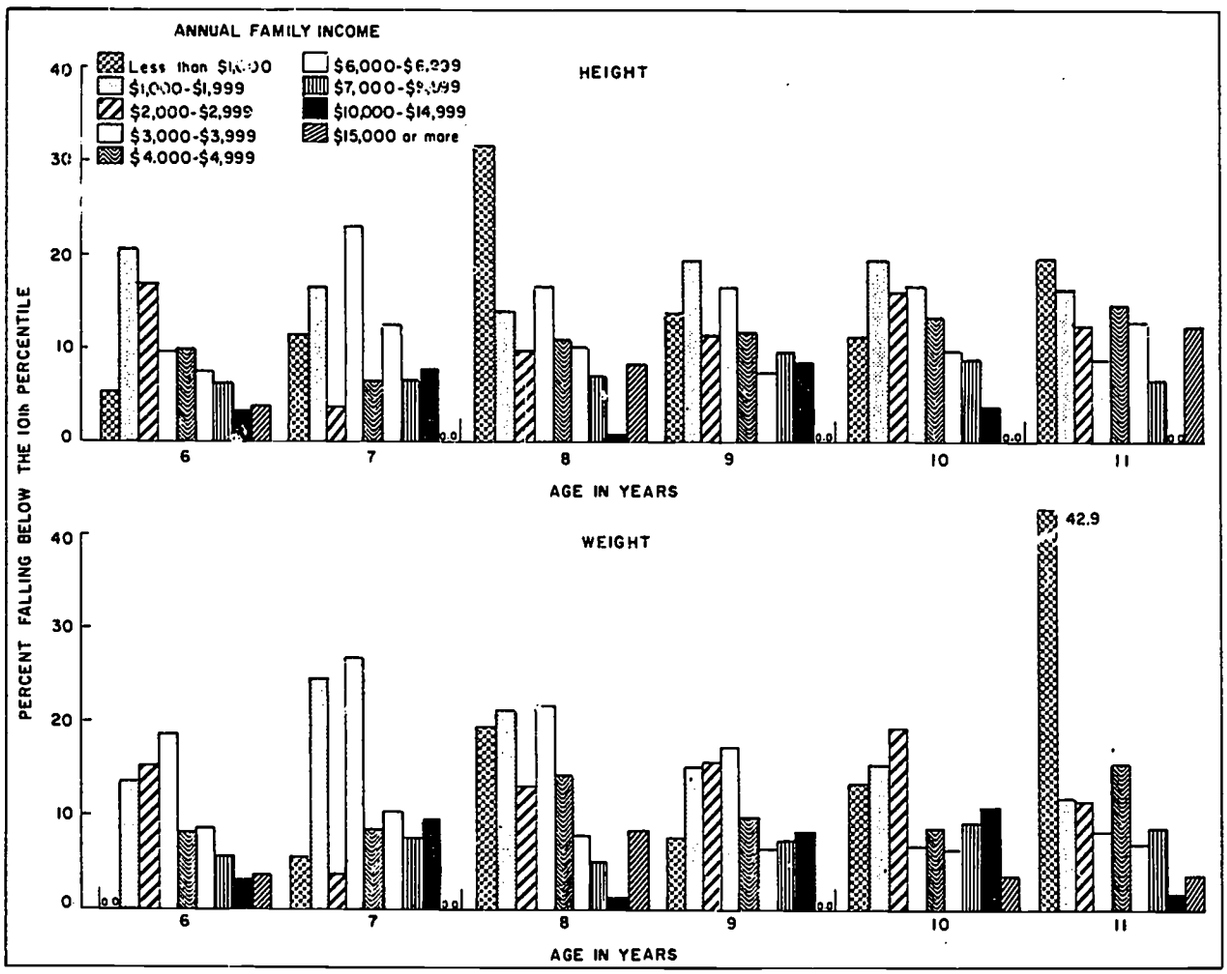

Figure 2. Percentage of girls falling below the 10th percentile of heights and weights specific to each age group, by age, annual family income, and education of parent.

describes the situation much more plausibly than the statement "there is no relationship between family income and height and weight."

The weighted regression analysis described on pages 75-77 of appendix I produced similar results (tables 11,12). The slope of the line fitted through the mean heights (or weights) and the midpoint of each income (or educational) level was tested to determine whether it differed statistically from a zero slope, i.e., no relationship at all between height (or weight) and income (or education.) Of the 12 times the line was fitted by height and the slope was determined and then tested for income groups, 10 of the lines were significantly greater than zero ($p < .05$) and when fitted by weight eight were significant. When these same tests were performed on the population grouped by educational level, 11 of 12 were significantly greater than zero both by height and by weight. If, in fact, there were no real relationships it would be expected by chance alone to find, on the average, only one slope in 20 significantly greater than zero at $p < .05$.

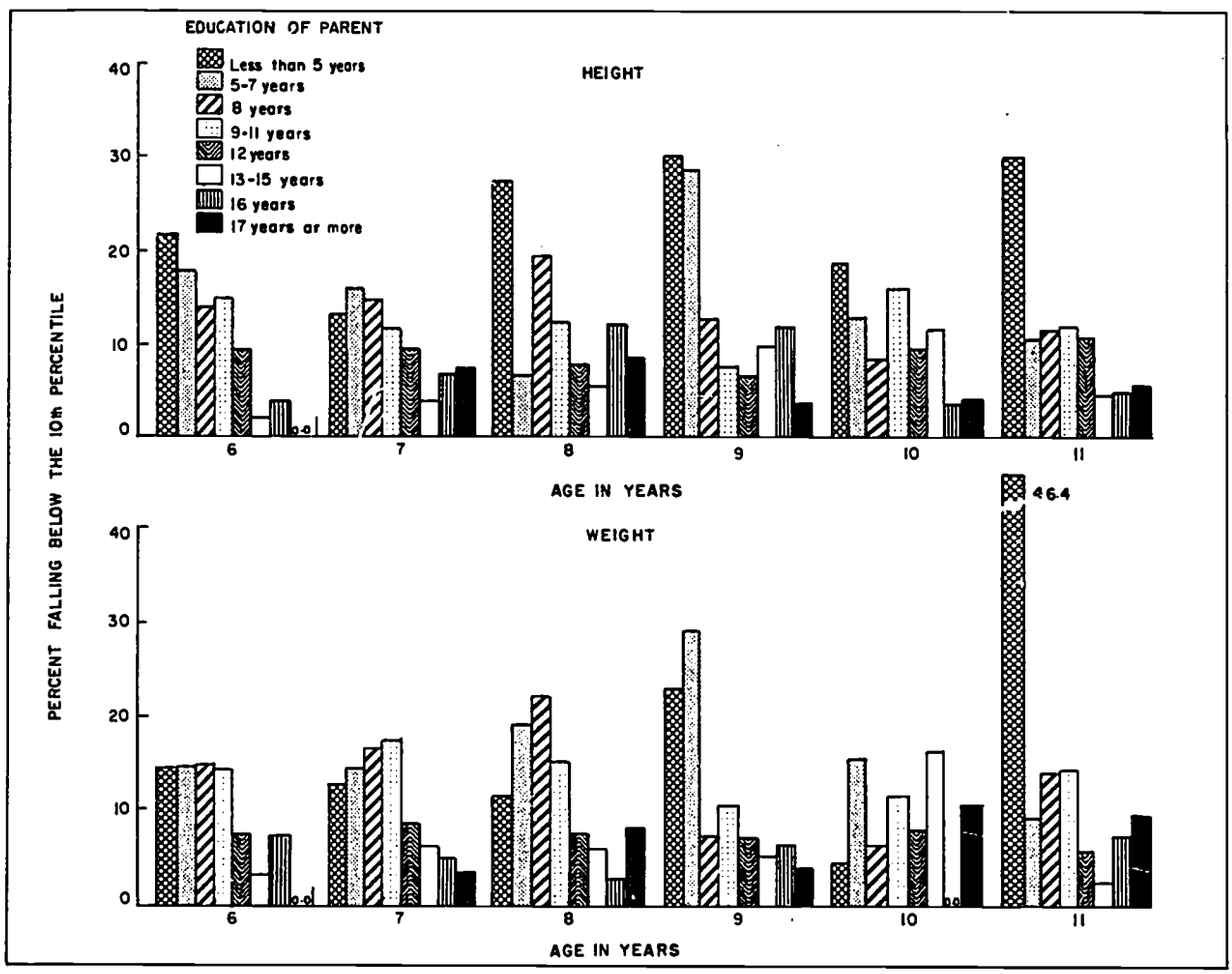

Figure 2. Percentage of girls falling below the 10th percentile of heights and weights specific to each age group, by age, annual family income, and education of parent—Con.

Analysis by Smallest 10 Percent of Children

Because of the increasing interest in population surveys that aim to assess the nutritional status of children, a separate analysis was performed that focused especial attention on the smallest children in the population by height and/or weight. Percent distributions[m] were obtained for each of the 12 age-sex groupings for height and for each of those for weight (figure 2 and tables 13,14) and the first decile or the lowest 10th percentile by height and by weight was chosen as the center of the study. The data were arranged by family income and educational groupings as before.

The height (and weight) value at the lowest 10th percentile, obtained for each age-sex group, was designated the cutoff point for that group. Then, for each of the 10 income (or eight educational) groups within each of the 12 age-sex groups, the percent of children falling below this value was correlated with family income (or educational level).[n]

Spearman's rank correlation was performed on these percentages under the cutoff point as was done with the means (pages 5-9 of text and pages 74-75 of appendix I). The number of significant correlations as seen in table 15 was less than when the means were compared (i.e., 10 of 12 by height and six of 12 by weight for income and nine of 12 by height and seven of 12 by weight for education); however, the sampling variability at the extremes of the distribution makes this type of statistical testing much more erratic.

DISCUSSION

The fact that there is a positive relationship between the socioeconomic status of the family, as determined in the Health Examination Survey, and the heights and weights of the children, i.e., in general, as income and educational level increase the physical size of the children, at ages 6-11, also increases, seems well established. This finding was not unexpected.

But what is the shape of this relationship? And what is its magnitude not only in terms of mere numbers but also when gauged by comparison with similar relationships from other studies? The behavior of the other variables—both dependent and independent—will also be examined. Various uses of the data will be suggested and discussed followed by speculation on the larger meaning of the present findings.

Shape of Relationship

Preliminary inspection of the data had suggested that rather than a monotonic increase between income (or education) on the one hand and height (or weight) on the other—as has been demonstrated here—there was a major single step increase at about $3,000 (figure 3A rather than B). It was as if this jump were an identifiable threshold or critical level in terms of dollars.

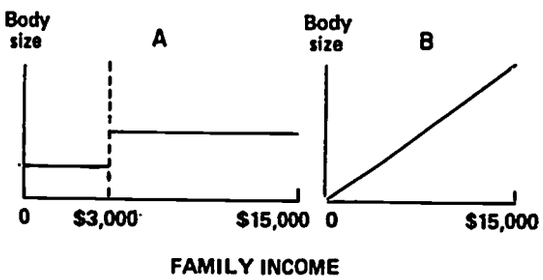

Figure 3. Concept of step function (A) versus linearly increasing function (B).

[m] In the first report (page 4), it was stated "It was assumed that the measurements—heights and weights—were distributed uniformly across each of the height and weight groups. On the basis of this assumption the linear interpolation method was used to derive both the height and weight percentiles. For both the heights and weights the 5th, 10th, 25th, 50th, 75th, 90th, and 95th percentiles were derived for each sex-age group." On further examination, this assumption was quite incorrect. The measurements were not evenly distributed at the extremes. In fact, by actual calculation, several times this method produced only 2 and 3 percent of the population below the computed estimated 10th percentile. In the present analysis percentiles were computed by frequencies for each single centimeter group rather than a 5-centimeter group. This way the error by extrapolation cannot possibly exceed a centimeter; whereas in the other it exceeded 2 centimeters several times.

[n] As seen in table 13, since none of the percentages for the income group of less than $500 were reliable by the criteria (described on page 73 of appendix I), the income group of less than $500 was pooled with the income group of less than $1,000 for analysis by separate age-sex groups. Similar pooling was not necessary for the analysis by educational level.

This would seem to imply that below this threshold, lack of money was the primary limiting factor operating through inability to purchase sufficient food, medical care, and proper sanitary conditions. Similarly, above this threshold the monetary limitation would not operate much, if at all. It would almost suggest a simplistic solution: merely supply dollars and this "bad correlation" would disappear.

The present analysis confirmed that $3,000 was *a dividing line*—those children whose family incomes were less than $3,000 were on the average significantly smaller than those from families with incomes more than $3,000. But it was just one of a succession of possible dividing lines. It was also found that $2,000, $4,000, and $5,000 performed the same sort of function *and to the same degree.* Percentages falling below 10th percentile value for each of these dichotomies within each sex and age group are shown in table 16, and the analysis of these data are described in pages 77 and 78 of appendix I.

This latter finding is also much more consistent with the demonstration of trends, that there is a monotonic increase in body size of children from families with incomes less than $500 to $15,000 or more. It also suggests that *all else being equal,* on the average, as the family income (and/or education) increases (at least within the limits of the categories used) the size of the children keeps increasing.

Despite this, when the selected analytic technique has called for a single dividing line so that only two populations are contrasted (i.e., a dichotomy with those above versus those below), the $3,000 cutoff point has been used in some of our analyses. In the standards prepared for the Maternal and Child Health Service publication, *Screening Children for Nutritional Status: Suggestions for Child Health Programs,* published in July 1971,[9] the HES data were standardized for both poverty and prematurity by eliminating all children whose birth weight was under 5 pounds 9 ounces and also those who came from families with incomes less than $3,000. By eliminating the "prematures" (defined by birth-weight criteria), which is a group containing an unduly high proportion of chronically ill and also persistently undersized children,[10] and by cutting off the extreme tail of low income and its associated effects, the aim was to provide tables of heights and weights that would "reflect as closely as possible the anticipated growth of normal well-fed children in the United States."[9]

In the urban-rural analysis later in the text, the data were standardized by race (and its associated effects in the United States in the 1950's and 1960's) and for "extreme poverty" (i.e., the $3,000 cutoff was used again). In these two cases, some cutoff point had to be chosen and, although $3,000 had no more validity (i.e., ability to insure against the confounding effects of monetary deprivation, per se, and the associated variables of ignorance, poor sanitation, poor personal hygiene, poor medical care, etc.) than $2,000 or $4,000 or $5,000, because it had been used earlier it was used again.

Income Versus Educational Level

So far, the terms "socioeconomic," "income," and "education" have been used in this report rather interchangeably. Now they can be examined and discussed individually. Income and educational level are the two most frequently used measures of socioeconomic status: most respondents know the answers rather readily, they are clearly reportable variables, and in some studies they can be objectively verified.

One of the most interesting questions which can be asked of these data is whether the heights and weights (and hence, on a population level, the general health)° of children more closely reflect the family income or the family educational level. (It would have been interesting to discriminate between the educational level of the mother and that of the father. But as noted in the Introduction, page 4, the data could not be grouped in that way.)

Accordingly, an attempt was made to disentangle and then to compare the separate effects of income and education. Does partialling out the effects of one completely destroy the relationship of height (or weight) with the other?

As already reported, the primary analysis repeatedly demonstrated a monotonic increase of height (and of weight) with both education and income—all having been analyzed separately. This,

°See discussion of size and health, pages 25-28.

of course, could have a variety of meanings, the two extreme ones being: (1) income and educational levels are two independent factors operating with about equal force or (2) income is the effective variable, but education and income are so highly correlated that education also demonstrates the same monotonic increase (and vice versa).

It's so evident that income and education interact in so many ways that we know *a priori* that neither extreme could be completely true. The first alternative can be rejected because income and education are anything but "independent factors." And the more complicated second extreme alternative, if true at all, could be true only in degree. The latter alternative would have been demonstrated analytically if partialling out the effects of one completely destroyed the relationship of height (or weight) with the other. But this was not at all the case!

Therefore, an intermediate relationship was sought: viz, acknowledging the high degree of interaction between income and education, when the effects are partialled out by holding one constant and observing the action of the other (as above), which one—education or income—has the greater residual effect?

Rather than obtaining a clear-cut answer to this question, the data would yield only a hint.

Income is held constant by using only those people in the $5,000-$7,000 range—this income group was chosen because it is large enough for analysis (N=1652); it was the modal income group (table 1) in the United States in the early 1960's; and it is clearly above a "poverty level"—and the educational trend is observed (tables 17,18). Then educational level was held constant by using only those who were graduated from high school but did not go to college (table 19). This is clearly the modal educational group and large enough for a "minimal analysis" (N=2750) and the height (and weight) trend by income was observed. Even though these two modal groups were the largest single groups among the HES data, in the tails of both distributions there are many extremely small cells and empty cells.

Spearman's coefficients of correlation demonstrated no consistent trend over all age-sex subgroups (table 20) as was demonstrated with our total population. Four significant correlations were found when holding income constant, while only one was found when holding education constant. Although this gives a slight hint that education is a more important factor than income in affecting the average size of children, it has certainly not been statistically demonstrated.

The comparative regression analysis was slightly more suggestive. When comparing the normalized magnitudes (z values) of the slopes of the fitted regression line of height (or weight) versus income (table 11) to height (or weight) versus education (table 12), for each of the 12 age-sex categories, it was found that education had the greater z values in eight of the 12 groups for weight and eight of 12 for height. By no means are these two analyses considered definite enough to claim as a finding; they are merely suggestive. (See discussion of sign test, page 74 of appendix 1).

The most prudent conclusion is that income and education are so highly correlated and interact in such a complex manner that a study must be specifically designed to tease out and isolate these two variables so that their modes of operation and their relative magnitudes of effect on the normal or healthy growth process of children can be studied with precision and with sufficient number of subjects to draw more definite conclusions. In a multipurpose cross-sectional study such as the Health Examination Survey with so many variables being studied and with a sample representative of the total United States population[P] one is left with—except for, perhaps, a hint that the educational level of parents affects normal healthy growth and development of the children slightly more than their income does—the rather inconclusive conclusion that education and income are simply separate measures of one conglomerate variable, "socioeconomic status," as it affects the size of children.

[P]On the one hand, this type of sample is absolutely necessary to accurately estimate the frequency distribution of these biomedical parameters in the United States; but, on the other hand, when the data from this type of sample is used for *hypothesis testing*, subsamples must be selected which are—by the time all the necessary conditions and characteristics are met—of much smaller size than would be more readily attainable in a single-purpose epidemiologic study.

Other Variables

When looking both at the two dependent variables, height and weight, and at the biologic variables used as the major population subgroupings for analysis (viz, age, sex, and race) little, if any, differences in response to socioeconomic effects can be detected within these contrasting sets of variables.

By careful inspection, the two principal dependent variables—height and weight—appeared to vary by socioeconomic status similarly to each other throughout all sex-age groups. In other words, they seemed equally sensitive to socioeconomic effects.[9]

Again by careful inspection, heights and weights appeared to vary by socioeconomic status for the boys in the same way as for girls, for Negroes as for whites, and throughout the six different single-year age groupings.

It is reported by Acheson that the growth of boys is generally affected more by adverse environmental conditions than is that of girls and conversely, when favorable conditions are restored, that boys have more "catch-up" growth.[11,34] This analysis of HES data can neither confirm nor deny this. Even though this differential was not observed, the cells are so small and the apparent magnitude of effects of socioeconomic deprivation on these grouped data is perhaps so slight that it is not a proper test of the above hypothesis.

It is stated also that children are more sensitive to adverse conditions during the most rapid periods of growth. The most likely ages to detect this, however, would be infancy and adolescence rather than the slower growth between 6 and 12 years. Furthermore, when analyzing for this effect, the data must be looked at in conjunction with skeletal age and other maturational measures so that, if an effect be found, it can be determined whether it be maturational delay or permanent stunting.

An analysis of trends was performed separately on whites and Negroes (tables 11, 12). Although a monotonic increase (identical to that demonstrated for all races combined) was found for "whites only," the same results could not be demonstrated by use of the "Negro only" data. But rather than inferring that socioeconomic status affects the growth of black children differently from the way it affects the growth of white children, it must be noted (as reported on page 5) that the sample size of the blacks was less than one-sixth that of white children. There were about 80 Negro children within each of the 12 sex-age groups. After these 80 were distributed into 10 economic subgroups, many of the subgroups did not contain any or contained only one or two subjects (table 1). The small cell frequencies necessitated collapsing the 10 income and educational categories into sometimes as few as four or five pooled categories because of the criteria explained in the appendix for determining the reliability of HES data. The nature of the Spearman correlation coefficient is such that smaller correlations will be found statistically significant if there are more degrees of freedom (i.e., a larger number of categories). This may explain why it was often impossible to demonstrate significant increasing trends with the collapsed Negro data. Even though the severe limitation on the sensitivity of the test imposed by the sample size almost negates the attempted parallel analysis by race, there is no evidence, either within the HES data or from other sources, to seriously consider the proposition that socioeconomic factors affect the growth (and health) of black and white children differently.

Urban-Rural Differences

In the monumental compendium, *Growth of Man* by Wilton Krogman, in the Tabulae Biologicae series in 1941,[12] in which summary tables

---

[9] Analogous to income and education as measures of socioeconomic status, it can be said that height and weight are simply the two most common and useful measures of the single dependent variable, "size." In these analyses height and weight are not used as two variables independent of each other which, of course, they are not. However, when differences in size of children are used, as here, to examine differences in environmental circumstances—rather than comparative growth over time of a group of children from similar environments as would be found in the traditional child growth studies (in which the chief determinants of variation are genetic)—the two measures are more independent of each other (e.g., a fat boy in a circus versus the emaciated child in a war-ravaged country can be the same height and age).

The complex relationship between height and weight will be examined further in future reports when additional body measurements are considered.

of all the data on human growth in the world literature between 1926 and 1938 are presented, there were only six studies (three, United States; one, England; one, Scotland; one, Swiss) which dealt in any way with urban-rural differences in the size of children. All of them were simply descriptive of the differences as found without any concomitant analysis of differences in socioeconomic status or ethnic composition. In the American studies, the urban children were distinctly larger (but the rural were rural Utah, the Eastern Tennessee mountains, and Puerto Rico) while in both Scotland and England the farm children were distinctly larger than the urban. The Swiss study which compared army recruits found that before 1910 the rural youths were much the larger, but by 1930 there was almost no detectable urban-rural difference.

Since then Wolanski and associates[13-15] have been intensively comparing growth in Polish children (i.e., rates, attained size, and patterns of growth)between urban children and those from the fast disappearing medieval villages. They consistently find size and most measures of physiologic response superior in the urban children together with an earlier maturation. Although their data are extensive (including genetic studies) and their analyses are sophisticated, they have been unable to satisfactorily adjust for the accompanying great socioeconomic disparity between village and city dwellers in Poland to measure the effect of urbanization per se on the growth of children.

This analysis of HES data is an attempt to make some contribution to the subject which can be very loosely stated, "In general, is country living more healthful for children than city living?" This loose question suggests many others like the following: "Does the boy who stays on the farm grow bigger and stronger than his cousin who moved into the city?" and "Does the greater amount of fresh air [and outdoor living and exercise?]of the farm promote better growth?"; "For parents who are keenly interested in these kinds of questions—and at the same time have the ability to make the choice—is it better to raise their children in the city or in the country?"

When trying to get at some of these questions with these HES data, a variety of ways of grouping and organizing the data have been attempted. As pointed out on page 4, biologic epidemiologic sense had to be made within the given classification system. Page 81 of appendix II gives the coding definitions in more detail and also lists the names and populations of the 24 SMSA central cities that constituted the HES sample of cities. Within the city limits of these 24 places there are shared in common most of the following: heavy industry; commerce; high population density; air and noise pollution; automobile traffic; diversity of entertainment attractions; lack of open space; plethora of asphalt, concrete, and brick rather than vegetation; broad population mixture of various ethnic and socioeconomic groups; and many cultural and educational opportunities. There are also sophisticated medical centers in most of them, complex and active health departments, and more consistently safe drinking water and waste disposal available almost automatically to every member of the community regardless of geographic section or socioeconomic stratum than in rural areas with their overflowing septic tanks, privies, erratic refuse disposal systems, individual water sources, etc.[16]

Using the dichotomy SMSA/not-SMSA, SMSA is further subdivided into: central city/not central city. Central city is a much more definable population and much more homogeneous in character than is SMSA/not central city. Although, generally, SMSA/not central city is "suburbia" and all that goes with it, it ranges from the highly industrialized Wyandotte-Ecorse section of the Detroit SMSA to Gibson Island, Maryland, or North Shore Long Island, New York.

The other side of the dichotomy not-SMSA, includes most[r] of the urban but small cities, towns, and villages under 50,000 population on the one hand and almost all[r] the frankly rural on the other. Rural is further subdivided into farm and nonfarm. The farm population is defined as all persons living in rural territory in places of 10 or more acres from which sales of farm products amounted to $50 or more during the preceding 12 months or on places of less than 10 acres from which sales of farm products had amounted to $250 or more during the preceding 12 months (appendix II, page 81).

[r]Many small urban cities have been included as part of an SMSA and 1-2 percent rural, including farms, will also fall in SMSA.

To increase the sample size, both farms over 10 acres in size and those under 10 acres were combined into one group. But this shouldn't create too much heterogeneity in the group for analysis because both populations were standardized by race and income. The rural nonfarm category was discarded because it was such a heterogeneity, as the Park Ranger's House in Yosemite and large estates on Long Island to shacks in the deepest recesses of Appalachia and mud huts in the sands of Southern Texas.

By standardizing for race and major income break (i.e., less or more than $3,000) and using the two most homogeneous and yet contrasting groups—contrasted by degree of urbanization—an attempt is made to partial out the effects of "urbanization" itself on heights and weights of children.

As is seen in figure 4 and tables 21-25, there is no discernible effect of "urbanization" per se on height and weight in contrast to the marked effects of income and education. When the mean heights of the 12 age-sex groups are contrasted, in seven groups the children from the central cities are taller while in five groups those from the farms are taller; when the two groups are compared by weight there is a six-to-six tie. Since no effect can be found in the two groups most highly contrasted for urbanization, it is considered unnecessary to examine the data further along these lines. It is concluded that the data from Cycle II Health Examination Survey very strongly suggest that for children growing up in the 1950's and 1960's in the United States it makes no difference, on the average, either in the rate of growth or size attained at any given age as to whether they live in the middle of the big city, in the country, or in a suburb as long as one takes into account the major detectable socioeconomic factors such as income and education. This statement is most confidently made for analysis of white children from families with incomes over $3,000. This subgroup was used in an attempt to standardize for the major socioeconomic variables because it is the largest, homogeneous, statistically stable subgroup for analytic comparison. It certainly does not indicate a lack of interest in examining other population subgroups to see if this is equally true for them. For this kind of comparison the other population subgroups are too small for proper statistical analysis. Although it is not known for certain whether this is equally true for all the other subgroups, we have no reason to believe that it is not; but because of the much smaller numbers available for analysis, we simply cannot speak with the same degree of confidence.

The HES data will not allow an intelligent statement to be made as to whether, on the average, it is better for a black family in the lowest socioeconomic strata to live in an inner city ghetto or out in a rural hovel. Furthermore, the main conclusion is a statement about a central tendency using a comparison of means. It is not a statement about OPTIMAL conditions; it is not a statement about peculiar individual circumstances; and it is not a definite statement about subgroups of this population. It may well be that a football coach looking for the biggest, fastest, strongest young men to recruit might be most likely to find them out in the backwoods where he reputedly did several generations ago. That is, if all the combinations are present which are conducive to large size and robust health—genetically sound (and also "large" genes), absence of disease, good medical care, nourishing and adequate diet, absence of serious injuries, and a generally healthful environment (pages 24, 25)—then the additional stimulus of an unusually vigorous outdoor existence such as reputedly occurred with the Bunyanesque farm boys of Minnesota[5] several generations ago may still be the best of all possible conditions for optimal growth. The present data cannot answer this kind of question.

The main conclusion suggests, however, that in modern America, in general, the distribution of goods, services, and information is such that good food, good medical care, and general healthful living—to the extent that they are reflected in growth and *as long as one is above a certain socioeconomic level*—are equally available to the city boy and to the country boy.

---

[5]There was a colorful story in the 1920's and 1930's, when Bernie Bieman's championship football teams were consistently of such awesome size and power, that when a scout prowling the back country encountered a promising looking farm boy plowing in this field, he would ask directions to the nearest town and if the boy pointed with his hand the scout continued on his way, but if the boy picked up the plow using it as a pointer, the scout became interested.

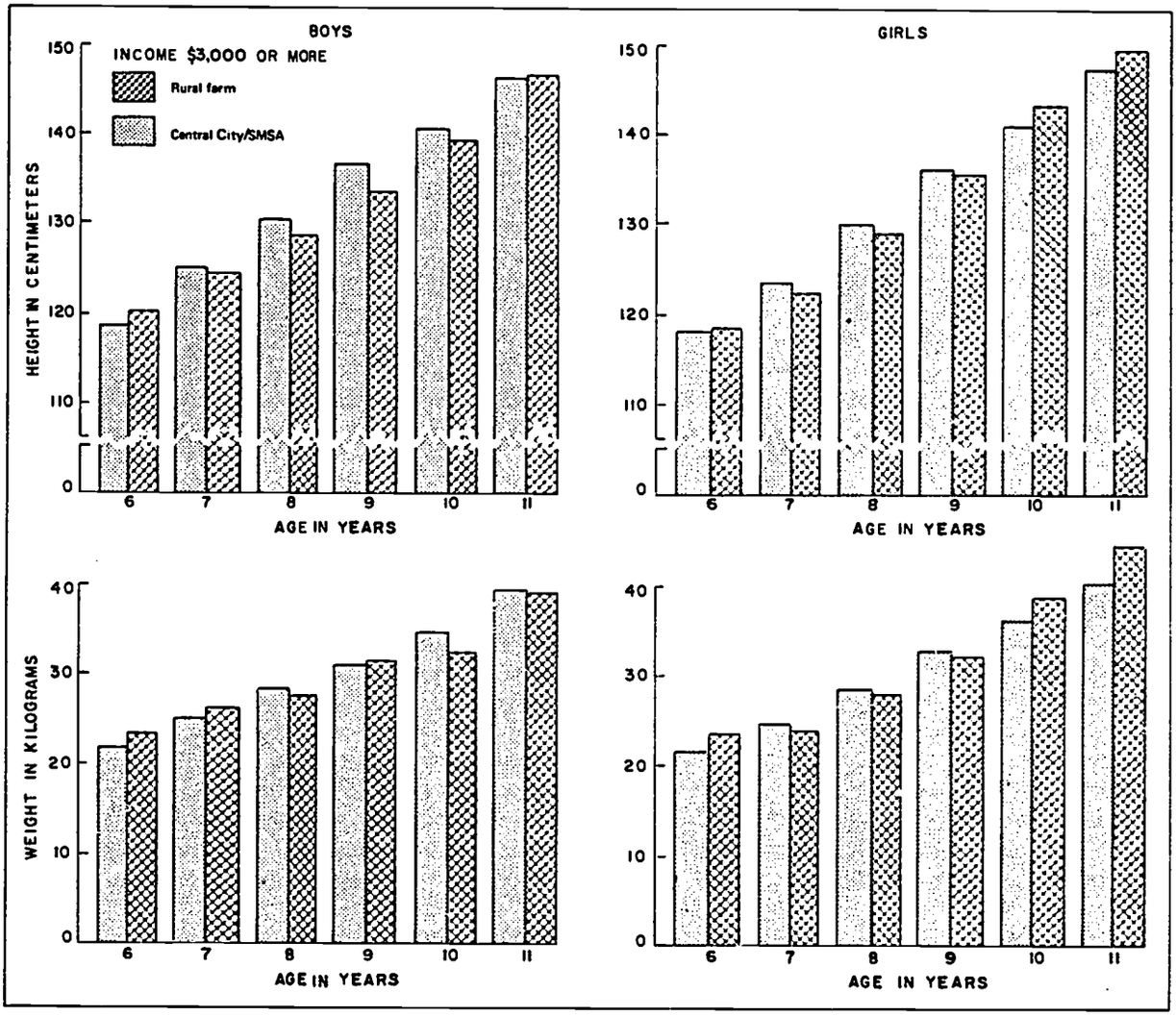

Figure 4. Mean height and weight for children from rural farms with annual family income of $3,000 or less per year and from central city/SMSA with annual family income of $3,000 or more per year, by age, sex, and annual family income.

Comparison With Other Populations

To achieve a sense of scale, to better appreciate the magnitude of the differences of the contrasting socioeconomic groups, the HES data have been plotted against data from other population groups around the world and also against the "secular trend" of North America.

McDowell et al. compared the mean heights and weights of children 6 through 11 years of age from the United States, United Arab Republic (U.A.R.), and India.[17] As described in the report, the sources of data were the following: the U.S. data were the same HES material presented earlier by age, sex, and race by Hamill[1] et al.; the data from India were from a nationwide cross-sectional survey conducted from 1956-65 by the Indian Council on Medical Research; those from Egypt were from a national school health survey in 1962 and 1963 jointly conducted by the Egyptian Central Statistical Committee and the Ministry of Public Health. The comparison is reproduced

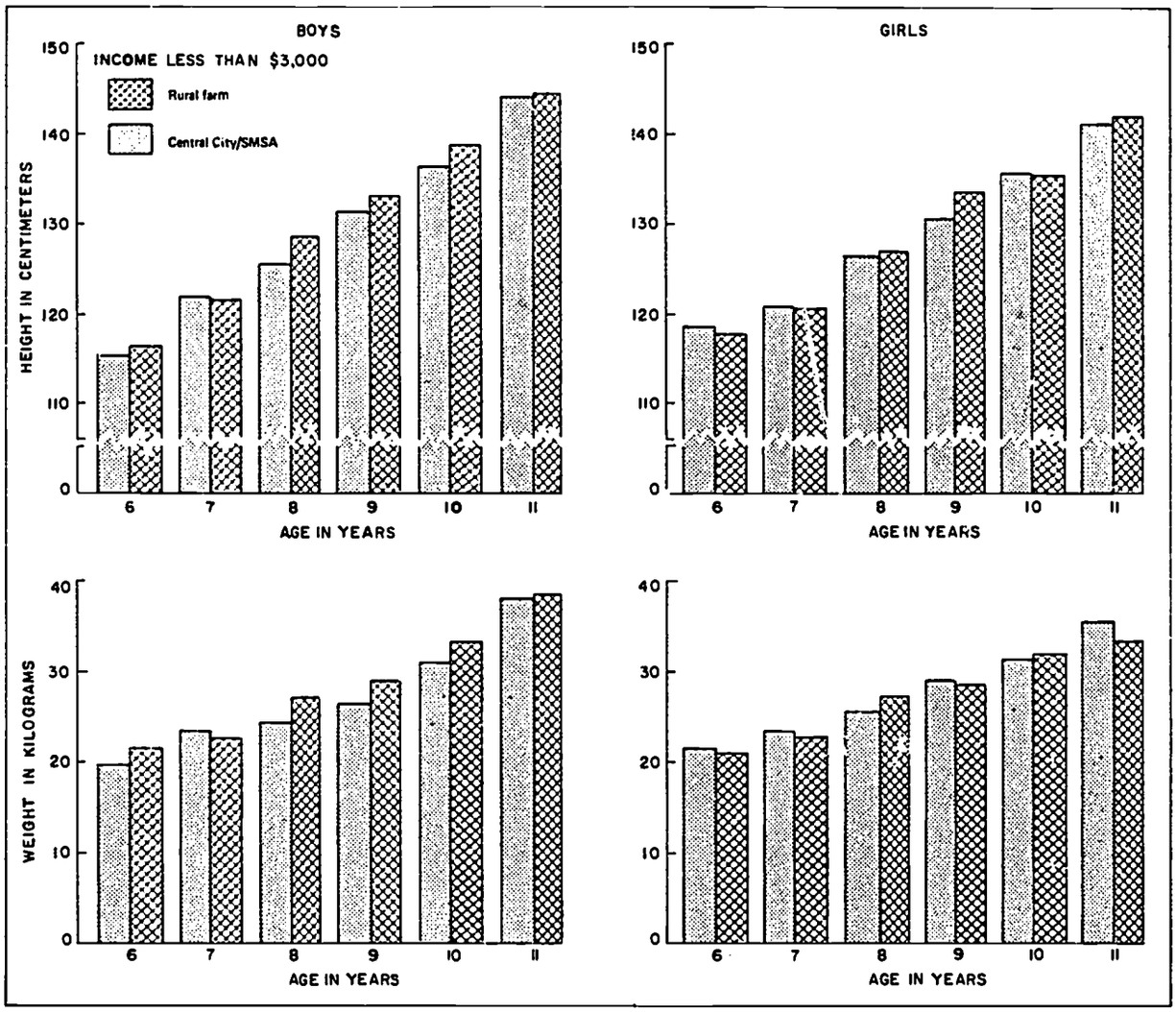

Figure 4. Mean height and weight for children from rural farms with annual family income of $3,000 or less per year and from central city/SMSA with annual family income of $3,000 or more per year, by age, sex, and annual family income.—Con.

in figure 5. These mean values by sex and single year of age were only compared for the total populations because comparable analyses by socioeconomic variables as used in this report are not available from India and Egypt.

When the data from the lowest 19.26-percent socioeconomic segment in the United States (i.e., those with incomes less than $3,000) are superimposed in figure 6 (from table 24) on the 10th, 50th, and 90th percentile distributions of the total socioeconomic segment of India and Egypt (representing the median socioeconomically), the 90th percentile of the category "U.S. less than $3,000" is much the greatest value while the U.S. less than $3,000 50th percentile lies between the 90th percentile for Egypt and that for India and the U.S. less than $3,000 10th percentile is sandwiched between the medians for U.A.R. and India. This was true for both boys and girls (and the weight data were similar).

When the median height and weight values for the four population groups are compared

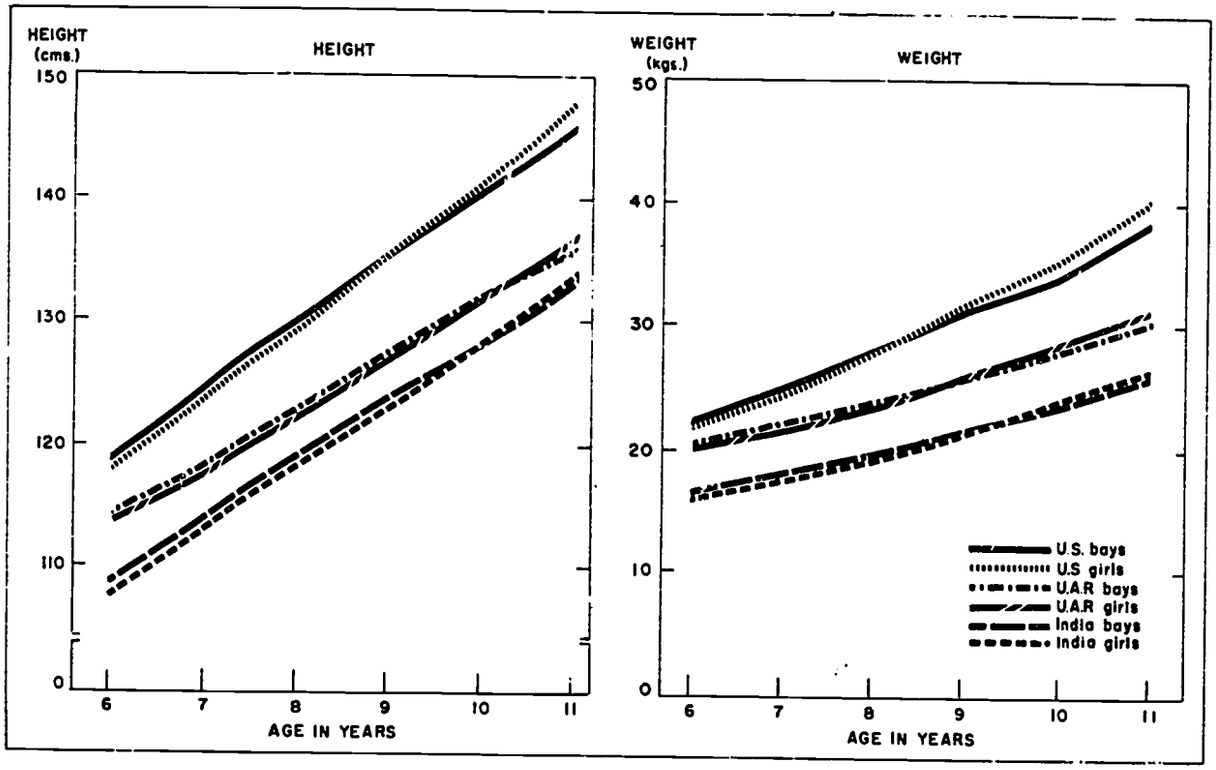

Figure 5. Mean height and weight for children, by sex and single year of age: United States, United Arab Republic, and India.

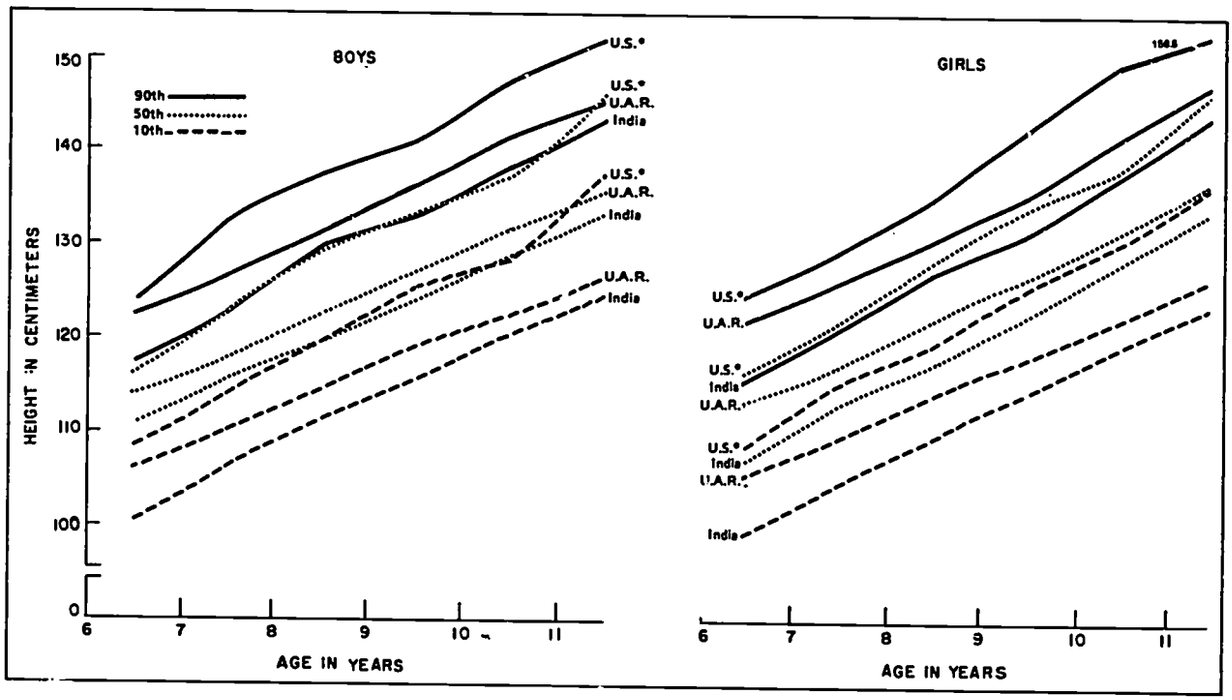

Figure 6. 10th, 50th, and 90th percentiles of height and weight for U.S. children with annual family income less than $3,000 per year, U.A.R. children, and Indian children, by age and sex.

(viz: India, Egypt, U.S. less than $3,000, and U.S. more than $10,000) it is seen in figure 7 that there is less difference in children's sizes between the two socioeconomic extremes in the United States than between the children from the U.S. less than $3,000 and the median of Egypt. (When ranking the countries around the world by technological and socioeconomic development, Egypt is certainly not one of the most "underdeveloped.")

Report No. 104 referred to Meredith's collation of the world literature on heights and weights of children in which he uses 8-year-olds as the reference age in over 300 samples.[18] As he points out in comments about each study, there is a great range in the precision and accuracy of the data.

In figure 8 the three U.S. population groupings (i.e., less than $3,000, more than $10,000, and all incomes combined) are placed on a continuum from around the world. Although it would be a mistake to expect too much accuracy from some of these data, a comparative scale of values can be readily appreciated.

Another way of assessing the magnitude of difference between the extreme socioeconomic levels is that, when comparing mean heights, children from the upper income stratum are about 0.4 years "ahead of" those from the lowest level (A of table 25). Specifically, a 10.5-year-old boy (U.S. less than $3,000) has the same average height as a boy 10.02 years (U.S. more than $10,000).

Comparing countries in B and C of table 25, U.S. children's heights are about 1.58 years ahead of their U.A.R. counterparts and 2.16 years ahead of their Indian counterparts. Specifically, a 10.5-year-old boy from Egypt has, on the average, a height equivalent to a boy 8.8 years from the United States; while the 10.5-year-old boy from India is equivalent in height to an 8.28-year-old boy from the United States.

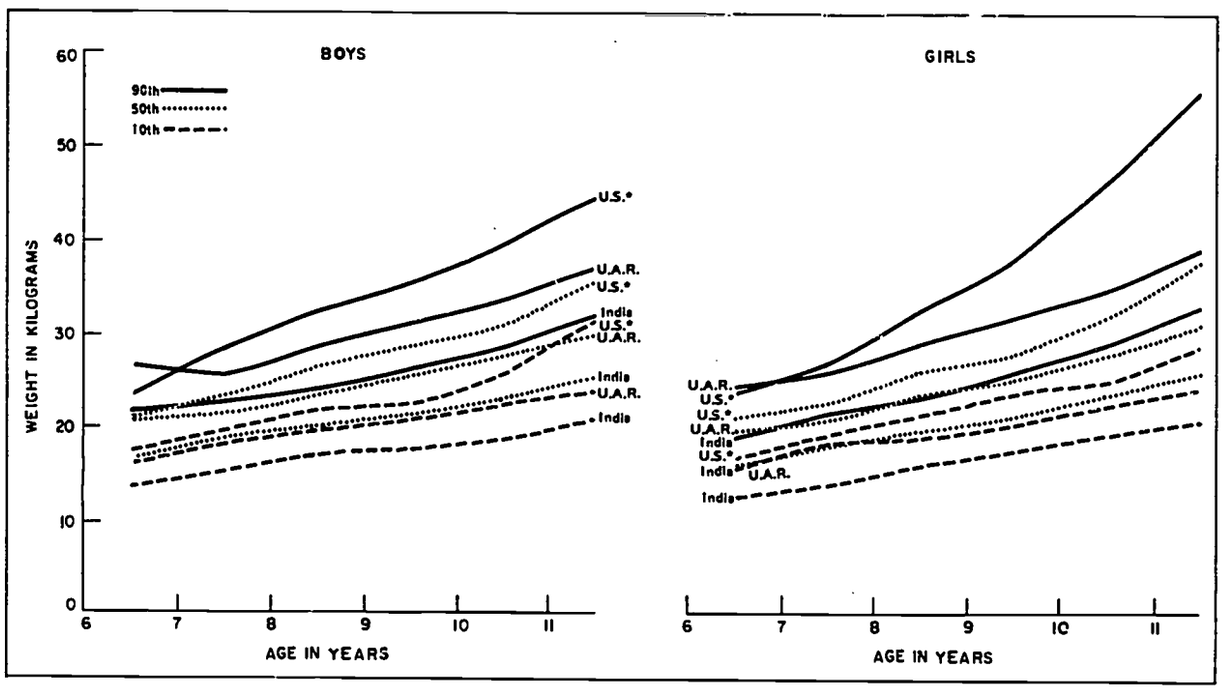

Figure 6. 10th, 50th, and 90th percentiles of height and weight for U.S. children with annual family income less than $3,000 per year, U.A.R. children, and Indian children, by age and sex—Con.

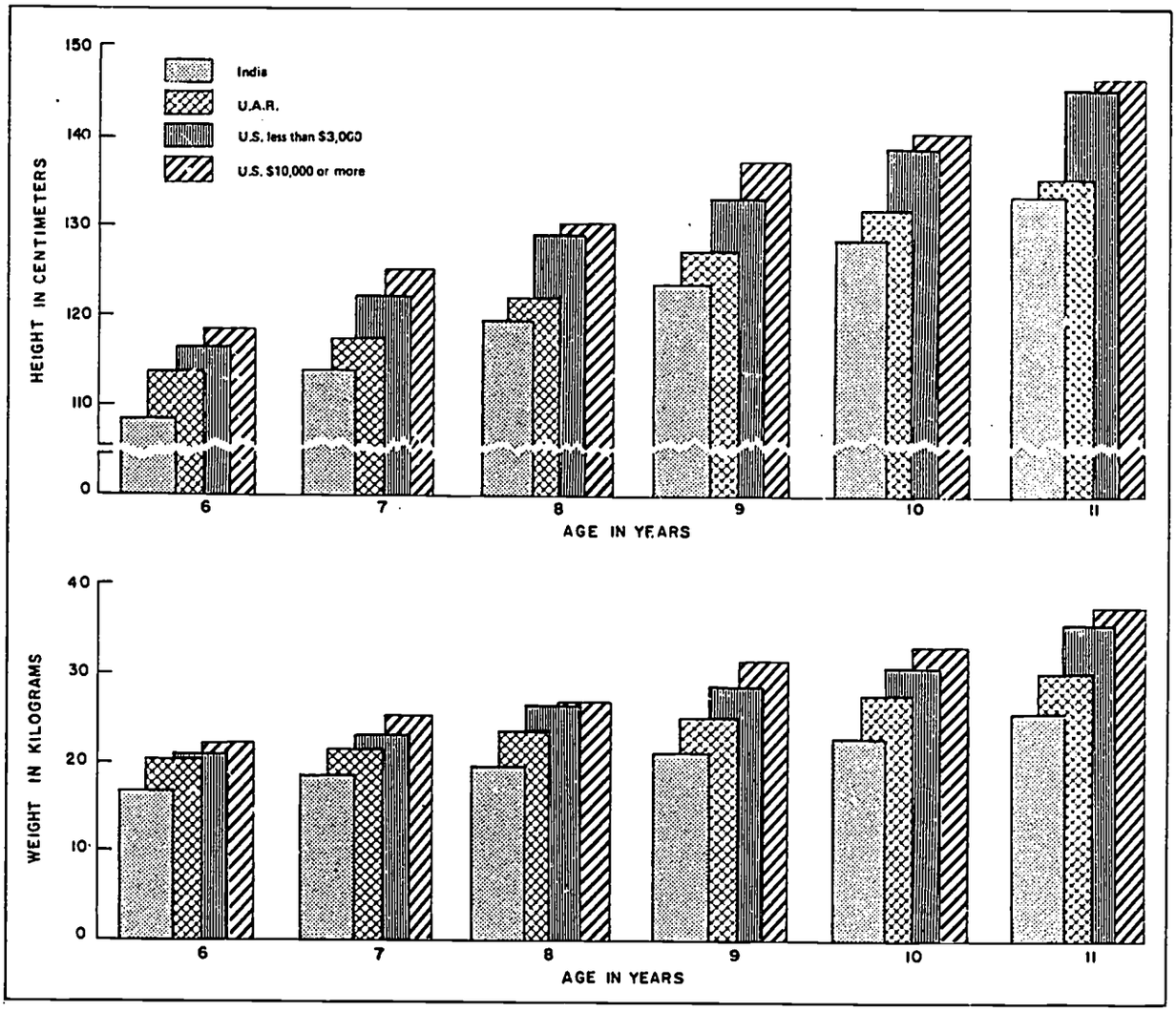

Figure 7. Median height and weight of U.S. boys with annual family incomes less than $3,000 and $10,000 or more and median height and weight of boys from India and the U.A.R., by age.

Secular Trend

The secular trend to grow bigger and mature earlier in the United States and Canada and Western Europe for the past century has been observed, measured, discussed, and speculated about for many years. There is nothing approaching general agreement among the experts on the causes, the meaning, the consequences, or on how far this trend will go. But there is no denying the fact that the trend is real and that whatever the antecedents and consequences it appears to have moved inexorably upward at a rather constant rate. From Meredith's data summarizing the body increase in boys in North America from the last quarter of the 19th century through 1960,[19] a regression line[t] is constructed (figure 9) and the three U.S. population groups (de-

[t]The regression of height for each year of measurement for 10-year-old boys is 0.13 cm. per year with a straight line fitting quite well (i.e., about ½-inch increase per decade).

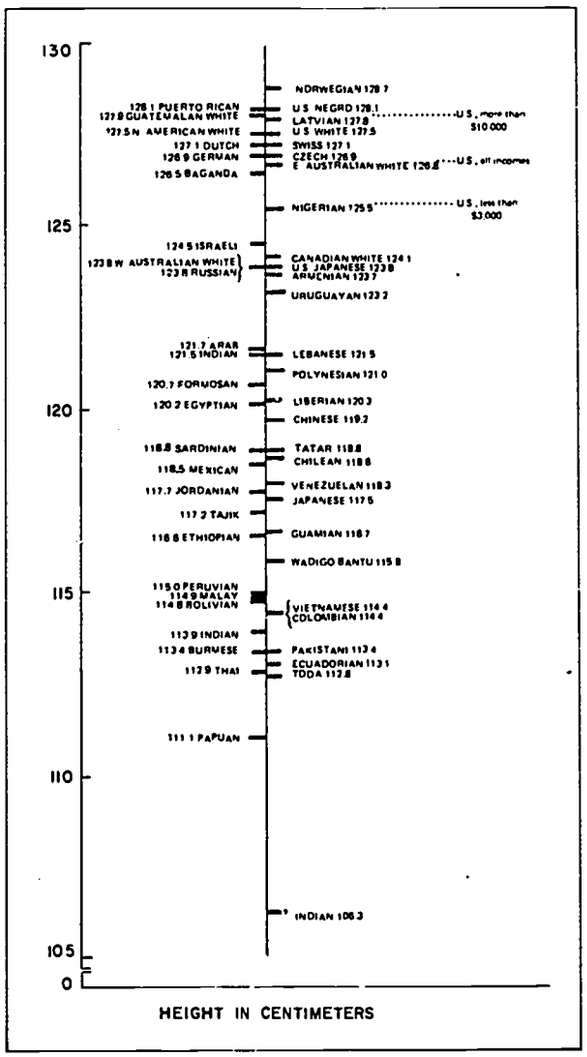

Figure 8. Relation of heights of three U.S. income groupings of 8-year-old boys to those of rest of world, viz, Meredith Study.

fined socioeconomically) are placed on it. Using this regression line as another way to scale the magnitude of differences, the U.S. socioeconomic extremes are only about 14½ years apart (i.e., U.S. less than $3,000 plots at 1961 and U.S. more than $10,000 plots at 1975), while Egypt plots at about 1901 and India at about 1878).

Whatever the causes leading to this secular trend in the Western World (see discussion of confounding variables, pages 13 and 14 of Report No. 104) the effective complex of factors appears to be intimately bound up in the "Western style of life" rather than a geographic region of the globe, viz, Australia and New Zealand; Northern and Western Europe; United States and Canada; and, increasingly, Japan and probably U.S.S.R. (also see discussion, Report No. 104, pages 15 and 16, American Negroes versus African Negroes). Furthermore, there appears to be a gradient of sizes roughly corresponding to the degree of "Westernization" (figures 8 and 9). Among the companions to this increasing size and earlier age of maturation of children are greatly lowered maternal and infant deaths, lower mortality and morbidity of childhood, and greatly increased life expectancy.

In searching the available data for the main causes of this increasing size of children, none clearly stand out. There were certainly no simple explanations apparent. That it is not simply due to a rising educational level (e.g., more people going to college each year) or income level (e.g., constantly rising gross national product (GNP))[u] or elevated socioeconomic status, is suggested by the following two arguments:

(1) Hathaway in 1960 reviewed the available data from over 20 U.S. college studies, covering the previous 100 years.[20] Table A summarizes two of the most extensive studies. Most of the studies compare incoming freshmen over the years. Although there are, naturally, some differences in actual measurement, they are all unanimous on their findings: i.e., incoming freshmen have become taller and heavier (despite also becoming approximately 1 year younger) over this time. This is equally true for women and for men. The sources of the most extensive serial data were Harvard, Yale, and Amherst for men and Wellesley, Smith, and Vassar for women. The magnitude of change was roughly 3 inches in height

[u] But it is believed. . see page 24, that the very complex "increased standard of living" does encompass a large part of the factors, but that it is not primarily the money itself (or even the GNP part, itself).

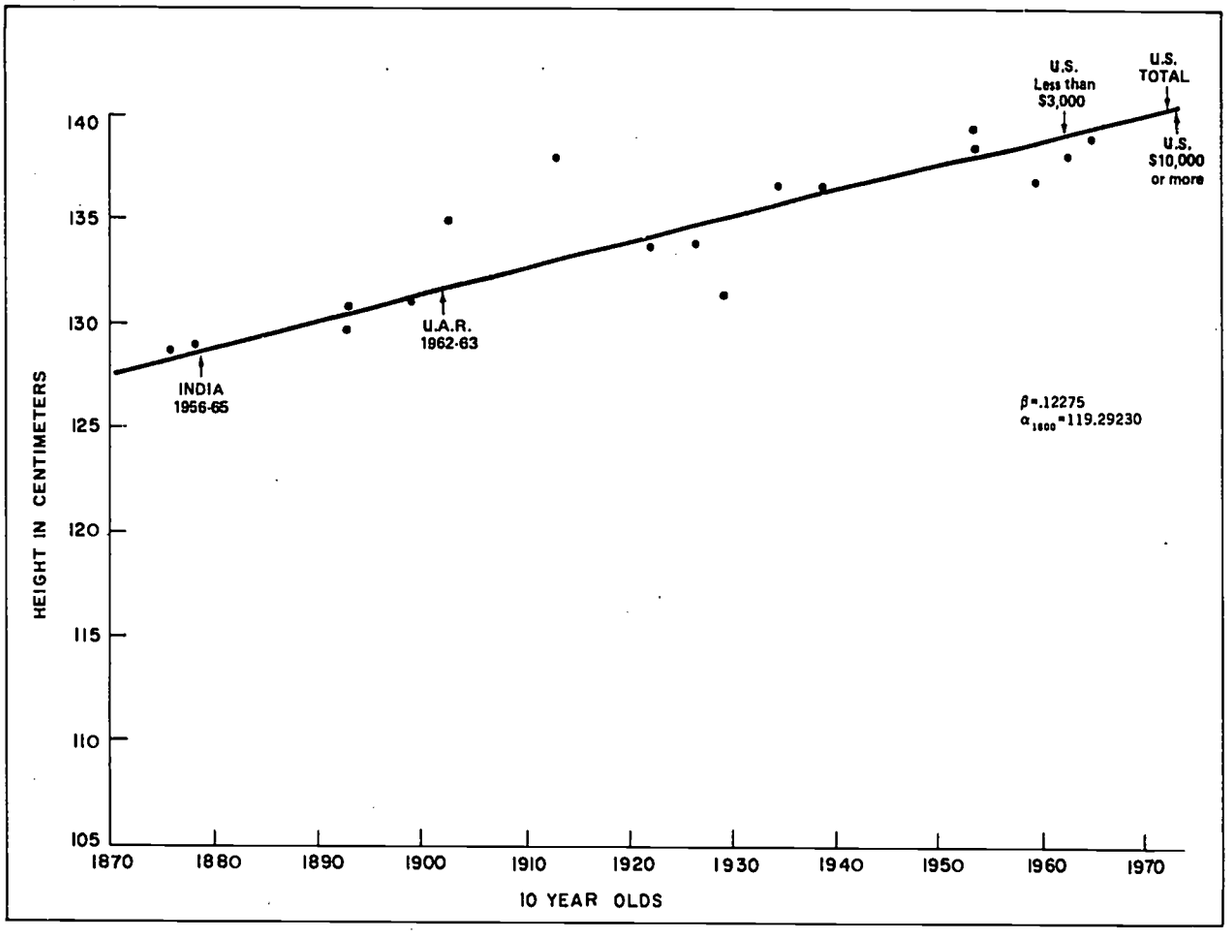

Figure 9. Regression line showing the growth of U.S. 10-year-old children during the last century by income groups, with the comparison of Indian and U.A.R. children for the years 1963-65.

and over 20 pounds in weight.[v] Analysis for percentage of tall men (72 inches and over) in the freshman class support this. "At Amherst only one class before 1910 had as many as 10 percent tall men; from 1937 all but two classes had over 20 percent tall men; and in 1956 and 1957 tall men made up over 30 percent of the class."[20] There was a similar phenomenon at the other schools. And family comparisons of pairs of fathers and sons and mothers and daughters measured at the same age, i.e., when they entered as freshmen—showed the sons to be almost 1½ inches taller than their fathers had been and the daughters more than 1 inch taller than their mothers. Furthermore, table B shows that the total height difference between the first and fourth generation of Harvard men was 3 inches.

In short, this steady increase in the size of college students occurred within, presumably, a

[v]This is only about 60 percent as great an absolute increase in size as Meredith estimated for 10-year-olds over the same time frame. And it is even a smaller proportionate increase for this disparity. Two explanations come to mind: part of the increased size in "Meredith's 10-year-olds" might well be due to earlier maturation[18] and the other might be due to rising socioeconomic level of a greater proportion. That is, the college students would have rather constantly, over the 100 years, come from the highest socioeconomic strata—i.e., no relative change—whereas the much broader socioeconomic spectrum of Meredith's 10-year-olds, it can be conjectured, might allow for a greater relative improvement over the years in the lower socioeconomic strata.

Table A. HARVARD MEN AND WELLESLEY WOMEN: Average heights and weights by decades of birth, 1836-1915

Birth date	Harvard men			Wellesley women		
	Cases	Height	Weight	Cases	Height	Weight
	Number	Inches	Pounds	Number	Inches	Pounds
1836-45----	2	67.1	140.0			
1846-55----	43	68.5	140.6			
1856-65----	335	68.1	138.4	45	63.3	119.9
1866-75----	506	68.7	139.7	235	63.3	120.4
1876-85----	307	69.1	146.8	212	63.7	120.7
1886-95----	267	69.4	149.2	40	64.3	121.6
1896-1905--	607	69.8	148.9	266	64.6	123.7
1906-15----	546	70.1	149.0	267	65.0	125.2

Source: U.S. Department of Agriculture, Heights and Weights of Adults in the United States by M.L. Hathaway and E.D. Foard, Home Economics Research Report No. 10, Washington, U.S. Government Printing Office, Aug. 1960, p. 28.

Table B. HARVARD MEN: Average heights and weights of fathers and sons, four generations

Generation	Age when measured	Cases	Height	Weight
	Years	Number	Inches	Pounds
Great grandfathers--	50	8	67.0	149.5
Grandfathers--	30	92	68.6	152.4
Fathers---	19	132	69.0	145.8
Sons------	18	153	70.1	151.1

Source: U.S. Department of Agriculture, Heights and Weights of Adults in the United States by M.L. Hathaway and E.D. Foard, Home Economics Research Report No. 10, Washington, U.S. Government Printing Office, Aug. 1960, p.38.

stable socioeconomic stratum without change in "income" or "educational" levels or socioeconomic status.

By "stable socioeconomic stratum" is not meant the relative constancy of the constituent families such as existed in England for 900 years; but instead the relative socioeconomic stability over time of the population channel, itself, from which the students were drawn. (This is conjecture; the authors could find no definitive studies of the two following assumptions: viz, (a) the educational and relative income constancy over the century of the higher socioeconomic level families—but certainly from 1860 to 1960 in America, the carpenter's way of life changed far greater than did the physician's—and (b) the college students, but most especially the Ivy League students, were predominantly selected from this channel[w] during the century.)

[w]It has only been since 1945 that the U.S. college population has been originating from an ever-broadening socioeconomic and cultural base.

(2)When contrasting the two United States socioeconomic extremes, there appears to be an enormous disproportion between the rather small differences in the size of the children on the one hand and the magnitude of the differences in income and education on the other. For example, when the regression line constructed for secular trend of increasing size is used for a sense of scale, it was shown (figure 9) that the children of the two extreme groups were only 14.6 years apart. That is, if the trend continues without drastic change, in about 10 or 20 years the mean heights of the children from the lowest socioeconomic one-fifth will equal the mean heights today of the children from the upper group. Are there the slightest grounds for predicting that in this same 10, 20, or even 50 years the real income of this same segment of the U.S. population receiving less than $3,000 annually (median between $1,000 and $2,000) will have equalled today's real income of the segment representing $10,000 or more (median near $14,000)? And even less likely would be the bridging of the formal educational disparity: viz, the lowest 19.26-percent income represents educationally 9th and 10th grades and below with a median between the 7th and 8th grades, while the comparable upper educational segment had a median of 4 years of college!

Although classifications of heights and weights of children by socioeconomic levels similar to these HES data are not available from other countries which would permit precise comparisons, figures 5-9 give enough sense of scale to strongly suggest that more of the factors conducive to greater size of children are available to the lowest socioeconomic groups in the United States than to all but the most highly favored few in India and to no classes at all in the underdeveloped countries such as Burma and Ethiopia. Although income and education make a very demonstrable difference, the other factors which are universally available to all classes of Americans make far more difference. (This finding does not repudiate the statements of the past few years concerning "pockets of hunger and starvation" in the United States. It does, however, emphatically limit these pockets in size, in number, and in severity. Otherwise one would be forced to conclude that the nonstarving proportion of the lowest socioeconomic group in the United States yields children much bigger than the next higher socioeconomic groups to be able to maintain *group averages* of height and weight only very slightly lower than those of the next higher socioeconomic groups.

In addition, if the same socioeconomically lowest one-fifth of the U.S. population is still so much larger than the national averages of so many other countries (figure 8) and if included in that group were a large proportion of severely stunted, malnourished children, then how gargantuan, indeed, must be the remaining portion to pull the average sizes of this lowest U.S. socioeconomic group so much higher than the figures from most of the rest of the world. To repeat, this argument does not claim that the HES data prove there are no pockets of malnutrition and even starvation in the United States of America; but it does greatly limit their possible extent.)

The HES findings also strongly suggest that a shift in the population from rural to urban—if it occurs in a society like mid-century U.S.A. in which both farms and cities are "modern" (page 15)—does not explain the secular trend of increasing size. The HES findings by themselves cannot, of course, shed light on the effects on children's growth of the steady move from rural America to urban America of the past century. However, the very convincing college data referred to on pages 21 and 22 of steadily increasing size despite the trend of the Ivy League schools to draw students from ever-widening socioeconomic and geographic regions over this same century (again, authors' conjecture) seem convincing that the shift in America from farm to city could not, in itself, explain much of the secular increasing size.

Milicent Hathaway and Elsie Foard concluded the discussion of their two remarkably wide-ranging and thoughtful reports[20,21] with the following: "Many factors are doubtless responsible for changes in body size of the population of the United States. Although there is still disagreement among scientists as to the limits of plasticity of the human organism, changes in size represent an increase under more favorable environment of the growth potential inherent in the genes (Goldstein 1943 and Kaplan 1954). Some of these environmental factors are improvement in the socioeconomic status of much of the population,

improvement in medical care and sanitation, greater availability and consequent consumption of nutritious foods, and improvement in the general knowledge of nutritional needs.

"Improved prenatal and infant care has greatly reduced infant mortality. Attention to the care of infants and children through periodic examinations by family physicians, pediatricians, or at well-baby or child clinics is now practiced widely. The child has better dietary direction, immunization against childhood diseases, and early detection and correction of remediable conditions. More attention is given to outdoor play, and light sanitary homes are more generally available. This better start has contributed to better development, greater size, and longer life" (pages 99 and 100, reference 20).

The HES findings contradict nothing at all of what Hathaway and Foard stated in 1960. On the contrary, within the HES data, there were detected no simple, persuasive, and powerful factors which could be readily measured in a large nationwide survey and which, by themselves, directly accounted for most of the secular increase. Most of the increase is undoubtedly caused by the general complex of factors cited above by Hathaway and Foard that have all been part of the cultural-technologic transformation—urban and rural—in the past century in the United States.

Genetic Factors

Hathaway and Foard continued:[20] "A major difficulty in studies of growth and size still is separation of such factors as accelerated maturation and genetic diversification from serial changes produced by introduction of newer ethnic strains (Hunt 1958), as well as the effects of the many environmental factors" (page 100).

The confounding variable of accelerated maturation has been frequently mentioned in Report No. 104 and earlier in this report and will be discussed in detail when data on skeletal maturation are presented. This report has focused almost exclusively on socioenvironmental factors which may influence growth and size—and it is further limited to only those factors available in Cycle II. However, that does not signify that the authors totally disregard the importance of possible genetic factors in addition to these environmental factors in this discussion of the meaning and causes of differences in children's sizes both in the present and over the past.

The introduction of newer ethnic strains (so-called hybrid vigor) as discussed by Hunt[22] and by Hathaway and Foard[20] may explain some part of the secular trend; while social stratification of genes and assortative mating may explain some part of the observed differences in the HES socioeconomic groups. (If, for example, social stratification had resulted in dissimilar frequencies of genes for size among differing socioeconomic levels, the result would be seen in differences among the offspring. Any genetic differences existing through the socioeconomic continuum would be intensified by positive assortative mating;[23] i.e., the tendency for individuals to marry someone like themselves. This has been observed, for example, for educational attainment.[24] Despite the existence of some interclass mobility, assortative mating may explain a portion of the observed differences.)

In Cycle III, concluded in March 1970, many genetic markers—principally on blood—were obtained on youths 12-17 years of age. These data, together with a special subgroup of several hundred twins from Cycles II and III, analysis by other nontwin siblings, and the fact that approximately one-third of the subjects examined in Cycle III were examined about 3 years previously in Cycle II (as 9 through 11-year-olds), will all be used in future reports to enlarge this discussion of "possible causes" by the examination of genetic and other familial factors.

Size and Health

There has been throughout this entire discussion an implicit assumption that large size of children and health are so closely related that large size almost means good health. The most immediate distinction to be kept in mind when examining this relationship more carefully is whether the subject is the *individual* child or a *population* made up of individual children (or, more strictly, a sample representing a defined population of individual children). Then, the various meanings of the terms "size" and "health" bear further scrutiny in this context.

If when considering the meanings of "health," the definition of the World Health Organization is used, "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity," it would be well to amplify on the "absence of disease or infirmity." For children, absence of disease should include not only overt but also latent disease such as Huntington's chorea. It could also include precursors to later disease such as obesity, elevated blood pressure, and high serum lipids as well as behavior which fosters later disease such as cigarette smoking and the reckless use of alcohol and other drugs. Absence of infirmity could be expanded to include freedom from transmissible genetic defects and developmental defects; good relative resistance to disease both during childhood and later life; enough vigor for enjoyment of pleasures and for effective work, study, and psychic growth; adequate physiologic and somatic development; and an environment conducive to growth. These seem to be the minimal preconditions for the rather expansive, "state of complete physical, mental and social well-being." These criteria of health are as applicable to individuals as to a defined population, but, of course, the assessment techniques are quite different. The health assessment of the individual child is, of course, performed by the pediatrician, while that of the population is performed by the epidemiologist who synthesizes information and skills from the clinic, from surveys, and from vital and health record systems and relies on statistical analytic tools.

Just as the health assessment of the child is clinical while that of the population is epidemiological—with differing techniques, purposes, and emphasis but with much overlap—so the appraisal of size differs by subject (i.e., individual or population) and purpose.

An appraisal of the size of the individual child—whether the main purpose be clinical or nonclinical—requires some understanding of his life context and enough information over time—either by repeated visits or by reliable history—to construct, at the minimum, a rudimentary growth curve. If the appraisal is for other-than-health reasons, it usually leans heavily to matters of taste, life style of family, and the individual's abilities and ambitions. For example, if a child is at the 99th percentile in height, some of the most important questions to answer before a value judgment can be made are: Is weight proportionate? A boy or a girl? What shape growth curve? Any health significance? If these answers are happy ones, then an appraisal moves into the more personal sphere: e.g., if he plans to become a professional football player, this can be very good, in general; however, if she had her heart set on becoming a jockey or ballerina it can be very discouraging, indeed. When relating size to the individual, there's a very clear distinction between the maximal and the optimal.

The clinical appraisal of size (or better, growth) has two aspects: (1) a suspected disturbance *of size itself* (or a desired alteration in projected size, such as when an unusual height for a girl is predicted) which is best performed at rather highly specialized growth centers if medical or surgical intervention is anticipated and (2) consideration of size in the clinical practice of pediatrics in which height and weight (including both a growth curve and recent changes) are used as indicators of healthy or morbid processes.

In general, the common medical condition, obesity (which will be dealt with in a future report), and the much rarer condition, gigantism (excessive growth of the skeleton), are the only important medical conditions of excessive size. By "importance" is meant of sufficient prevalence to occur more than once or twice in an entire career in general pediatric practice or to have any impact on population data. Because almost all other medical disturbances of size—either of endogenous or exogenous origin—with the exception of obesity, result in low weight and/or low stature, "big" and "healthy" are linked together in common usage as in "big, healthy baby" or "big, strong, healthy boy."

As assessing the meaning of a child's size in terms of health is the function of the pediatrician—and in rarer cases pediatricians who specialize in disturbances of growth—so the assessment of the meaning of the size of children in a given population in terms of health is the function of the epidemiologist. The clinical assessment of size is completely described in a combination of the following four books along

with a standard text like Nelson's *Pediatrics*;[25] *Endocrine and Genetic Diseases of Childhood* by Gardner;[26] *Growth and Development of Children* by Watson and Lowry;[27] *Preventive Pediatrics* by Harper;[10] and *Growth at Adolescence* by Tanner;[28] (The books by Harper and by Tanner are good bridges between the clinical and the epidemiologic assessments.)

The only immediate contribution to the clinical evaluation which this report can make are a few additions to the following summary paragraph from Report No. 104 (page 16). "When applying these data to the individual child, one must use skill and additional specific knowledge about the child and his total setting. The size of parents and grandparents,[26-29,31-32] region of country, socioeconomic strata, ethnic and racial differences (including the difficult assessment[32,33] of food intake patterns from birth onward, which will vary by cultural habits and tastes, knowledge of nutrition, economics and availability of various foods), genetic differences, amount and type of exercise, disease, and environmental influences must all be used to make proper adjustments."

Predictions or expectations about an individual are made by matching the one against a "similar enough group"[x] for which percentage distributions are available for the given variable under study. It is then seen where the individual is placed with respect to all other "similar enough" individuals. This is a topographic activity. In Report 104, race (i.e., white or Negro) was found to make a real but so slight a difference that different sets of standards were not recommended, and children from the Midwest and Northeast tended to be a little larger than children from the South and West. Which sex made much more difference than race or region; but of course age was so important that the height or weight of a child without accounting for age is almost meaningless.

In this report it has been shown that in the 1960's degree of urbanization, per se, makes no difference in a country like the United States. Income and education make a very real difference, but only a difference of a few percentage points which was very small, indeed, when compared with the difference made by country of origin. By far the greatest difference in the size of children at a given age is made by how culturally and technologically similar the child's country of origin is to the United States.

An epidemiologic assessment of the meaning of children's size in a given population is what has been going on in this report (as a continuation of Report No. 104). A thorough assessment being beyond the scope of this one report, the focus has been on socioeconomic and demographic factors. As was stated when considering medically caused disturbances of size, obesity is the only "disease" of oversize of sufficient prevalence to affect population data. (This will be the subject of a future report.) Both clinically defined medical conditions and epidemiologically defined conditions of large populations such as contagious diseases; community-wide sanitary and housing conditions; frequency of disease in the population, especially intestinal infestations; adverse climate; and—assuming increasing worldwide importance—community-wide nutritional circumstances and dietary practices all conspire to small size if they have an effect on size at all. Superimposed on these environmental conditions are the social, cultural, and economic capabilities not only of the community but also of the constituent families. Deficiencies in any of these spheres can all interfere with the full realization of the growth potential of the children.

Consequently in the 1970's it seems most prudent to assume that for comparing large populations of children "the bigger they are the healthier they are" is a good rule of thumb with, of course, several qualifications.[y] In fact there are some who feel that possibly all major population groups of the world are of the same po-

[x] Of course, the skill involves matching with a "similar enough" group except for the one variable under consideration and then not being a slave to a mechanical interpretation of the percentiles.

[y] (1) Either the obese part of the population be considered separately or stature be considered the predominant index of size and (2) the population be representative of a large enough gene pool to compensate for some of the breeding groups known for unusual size like the Pygmy and the Watusi.

tential mean size genetically and that any diminution in size of the group mean is a direct measure of some adverse growth condition. Of course many who deal with population genetics do not agree but feel that while environmental circumstances certainly play a very large role in the resultant group sizes, the different large breeding groups of humans (races?) would still have their own distinctive sizes and shapes for the group as a whole even if all the environmental conditions which affect growth and health were somehow standardized throughout the world.

Despite the myriad complications when attempting to interpret causes and consequences in the accumulating growth data and despite the levels of sophistication used, Meredith nicely summarized the contrasting size of 8-year-old children around the world by stating,[18] "Norwegian children living in Oslo and Bergen had a mean body weight greater than that of [Pakistani] children living in East Pakistan by 21 pounds or 55%." No one can doubt that, in this context, height and weight have a very profound relationship to any concept of "healthy children."

REFERENCES

[1]National Center for Health Statistics: Height and weight of children, United States. *Vital and Health Statistics.* PHS Pub. No. 1000-Series 11-No. 104. Public Health Service. Washington. U.S. Government Printing Office, Sept. 1970.

[2]National Center for Health Statistics: Plan and initial program of the Health Examination Survey. *Vital and Health Statistics.* PHS Pub. No. 1000-Series 1-No. 4. Public Health Service. Washington. U.S. Government Printing Office, July 1965.

[3]National Center for Health Statistics: Cycle I of the Health Examination Survey: sample and response, United States, 1960-1962. *Vital and Health Statistics.* PHS Pub. No. 1000-Series 11-No. 1. Public Health Service. Washington. U.S. Government Printing Office, Apr. 1964.

[4]National Center for Health Statistics: Plan, operation, and response results of a program of children's examinations. *Vital and Health Statistics.* PHS Pub. No. 1000-Series 1-No. 5. Public Health Service. Washington. U.S. Government Printing Office, Oct. 1967.

[5]Tanner, J.M., Hiernaux, J., and Jarman, S.: *Growth and Physique Studies* in IBP Handbook No. 9. Human Biology: A Guide to Field Methods, Weiner, J. S. and Lourie, J. A. London. Internat. Biol. Programme, 1969.

[6]Tanner, J. M.: Personal communication.

[7]Krogman, W. M.: A handbook of the measurement and interpretation of height and weight in the growing child. *Monog. Soc. Research in Child Dev.* 13:(3), 1950.

[8]Standard Metropolitan Statistical Areas: Prepared by the Office of Statistical Standards, Bureau of the Budget. Washington. United States Government Printing Office, 1967.

[9]Screening Children for Nutritional Status: Suggestions for Child Health Programs. Public Health Service Publication, 1971.

[10]Harper, P. A.: *Preventive Pediatrics: Child Health and Development.* New York. Appleton, 1962.

[11]Acheson, R. M.: Effects of Nutrition and Disease on Human Growth, J. M. Tanner, ed., *Human Growth, Vol. III of Symposia of the Society for the Study of Human Biology.* London. Pergamon Press, 1960.

[12]Krogman, W. M.: *Growth of Man,* in Denzer, H.; Koningsberger, V. J.; Vonk, H. J., eds. Tabulae Biologicae, Vol. XX. Don Haag. Vitgeverij Dr. W. Junk, 1941.

[13]Wolanski, N. and Lasota, A.: Physical development of countryside children and youth aged 2-20 as compared with the development of town youth of the same age. *Zietschrift Fur Morphologie and Anthropologie* 54:272-292, Jan. 1964.

[14]Wolanski, N.: Environmental modification of human form and function. *Ann. N.Y. Acad. of Sciences* 134:826, 1966.

[15]Wolanski, N.: Formation of typology and body posture in town and rural. *Acta Anatomica* 56:157-183, 1964.

[16]Wolman, A.: Personal communication.

[17]National Center for Health Statistics: Height and weight of children in the United States, India, and the United Arab Republic. *Vital and Health Statistics.* PHS Pub. No. 1000-Series 3-No. 14. Public Health Service. Washington. U.S. Government Printing Office, Sept. 1970.

[18]Meredith, H. V.: Body size of contemporary groups of eight-year-old children studied in different parts of the world. *Monog. Soc. Research in Child Dev.* 34-125:(1). Chicago. University of Chicago Press, 1969.

[19]Meredith, H. V.: Change in stature and body weight of North American boys during the last 80 years, in L. Lipsitt and C. Spiker, eds., *Advances in Child Development and Behavior, Vol. 1,* New York. Academic Press, 1963. pp. 69-114.

[20]Hathaway, M. L., and Foard, E. D.: Heights and weights of adults in the United States. *Home Economics Research Report No. 10.* Human Nutrition Research Division, United States Department of Agriculture. Washington, D.C., 1960.

[21]Hathaway, M. L.: Heights and weights of children and youth in the United States. *Home Economics Research Report No. 2.* Institute of Home Economics, United States Department of Agriculture. Washington, D.C., 1957.

[22]Hunt, E. E., Jr.: Human growth and body form and recent generations. *Am. Anthrop.* 60:118-131, 1958.

[23]Crow, J. F., and Felsen, J.: The effect of assortative mating on the genetic composition of a population. *Eugenics Quart.* 15:85-97, 1968.

[24]Burgoss, E. W. and Wallin, P.: Homogamy in social characteristics. *Am. J. Sociol.* 49:109-124, 1943.

[25]*Textbook of Pediatrics,* ed. 9 edited by W. E. Nelson. Philadelphia. W. B. Saunders, 1969.

[26]Gardner, Lytt I.: *Endocrine and Genetic Diseases of Childhood.* Philadelphia. W. B. Saunders, 1969.

[27]Watson, H., and Lowrey, G.: *Growth and Development of Children.* ed. 5. 1967. 10.50 (ISBN O-8151-9125-1) Year Bk. Med.

[28]Tanner, J. M.: *Growth at Adolescence.* Oxford. Blackwell Scientific Publications, 1962. p. 5.

[29]Krogman, W. M.: A handbook of the measurement and interpretation of height and weight in the growing child. *Monog. Soc. Research in Child Dev.* 13-48:(3), 1948.

[30]Garn, S. M., and Rohmann, C. G.: Ped.Clin. North America 14:283, 1967.

[31]Tanner, J. M., Goldstein, H., and Whitehouse, R. H.: Standards for children's height at ages 2-9 years allowing for height of parents. *Arch. Dis. Childhood* 45:755-62, 1971.

[32]Beal, V. A.: A critical view of dietary study methods. *Food and Nutrition News,* 40:(3), Dec. 1968, and 40:(4), Jan. 1969.

[33]Beal, V. A.: The nutritional history in longitudinal research. *J.Am.Dietet.A.* 51:426-432, Nov. 1967.

[34]Acheson, R. M., and Blanco, R.: Personal communciation—unpublished data.

[35]National Center for Health Statistics: Replication: an approach to the analysis of data from complex surveys. *Vital and Health Statistics.* PHS Pub. No. 1000-Series 2-No. 14. Public Health Service. Washington. U.S. Government Printing Office, Apr. 1966.

[36]Daniels, H. E.: Rank correlation and population models. *J. of the Roy. Statist. Soc.,* Series B, 12:(A50).

[37]Siegel, S.: *Nonparameter Statistics.* New York. McGraw-Hill Book Co. Inc., 1956.

———— ○○○ ————

LIST OF DETAILED TABLES

		Page
Table 1.	Unweighted sample size for children, by age at last birthday, sex, race, and annual family income: United States, 1963-65	32
2.	Unweighted sample size for children, by age at last birthday, sex, and race and by education of parent: United States, 1963-65	34
3.	Mean height, mean weight, standard error of the mean, and unweighted and weighted sample sizes for children ages 6 through 11, by annual family income and education of parent: United States, 1963-65	35
4.	Height and weight for children by age at last birthday, sex, and annual family income: weighted sample size, mean, and standard error of the mean, United States, 1963-65	36
5.	Height and weight for children by age at last birthday and sex and by education of parent: weighted sample size, mean, and standard error of the mean, United States, 1963-65	38
6.	Height and weight for white children by age at last birthday, sex, and annual family income: weighted sample size, mean, and standard error of the mean, United States, 1963-65	40
7.	Height and weight for white children by age at last birthday and sex and by education of parent: weighted sample size, mean, and standard error of the mean, United States, 1963-65	42
8.	Height and weight for Negro children by age at last birthday, sex, and annual family income: weighted sample size, mean, and standard error of the mean, United States, 1963-65	44
9.	Height and weight for Negro children by age at last birthday and sex and by education of parent: weighted sample size, mean, and standard error of the mean, United States, 1963-65	46
10.	Use of the sign test and z-test to compare the mean height and weight of children of extreme family income and education groups, by age of child at last birthday and sex: United States, 1963-65	49
11.	Summary of Daniel's Test for Trend and weighted least squares slopes for relationship of height and weight to annual family income, for children by age at last birthday, sex, and race: United States, 1963-65	50
12.	Summary of Daniel's Test for Trend and weighted least squares slopes for relationship of height and weight to education of parent, for children by age at last birthday, sex, and race: United States, 1963-65	51
13.	Percent of children falling below the lowest 10th percentile of heights and weights specific to each age-sex group, by annual family income: United States, 1963-65	52
14.	Percent of children falling below the lowest 10th percentile of heights and weights specific to each age-sex group, by education of parent: United States, 1963-65	54
15.	Summary of Daniel's Test for Trend for percent of children falling below the lowest 10th percentile within each age-sex category for annual family income and education of parent: United States, 1963-65	55
16.	Percent falling below the lowest 10th percentile value for height and weight for each age-sex group of children by four possible family income dichotomies, and the ratio of above to below within each dichotomy: United States, 1963-65	56
17.	Height for children by age at last birthday and sex and by education of parent: weighted sample size, mean, and standard error of the mean, United States, 1963-65	58
18.	Weight for children with annual family income between $5,000 and $7,000, by age at last birthday and sex and by education of parent: weighted sample size, mean, and standard error of the mean, United States, 1963-65	60

List of Detailed Tables--Con.

		Page
Table 19.	Height and weight for children with education of parent equal to 12 years, by age at last birthday, sex, and annual family income: weighted sample size, mean, and standard error of the mean, United States, 1963-65	62
20.	Summary of Daniel's Test for Trend when either annual family income or education of parent is held constant at the modal class and the other allowed to vary, by age at last birthday and sex: United States, 1963-65	64
21.	Height and weight for white children living in the central city of an SMSA, by age at last birthday, sex, and annual family income: mean, standard error of the mean, and weighted sample size, United States, 1963-65	65
22.	Height and weight for white children living on farms of any size in rural areas, by age at last birthday, sex, and annual family income: mean, standard error of the mean, and weighted sample size, United States, 1963-65	66
23.	Height and weight for white children living in suburban areas, by age at last birthday, sex, and annual family income: mean, standard error of the mean, and weighted sample size, United States, 1963-65	67
24.	10th, 50th, and 90th percentiles of height and weight distributions of children, by age at last birthday and sex for the following income groups: U.S. total, U.S. less than $3,000, U.S. $10,000 or more, and total incomes for India and U.A.R.: United States, 1963-65; India, 1956-65; and U.A.R., 1962-63	68
25.	Cross-cultural comparison of age of children upon attaining equivalent height or weight: A. U.S. child in income group of less than $3,000 to U.S. child in income group of $10,000 or more; B. U.A.R. child to U.S. child, all incomes; C. Indian child to U.S. child, all incomes	70

Table 1. Unweighted sample size for children, by age at last birthday, sex, race, and annual family income: United States, 1963-65

Age, sex, and race	All incomes	Annual family income				
		Less than $500	$500-$999	$1,000-$1,999	$2,000-$2,999	$3,000-$3,999
Total						
Boys 6-11 years	3,632	34	82	210	258	315
6 years	575	5	18	33	36	58
7 years	632	5	13	37	49	52
8 years	618	9	11	36	57	53
9 years	603	5	18	33	33	49
10 years	576	8	8	35	39	47
11 years	628	2	14	36	44	56
Girls 6-11 years	3,487	29	104	232	274	310
6 years	536	8	14	38	49	45
7 years	609	8	15	40	42	59
8 years	613	1	17	35	46	66
9 years	581	5	22	38	50	35
10 years	584	4	18	50	49	44
11 years	564	3	18	31	38	51
White						
Boys 6-11 years	3,153	29	51	130	184	224
6 years	489	4	14	20	26	34
7 years	551	5	6	22	34	41
8 years	537	8	7	25	37	37
9 years	525	4	11	21	25	36
10 years	509	6	5	23	31	32
11 years	542	2	8	19	31	44
Girls 6-11 years	2,947	22	65	150	170	221
6 years	461	4	6	25	31	33
7 years	512	8	9	22	25	44
8 years	498	1	15	18	26	41
9 years	494	4	14	29	32	29
10 years	505	3	11	36	30	33
11 years	477	2	10	20	26	41
Negro						
Boys 6-11 years	464	5	31	80	72	91
6 years	84	1	4	13	10	24
7 years	79	0	7	15	15	11
8 years	79	1	4	11	20	16
9 years	74	1	7	12	8	13
10 years	65	2	3	12	7	15
11 years	83	0	6	17	12	12
Girls 6-11 years	523	7	39	82	102	89
6 years	72	4	8	13	18	12
7 years	93	0	6	18	15	15
8 years	113	0	2	17	20	25
9 years	84	1	8	9	18	16
10 years	77	1	7	14	19	11
11 years	84	1	8	11	12	10

Table 1. Unweighted sample size for children, by age at last birthday, sex, race, and annual family income: United States, 1963-65—Con.

Annual family income—Con.						
$4,000-$4,999	$5,000-$6,999	$7,000-$9,999	$10,000-$14,999	$15,000 or more	Don't know	Blank or refused
334	841	756	430	183	144	45
69	140	91	67	29	22	7
52	156	131	72	27	28	10
50	141	139	64	33	21	4
49	143	138	70	29	27	9
52	119	136	79	26	21	6
62	142	121	78	39	25	9
321	811	695	383	146	128	54
42	120	118	57	21	19	5
64	159	129	50	18	16	9
52	137	118	76	24	28	13
62	125	114	70	23	19	8
50	127	114	69	32	19	8
51	143	102	61	28	27	11
286	765	712	425	181	125	41
62	126	83	65	29	21	5
43	145	124	72	27	23	9
42	130	133	63	32	19	4
44	127	128	70	29	22	8
45	110	131	77	25	18	6
50	127	113	78	39	22	9
269	714	665	377	145	106	43
34	113	115	57	21	18	4
55	140	123	47	18	14	7
45	111	113	74	24	21	9
51	110	109	69	23	16	8
46	114	109	69	32	16	6
38	126	96	61	27	21	9
47	70	41	5	0	19	3
7	12	8	2	0	1	2
8	11	7	0	0	5	0
8	10	6	1	0	2	0
5	14	8	0	0	5	1
7	9	5	2	0	3	0
12	14	7	0	0	3	0
52	87	30	5	0	22	8
8	5	3	0	0	1	0
9	17	6	3	0	2	2
7	25	5	2	0	7	3
11	13	5	0	0	3	0
4	12	5	0	0	3	1
13	15	6	0	0	6	2

Table 2. Unweighted sample size for children, by age at last birthday, sex, and race and by education of parent: United States, 1963-65

Age, sex, and race	All education groups	Education of parent								
		Less than 5 years	5-7 years	8 years	9-11 years	12 years	13-15 years	16 years	17 years or more	Unknown
Total										
Boys 6-11 years	3,632	99	234	226	678	1,432	360	340	222	41
6 years	575	12	35	30	110	241	50	52	38	7
7 years	632	21	36	30	122	258	66	65	24	10
8 years	618	14	32	40	115	253	67	48	44	5
9 years	603	14	52	32	120	230	52	65	32	6
10 years	576	18	37	40	99	216	67	51	42	6
11 years	628	20	42	54	112	234	58	59	42	7
Girls 6-11 years	3,487	98	220	249	690	1,318	374	291	189	58
6 years	536	13	30	35	106	201	69	49	24	9
7 years	609	16	34	38	125	243	71	49	27	6
8 years	613	14	45	36	130	211	73	49	37	18
9 years	581	18	35	43	111	229	54	45	34	12
10 years	584	19	36	46	116	208	68	46	37	8
11 years	564	18	40	51	102	226	39	53	30	5
White										
Boys 6-11 years	3,153	75	163	183	531	1,294	335	325	218	29
6 years	489	7	27	23	84	211	44	49	38	6
7 years	551	15	26	26	99	229	64	63	24	5
8 years	537	12	17	33	87	233	61	47	42	5
9 years	525	9	36	26	98	209	46	64	32	5
10 years	509	16	29	33	78	198	64	46	41	4
11 years	542	16	28	42	85	214	56	56	41	4
Girls 6-11 years	2,947	78	140	185	530	1,179	344	277	181	33
6 years	461	13	18	23	82	185	64	48	24	4
7 years	512	12	20	26	101	216	64	44	25	4
8 years	498	11	29	26	99	180	65	43	36	9
9 years	494	14	27	31	87	202	50	43	33	7
10 years	505	16	21	40	86	191	64	46	34	7
11 years	477	12	25	39	75	205	37	53	29	2
Negro										
Boys 6-11 years	464	24	71	43	144	134	23	12	2	11
6 years	84	5	8	7	25	29	6	3	0	1
7 years	79	6	10	4	23	28	2	2	0	4
8 years	79	2	15	7	27	20	6	1	1	0
9 years	74	5	16	6	21	19	5	1	0	1
10 years	65	2	8	7	21	18	3	4	0	2
11 years	83	4	14	12	27	20	1	1	1	3
Girls 6-11 years	523	20	79	64	154	135	30	12	7	22
6 years	72	0	12	12	23	15	5	1	0	4
7 years	93	4	14	12	23	26	7	3	2	2
8 years	113	3	16	10	31	30	8	6	1	8
9 years	84	4	7	12	23	26	4	2	1	5
10 years	77	3	15	6	29	17	4	0	3	0
11 years	84	6	15	12	25	21	2	0	0	3

Table 3. Mean height, mean weight, standard error of the mean, and unweighted and weighted sample sizes for children ages 6 through 11, by annual family income and education of parent: United States, 1963-65

Annual family income and education of parent	Boys						Girls					
	n	N	Height in cm.		Weight in kg.		n	N	Height in cm.		Weight in kg.	
			$\bar{X}$	$s_{\bar{x}}$	$\bar{X}$	$s_{\bar{x}}$			$\bar{X}$	$s_{\bar{x}}$	$\bar{X}$	$s_{\bar{x}}$
Total	3,632	12,080	132.2	0.24	29.47	0.183	3,487	11,703	132.2	0.16	29.80	0.184
Annual family income												
Less than $500	34	127	129.8	1.56	26.71	0.867	29	117	126.4	2.85	24.53	1.010
$500-$999	82	306	129.3	1.68	27.17	1.193	104	376	132.3	1.24	29.62	1.122
$1,000-$1,999	210	773	130.3	0.89	27.95	0.606	232	838	130.1	1.16	27.80	0.643
$2,000-$2,999	258	889	130.9	0.76	28.55	0.566	274	923	131.7	0.75	29.33	0.874
$3,000-$3,999	315	1,041	131.3	0.66	28.59	0.491	310	1,021	130.6	0.75	29.32	0.634
$4,000-$4,999	334	1,129	131.1	0.70	29.01	0.419	321	1,056	131.9	0.78	29.84	0.595
$5,000-$6,999	841	2,690	132.2	0.24	29.68	0.230	811	2,607	131.9	0.38	29.75	0.333
$7,000-$9,999	756	2,462	133.7	0.47	30.55	0.297	695	2,353	133.0	0.30	30.29	0.356
$10,000-$14,999	430	1,468	133.4	0.55	30.08	0.464	383	1,314	133.9	0.60	30.94	0.531
$15,000 or more	183	599	133.5	0.91	30.58	0.685	146	487	134.5	0.99	31.33	0.836
Don't know	144	456	131.2	1.01	29.02	0.765	128	413	132.1	1.68	29.84	1.308
Blank or refused	45	135	132.1	1.40	30.14	0.932	54	193	133.6	1.38	29.58	0.902
Education of parent												
Less than 5 years	99	363	130.2	1.01	27.66	0.764	98	365	129.4	1.38	28.39	0.681
5-7 years	234	830	130.9	0.93	28.92	0.789	220	772	131.7	0.77	28.57	0.485
8 years	226	759	132.6	0.83	29.92	0.621	249	838	132.6	0.83	29.93	0.718
9-11 years	678	2,161	131.4	0.53	29.18	0.451	690	2,224	130.9	0.41	29.23	0.408
12 years	1,432	4,727	132.1	0.27	29.35	0.187	1,318	4,373	132.6	0.34	30.17	0.319
13-15 years	360	1,191	133.2	0.52	29.96	0.377	374	1,252	131.8	0.47	29.50	0.342
16 years	340	1,125	133.6	0.36	30.68	0.369	291	991	133.4	0.63	30.58	0.456
17 years or more	222	767	133.3	0.63	29.85	0.434	189	674	134.3	1.02	30.65	0.703
Unknown	41	154	129.0	1.50	27.36	1.292	59	209	131.0	2.27	30.01	2.412

NOTE: n=sample size; N=estimated number of children in thousands; $\bar{X}$=mean; $s_{\bar{x}}$=standard error of the mean.

Table 4. Height and weight for children by age at last birthday, sex, and annual family income: weighted sample size, mean, and standard error of the mean, United States, 1963-65

Sex and annual family income	6 years			7 years		
	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
Boys	Height in centimeters					
All incomes	2,081	118.6	0.24	2,073	124.5	0.36
Less than $500	21	*	*	17	*	*
$500-$999	74	114.6	0.80	49	122.9	3.20
$1,000-$1,999	123	117.0	0.93	136	121.6	1.23
$2,000-$2,999	134	117.4	0.91	166	124.2	1.26
$3,000-$3,999	206	118.5	0.67	164	125.5	0.71
$4,000-$4,999	251	116.8	0.75	173	124.2	0.67
$5,000-$6,999	487	119.5	0.34	494	124.5	0.47
$7,000-$9,999	328	120.1	0.52	423	124.9	0.59
$10,000-$14,999	251	118.7	0.67	236	125.8	0.57
$15,000 or more	107	119.6	0.86	99	126.7	1.03
Don't know	74	120.6	1.57	85	122.2	1.60
No response	20	119.9	0.99	27	125.3	1.23
Girls						
All incomes	2,016	117.8	0.27	2,010	123.5	0.18
Less than $500	34	116.7	1.56	33	121.4	2.88
$500-$999	52	118.6	1.37	53	121.8	1.13
$1,000-$1,999	155	116.4	0.92	144	121.8	1.30
$2,000-$2,999	187	116.8	0.88	131	123.8	0.93
$3,000-$3,999	168	116.5	0.96	191	122.0	0.86
$4,000-$4,999	163	117.7	0.91	208	124.1	0.88
$5,000-$6,999	427	117.5	0.46	487	123.0	0.29
$7,000-$9,999	435	119.6	0.56	427	124.5	0.49
$10,000-$14,999	210	118.9	0.76	184	124.6	0.78
$15,000 or more	89	118.5	0.77	55	126.7	0.70
Don't know	69	115.2	2.08	54	122.8	0.90
No response	22	116.0	2.61	37	124.9	1.52
Boys	Weight in kilograms					
All incomes	2,081	22.01	0.148	2,073	24.69	0.185
Less than $500	21	*	*	17	*	*
$500-$999	74	19.84	0.538	49	23.23	1.624
$1,000-$1,999	123	21.08	0.522	136	22.34	0.512
$2,000-$2,999	134	20.83	0.482	166	24.85	0.670
$3,000-$3,999	206	21.47	0.296	164	24.82	0.354
$4,000-$4,999	251	21.45	0.309	173	24.81	0.363
$5,000-$6,999	487	22.45	0.323	494	24.55	0.340
$7,000-$9,999	328	22.92	0.335	423	24.99	0.365
$10,000-$14,999	251	22.12	0.551	236	25.41	0.668
$15,000 or more	107	*	*	99	26.73	1.193
Don't know	74	23.88	1.453	85	23.45	0.765
No response	20	22.77	1.537	27	26.11	0.849
Girls						
All incomes	2,016	21.55	0.229	2,010	24.16	0.206
Less than $500	34	20.34	0.469	33	22.40	0.979
$500-$999	52	21.43	0.978	53	22.87	0.489
$1,000-$1,999	155	20.45	0.388	144	22.23	0.659
$2,000-$2,999	187	20.70	0.635	131	24.20	0.943
$3,000-$3,999	168	20.98	0.691	191	22.79	0.467
$4,000-$4,999	163	22.34	0.781	208	24.59	0.627
$5,000-$6,999	427	20.92	0.260	487	24.30	0.269
$7,000-$9,999	435	22.50	0.423	427	24.61	0.392
$10,000-$14,999	210	22.59	0.767	184	25.40	0.924
$15,000 or more	89	22.35	0.963	55	25.65	0.655
Don't know	69	20.41	1.485	54	24.34	0.980
No response	22	21.29	5.008	37	24.26	1.171

NOTE: N=estimated number of children in thousands; $\bar{X}$ = mean; $s_{\bar{x}}$=standard error of the mean.

Table 4. Height and weight for children by age at last birthday, sex, and annual family income: weighted sample size, mean, and standard error of the mean, United States, 1963-65—Con.

8 years			9 years			10 years			11 years		
N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
Height in centimeters											
2,026	130.0	0.26	2,011	135.5	0.44	1,963	140.2	0.37	1,923	145.7	0.27
32	131.0	2.15	19	134.0	2.35	29	136.3	2.82	6	*	*
44	131.1	1.60	67	133.4	1.45	29	141.9	2.40	41	145.5	2.03
133	128.6	1.48	120	133.3	1.65	138	137.0	1.03	122	144.9	0.90
198	128.4	1.17	111	133.2	1.31	144	138.8	0.87	133	145.8	1.82
176	129.9	0.92	163	133.6	1.80	164	138.9	1.37	166	144.7	1.23
168	128.9	1.08	173	135.7	0.80	180	139.7	1.10	182	146.5	0.92
439	130.3	0.38	449	136.1	0.58	396	140.8	0.52	422	145.7	0.66
441	131.0	0.40	437	136.1	0.61	453	141.7	0.62	380	145.8	0.65
207	130.3	0.78	253	137.1	1.04	264	140.7	0.71	255	146.5	1.09
109	130.3	1.29	90	138.2	1.14	80	140.7	1.14	112	146.9	0.78
65	129.5	1.50	93	133.8	2.69	63	138.4	1.68	74	144.2	1.55
9	*	*	32	132.8	7.00	18	139.2	2.20	20	143.5	1.56
1,960	129.4	0.33	1,945	135.5	0.31	1,904	140.9	0.31	1,868	147.6	0.24
3	*	*	20	135.0	3.91	14	*	*	10	*	*
55	126.8	1.57	80	134.3	1.04	65	140.8	1.68	68	145.1	1.82
107	127.7	1.00	140	132.8	1.06	182	138.3	1.00	108	145.7	1.54
137	129.4	1.17	169	135.1	0.87	169	139.8	1.26	128	148.7	1.24
202	128.6	0.65	152	133.2	1.18	141	139.4	1.81	164	147.8	1.01
102	129.5	1.27	197	134.8	1.48	156	140.8	1.03	167	146.0	1.23
431	128.2	1.08	397	135.6	0.55	406	140.5	0.59	455	147.3	0.58
385	130.7	0.50	398	136.9	0.79	356	142.0	0.55	350	149.0	0.67
266	130.6	0.70	221	134.6	0.98	229	143.0	0.76	201	149.4	0.86
78	130.8	1.56	79	138.6	1.64	98	143.2	1.18	86	145.5	2.12
92	128.6	2.18	54	135.0	2.09	57	140.2	1.99	84	148.1	1.11
35	132.6	1.53	32	134.1	2.77	26	142.9	3.18	39	146.0	2.15
Weight in kilograms											
2,026	27.76	0.225	2,011	31.16	0.430	1,963	33.73	0.297	1,923	38.35	0.360
32	27.92	0.841	19	28.00	1.329	29	29.41	2.275	6	*	*
44	28.31	1.585	67	28.34	0.952	29	33.13	1.775	41	37.61	1.830
133	26.69	1.425	120	30.40	1.378	138	31.74	0.866	122	35.79	0.975
198	26.90	0.900	111	28.68	1.100	144	32.07	0.927	133	39.41	1.317
176	26.77	0.853	163	30.51	1.183	164	31.16	0.981	166	37.37	1.068
168	27.02	0.545	173	30.21	0.597	180	34.36	0.957	182	38.82	1.132
439	28.09	0.394	449	32.21	0.557	396	33.97	0.458	422	38.97	0.845
441	28.74	0.428	437	30.95	0.548	453	35.90	0.613	380	38.59	0.809
207	27.64	0.623	253	31.79	0.639	264	33.75	0.706	255	38.72	1.195
109	28.04	0.925	90	34.94	2.157	80	33.26	0.767	112	39.20	1.003
65	27.83	1.417	93	30.75	3.441	63	32.16	1.565	74	36.78	1.877
9	*	*	32	32.59	3.029	18	35.47	5.265	26	34.19	1.990
1,960	27.55	0.233	1,945	31.39	0.371	1,904	35.18	0.411	1,868	39.99	0.401
3	*	*	20	27.31	2.924	14	*	*	10	*	*
55	26.23	1.395	80	28.95	0.897	65	34.82	2.404	68	39.68	3.388
107	25.86	0.951	140	28.30	0.730	182	33.19	0.945	108	37.99	2.084
137	27.09	1.028	169	31.19	0.963	169	33.79	1.257	128	41.29	2.082
202	27.18	0.724	152	29.52	1.186	141	32.11	2.342	164	41.21	1.688
162	27.97	1.120	197	31.87	1.026	156	35.41	1.590	167	37.92	1.150
431	26.85	0.479	397	31.57	0.562	406	35.34	0.704	455	40.02	0.549
385	28.33	0.452	398	33.30	0.937	356	35.32	0.671	350	40.52	1.196
266	28.47	0.696	221	32.37	1.034	229	35.62	0.705	201	41.11	1.355
78	27.89	1.444	79	32.20	1.342	98	36.88	1.094	86	40.19	1.635
92	27.01	1.435	54	30.83	1.889	57	35.06	2.081	84	40.01	1.455
35	30.58	1.943	32	27.07	2.231	26	35.08	2.513	39	36.84	2.049

Table 5. Height and weight for children by age at last birthday and sex and by education of parent: weighted sample size, mean, and standard error of the mean, United States, 1963-65

Sex and education of parent	6 years			7 years		
	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
Boys	Height in centimeters					
All education groups	2,081	118.6	0.24	2,073	124.5	0.36
Less than 5 years	47	115.7	2.68	74	121.5	2.82
5-7 years	133	117.2	0.92	120	121.9	1.36
8 years	110	117.8	0.86	104	124.4	0.79
9-11 years	372	117.7	0.50	366	123.2	0.43
12 years	871	119.1	0.33	828	125.0	0.49
13-15 years	187	120.4	0.71	233	126.2	0.68
16 years	179	118.9	0.68	218	127.0	0.51
17 years or more	151	119.5	0.76	85	123.6	0.77
Unknown	27	114.4	0.86	41	121.7	1.57
Girls						
All education groups	2,016	117.8	0.27	2,010	123.5	0.18
Less than 5 years	57	115.7	2.42	59	121.1	2.99
5-7 years	118	115.2	1.46	112	122.7	1.30
8 years	131	116.8	1.06	123	122.4	1.13
9-11 years	391	117.1	0.94	400	121.8	0.49
12 years	745	118.2	0.45	808	124.0	0.33
13-15 years	258	119.2	0.55	214	124.8	0.86
16 years	180	119.0	0.52	167	124.6	0.79
17 years or more	97	118.6	0.54	102	125.8	1.03
Unknown	34	116.4	1.87	21	123.1	4.82
Boys	Weight in kilograms					
All education groups	2,081	22.01	0.148	2,073	24.69	0.185
Less than 5 years	47	20.30	1.623	74	23.14	1.136
5-7 years	133	20.87	0.437	120	23.13	0.694
8 years	110	21.76	0.574	104	24.01	0.670
9-11 years	372	21.35	0.241	366	24.22	0.408
12 years	871	22.32	0.172	828	24.95	0.280
13-15 years	187	23.16	0.542	233	25.25	0.497
16 years	179	22.27	0.517	218	26.64	0.800
17 years or more	151	21.85	0.519	85	23.03	0.480
Unknown	27	21.95	2.078	41	22.94	1.042
Girls						
All education groups	2,016	21.55	0.229	2,010	24.16	0.206
Less than 5 years	57	20.43	0.912	59	22.60	1.038
5-7 years	118	19.99	0.533	112	22.63	0.529
8 years	131	20.89	0.660	123	23.27	0.606
9-11 years	391	21.14	0.526	400	23.35	0.445
12 years	745	21.98	0.321	808	24.42	0.269
13-15 years	258	22.11	0.358	214	24.95	0.583
16 years	180	21.91	0.404	167	24.66	0.576
17 years or more	97	21.48	0.644	102	26.49	1.628
Unknown	34	20.77	1.091	21	24.34	2.728

NOTE: N = estimated number of children in thousands; $\bar{X}$ = mean; $s_{\bar{x}}$ = standard error of the mean.

Table 5. Height and weight for children by age at last birthday and sex and by education of parent: weighted sample size, mean, and standard error of the mean, United States, 1963-65—Con.

8 years			9 years			10 years			11 years		
N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
				Height in centimeters							
2,026	130.0	0.26	2,011	135.5	0.44	1,963	140.2	0.37	1,923	145.7	0.27
53	128.3	2.34	50	133.1	2.27	68	137.0	3.63	68	142.1	1.89
114	128.4	1.09	185	133.0	1.02	139	138.4	1.02	137	144.1	1.57
139	129.0	0.85	113	134.3	1.00	132	138.7	1.33	158	145.2	0.92
353	129.6	0.84	401	135.1	0.68	330	139.6	1.04	337	145.1	0.59
830	130.4	0.31	751	135.9	0.42	734	140.2	0.39	710	146.3	0.53
214	130.4	0.76	164	136.1	1.50	222	142.1	0.86	168	146.4	1.00
166	130.4	1.01	216	137.5	0.85	170	141.4	1.05	173	147.6	0.84
137	130.7	0.62	106	136.1	2.11	141	142.0	0.86	144	145.3	0.78
16	127.5	3.69	20	132.9	1.60	23	139.3	3.65	24	144.9	1.91
1,960	129.4	0.33	1,945	135.5	0.31	1,904	140.9	0.31	1,868	147.6	0.24
48	126.1	3.01	64	130.7	1.54	71	136.3	3.76	63	143.2	2.54
149	128.8	0.98	133	132.7	0.93	121	140.5	1.34	137	148.0	1.10
100	127.5	0.85	146	133.8	0.78	162	139.6	0.94	173	147.2	0.77
404	127.9	0.59	331	135.5	0.69	368	140.1	1.01	328	147.5	0.86
651	130.1	0.30	776	136.1	0.48	666	141.5	0.62	725	147.2	0.49
249	130.3	1.07	169	136.1	0.90	224	140.2	0.52	135	150.2	0.98
169	130.0	1.08	143	136.1	1.01	142	144.0	0.90	188	148.1	1.15
132	131.3	1.43	127	137.7	1.27	118	142.5	1.29	96	148.6	1.43
55	127.7	1.48	51	135.1	2.68	27	142.0	3.97	18	149.6	3.36
				Weight in kilograms							
2,026	27.76	0.225	2,011	31.16	0.430	1,963	33.73	0.297	1,923	38.35	0.360
53	26.78	1.840	50	28.20	1.114	68	30.75	2.343	68	34.84	1.567
114	26.34	0.733	185	29.32	0.948	139	33.51	1.384	137	38.81	1.592
139	26.96	0.638	113	30.48	1.296	132	33.64	1.381	158	38.62	1.589
353	27.71	0.695	401	31.46	1.001	330	33.46	0.695	337	37.85	0.711
830	28.02	0.274	751	31.02	0.349	734	33.91	0.554	710	38.19	0.345
214	27.68	0.382	164	32.12	1.318	222	34.11	0.737	168	39.35	1.069
166	28.43	0.640	216	33.35	1.087	170	33.88	0.875	173	40.13	1.375
137	28.07	0.651	106	30.81	0.866	141	34.84	0.660	144	38.41	0.986
16	27.65	2.554	20	28.90	2.794	23	31.21	6.128	24	35.45	2.711
1,960	27.55	0.233	1,945	31.39	0.371	1,904	35.18	0.411	1,868	39.99	0.401
48	26.86	2.721	64	28.76	1.527	71	32.62	2.859	63	37.06	1.400
149	25.93	0.811	133	28.68	0.885	121	33.67	1.080	137	39.06	1.041
100	27.28	1.265	146	28.68	0.611	162	34.21	1.010	173	40.11	1.568
404	26.79	0.566	331	31.83	0.760	368	35.15	1.215	328	39.77	1.195
651	27.99	0.415	776	31.95	0.487	666	35.52	0.444	725	40.11	0.638
249	28.48	0.480	169	32.61	0.956	224	34.25	0.689	135	40.89	1.125
169	27.35	0.648	143	31.52	0.946	142	38.26	0.848	188	40.47	0.951
132	28.46	0.928	127	32.31	0.810	118	34.30	1.046	96	40.73	1.455
55	27.51	0.957	51	31.64	3.203	27	41.54	8.199	18	39.83	5.428

Table 6. Height and weight for white children by age at last birthday, sex, and annual family income: weighted sample size, mean, and standard error of the mean, United States, 1963-65

Sex and annual family income	6 years			7 years		
	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
	Height in centimeters					
Boys						
All incomes	1,787	118.5	0.30	1,780	124.5	0.38
Less than $500	16	*	*	17	*	*
$500-$999	60	114.1	0.70	19	122.3	2.75
$1,000-$1,999	73	115.6	1.39	78	120.2	1.87
$2,000-$2,999	101	116.7	0.91	115	123.5	1.77
$3,000-$3,999	122	118.7	0.84	127	125.1	0.57
$4,000-$4,999	230	116.5	0.74	143	124.3	0.75
$5,000-$6,999	441	119.4	0.38	455	124.2	0.54
$7,000-$9,999	300	120.0	0.63	397	124.9	0.62
$10,000-$14,999	245	118.6	0.67	236	125.8	0.57
$15,000 or more	107	119.6	0.86	99	126.7	1.03
Don't know	71	120.9	1.59	66	121.9	2.01
No response	14	119.8	1.05	23	126.0	1.18
Girls						
All incomes	1,722	117.7	0.32	1,716	123.4	0.17
Less than $500	16	*	*	33	121.4	2.88
$500-$999	20	121.0	2.29	33	119.5	1.00
$1,000-$1,999	107	115.1	1.16	91	120.9	2.24
$2,000-$2,999	122	116.4	1.09	81	123.4	1.11
$3,000-$3,999	121	116.0	0.89	147	121.5	1.03
$4,000-$4,999	130	117.6	0.82	180	123.9	0.91
$5,000-$6,999	402	117.3	0.47	427	122.8	0.31
$7,000-$9,999	417	119.4	0.58	408	124.6	0.52
$10,000-$14,999	210	118.9	0.76	175	124.5	0.84
$15,000 or more	89	118.5	0.77	55	126.7	0.70
Don't know	65	115.0	2.24	49	123.4	0.80
No response	18	*	*	32	123.5	1.20
	Weight in kilograms					
Boys						
All incomes	1,787	22.04	0.175	1,780	24.81	0.213
Less than $500	16	*	*	17	*	*
$500-$999	60	19.61	0.433	19	22.97	5.278
$1,000-$1,999	73	20.46	0.801	78	21.68	0.726
$2,000-$2,999	101	20.63	0.555	115	24.91	1.081
$3,000-$3,999	122	21.83	0.440	127	25.20	0.330
$4,000-$4,999	230	21.22	0.294	143	24.98	0.680
$5,000-$6,999	441	22.58	0.372	455	24.55	0.368
$7,000-$9,999	300	22.73	0.341	397	25.03	0.363
$10,000-$14,999	245	22.06	0.540	236	25.41	0.668
$15,000 or more	107	22.08	0.484	99	26.73	1.193
Don't know	71	24.04	1.453	66	23.11	0.909
No response	14	24.23	1.748	23	26.41	0.859
Girls						
All incomes	1,722	21.62	0.253	1,716	24.27	0.204
Less than $500	16	*	*	33	22.40	0.979
$500-$999	20	22.85	2.263	33	22.10	0.464
$1,000-$1,999	107	19.90	0.441	91	21.49	0.816
$2,000-$2,999	122	20.58	0.822	81	24.31	0.984
$3,000-$3,999	121	20.99	0.689	147	23.03	0.520
$4,000-$4,999	130	22.67	0.969	180	24.57	0.687
$5,000-$6,999	402	20.91	0.255	427	24.45	0.341
$7,000-$9,999	417	22.51	0.433	408	24.60	0.407
$10,000-$14,999	210	22.59	0.767	175	25.64	0.874
$15,000 or more	89	22.35	0.963	55	25.65	0.655
Don't know	65	20.37	1.623	49	24.32	1.054
No response	18	*	*	32	23.71	1.305

NOTE: N = estimated number of children in thousands; $\bar{X}$ = mean; $s_{\bar{x}}$ = standard error of the mean.

Table 6. Height and weight for white children by age at last birthday, sex, and annual family income: weighted sample size, mean, and standard error of the mean, United States, 1963-65—Con.

8 years			9 years			10 years			11 years		
N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
Height in centimeters											
1,739	129.8	0.29	1,729	135.5	0.50	1,692	140.3	0.37	1,661	145.7	0.30
27	130.7	2.49	15	*	*	21	135.9	3.79	6	*	*
29	129.3	1.17	39	133.5	1.52	16	140.9	1.69	25	144.8	3.25
91	127.5	1.77	73	134.0	1.93	86	136.6	1.46	66	144.6	1.93
129	126.9	1.76	83	132.8	1.92	107	138.5	0.89	92	144.7	1.54
119	129.6	1.29	117	132.8	2.47	101	140.3	1.46	133	145.0	1.44
139	128.4	1.24	156	135.8	0.84	155	138.9	1.02	146	145.6	0.88
402	130.2	0.40	399	136.2	0.69	365	140.9	0.60	384	145.7	0.61
422	131.0	0.40	400	136.0	0.67	432	141.6	0.68	351	145.9	0.64
203	130.2	0.75	253	137.1	1.04	256	140.8	0.77	255	146.5	1.09
104	130.5	1.22	90	138.2	1.14	77	141.1	1.13	112	146.9	0.78
58	129.1	1.58	76	132.8	2.95	52	137.3	1.73	61	143.7	1.67
9	*	*	29	131.5	7.40	18	139.2	2.20	26	143.5	1.56
1,674	120.4	0.39	1,663	135.1	0.36	1,632	140.8	0.34	1,605	147.3	0.27
3	*	*	16	*	*	10	*	*	7	*	*
51	126.3	1.41	51	133.1	1.06	38	139.5	2.12	38	142.4	1.96
62	128.6	1.49	111	131.4	1.18	129	137.7	1.63	76	144.6	1.74
86	129.0	1.62	112	134.9	1.01	104	138.0	1.14	92	147.5	1.39
139	128.2	0.71	104	132.1	1.90	109	139.9	2.10	137	147.5	1.18
144	129.1	1.34	162	133.5	1.50	143	140.5	0.97	132	145.8	1.55
370	128.0	1.19	353	135.7	0.59	364	140.1	0.68	404	147.2	0.68
374	130.6	0.52	380	136.6	0.80	337	141.9	0.56	331	148.9	0.73
262	130.5	0.73	212	135.8	0.77	229	143.0	0.76	201	149.4	0.86
78	130.8	1.56	79	138.6	1.64	98	143.2	1.18	83	145.0	2.28
73	129.2	2.27	46	134.0	2.25	48	139.3	2.31	67	148.1	1.37
26	133.7	2.02	32	134.1	2.77	18	145.0	3.26	32	145.9	2.55
Weight in kilograms											
1,739	27.81	0.246	1,729	31.38	0.466	1,692	33.94	0.302	1,661	38.58	0.400
27	27.88	0.946	15	*	*	21	29.29	3.098	6	*	*
29	26.74	1.323	39	28.35	1.022	16	33.19	1.611	25	38.84	9.180
91	26.41	2.047	73	30.80	2.022	86	32.00	1.168	66	35.63	1.126
129	26.21	1.370	83	28.77	1.571	107	32.33	1.014	92	40.66	1.129
119	27.16	1.209	117	31.02	1.379	101	31.75	1.289	133	38.20	1.245
139	27.05	0.590	156	30.53	0.664	155	33.75	0.926	146	38.62	1.253
402	28.10	0.427	394	32.37	0.657	365	34.04	0.506	384	39.04	0.814
422	28.85	0.461	400	30.86	0.594	432	36.02	0.692	351	38.80	0.839
203	27.64	0.635	253	31.79	0.639	256	33.70	0.724	255	38.72	1.195
104	28.25	0.858	90	34.94	2.157	77	33.34	0.792	112	39.20	1.003
58	27.65	1.567	76	31.06	4.504	52	30.94	1.564	61	36.10	2.121
9	*	*	29	32.99	3.587	18	35.47	5.265	26	34.19	1.990
1,674	27.63	0.261	1,633	31.42	0.425	1,632	35.05	0.438	1,605	39.84	0.363
3	*	*	16	*	*	10	*	*	7	*	*
51	25.75	1.485	51	28.44	1.147	38	33.86	3.644	38	35.81	2.695
62	27.23	1.518	111	27.77	0.798	129	33.15	1.465	76	36.37	2.077
86	27.30	1.468	112	31.80	1.317	104	32.04	1.634	92	40.60	2.173
139	26.92	0.752	104	29.70	1.766	109	38.35	3.394	137	41.37	1.953
144	27.70	1.175	162	31.59	1.100	143	34.39	1.047	132	38.12	1.358
370	26.89	0.546	353	31.68	0.556	364	34.92	0.788	404	39.98	0.624
374	28.31	0.462	380	32.96	0.968	337	35.60	0.701	331	40.38	1.325
262	28.44	0.715	212	32.27	1.097	229	35.62	0.705	201	41.11	1.355
78	27.89	1.444	79	32.20	1.342	98	36.88	1.094	83	40.17	1.707
73	26.67	1.879	46	30.67	2.425	48	33.50	1.996	67	40.68	1.809
26	31.71	2.414	32	27.07	2.231	18	36.62	8.459	32	37.02	2.310

Table 7. Height and weight for white children by age at last birthday and sex and by education of parent: weighted sample size, mean, and standard error of the mean, United States, 1963-65

Sex and education of parent	6 years			7 years		
	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
Boys	Height in centimeters					
All education groups	1,787	22.04	0.175	1,780	24.81	0.213
Less than 5 years	29	19.79	4.525	51	22.45	1.745
5-7 years	104	20.80	0.572	85	22.81	0.689
8 years	87	21.77	0.638	88	24.28	0.667
9-11 years	287	21.19	0.275	288	24.36	0.394
12 years	762	22.44	0.168	722	25.05	0.308
13-15 years	169	22.97	0.510	227	25.27	0.479
16 years	171	22.22	0.524	211	26.64	0.842
17 years or more	151	21.85	0.519	85	23.03	0.480
Unknown	23	22.06	2.717	18	22.14	5.344
Girls						
All education groups	1,722	21.62	0.253	1,716	24.27	0.204
Less than 5 years	57	20.43	0.912	44	22.45	1.189
5-7 years	70	19.83	0.869	70	22.51	0.849
8 years	87	21.45	0.989	89	23.14	0.729
9-11 years	296	21.18	0.746	327	23.45	0.457
12 years	679	21.92	0.311	725	24.55	0.284
13-15 years	240	22.12	0.370	194	24.77	0.601
16 years	175	21.92	0.413	154	24.87	0.549
17 years or more	97	21.48	0.644	95	26.12	1.645
Unknown	16	*	*	15	*	*
Boys	Weight in kilograms					
All education groups	1,787	118.5	0.30	1,780	124.5	0.38
Less than 5 years	29	114.7	25.78	51	119.7	3.92
5-7 years	104	116.7	1.13	85	121.0	1.45
8 years	87	117.3	0.90	88	124.6	0.73
9-11 years	287	117.4	0.54	288	122.8	0.43
12 years	762	119.0	0.40	722	124.7	0.53
13-15 years	169	120.3	0.78	227	126.2	0.63
16 years	171	118.9	0.73	211	127.0	0.55
17 years or more	151	119.5	0.76	85	123.6	0.77
Unknown	23	114.2	0.94	18	121.0	27.23
Girls						
All education groups	1,722	117.7	0.32	1,716	123.4	0.17
Less than 5 years	57	115.7	2.42	44	119.3	2.21
5-7 years	70	113.0	1.90	70	122.3	2.09
8 years	87	117.6	1.44	89	122.0	1.46
9-11 years	296	116.7	1.28	327	121.6	0.45
12 years	679	118.0	0.43	725	123.8	0.33
13-15 years	240	119.1	0.59	194	124.4	0.90
16 years	175	119.0	0.54	154	124.7	0.73
17 years or more	97	118.6	0.54	95	126.0	1.08
Unknown	16	*	*	15	*	*

NOTE: N = estimated number of children in thousands; $\bar{X}$ = mean; $s_{\bar{x}}$ = standard error of the mean.

Table 7. Height and weight for white children by age at last birthday and sex and by education of parent: weighted sample size, mean, and standard error of the mean, United States, 1963-65—Con.

8 years			9 years			10 years			11 years		
N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
Height in centimeters											
1,739	27.81	0.246	1,729	31.38	0.466	1,692	33.94	0.302	1,661	38.58	0.400
45	26.10	5.991	31	20.08	0.753	59	31.13	3.144	54	34.42	2.289
59	25.76	1.187	117	29.52	1.307	102	33.22	1.835	89	38.82	1.661
109	26.45	0.667	90	30.35	1.553	103	34.00	1.513	125	39.37	1.927
263	27.85	0.963	325	32.30	1.245	247	33.84	0.721	262	38.81	0.921
759	28.15	0.287	683	31.13	0.398	663	34.16	0.602	646	38.10	0.346
193	27.39	0.403	145	31.76	1.319	210	34.03	0.718	162	39.45	1.075
163	28.43	0.655	212	33.08	1.060	151	33.84	0.945	166	40.20	1.420
128	28.31	0.610	106	30.81	0.866	138	34.92	0.681	141	38.50	0.991
16	27.65	2.554	16	29.32	3.351	13	*	*	11	*	*
1,674	27.63	0.261	1,663	31.42	0.425	1,632	35.05	0.438	1,605	39.84	0.363
41	27.25	6.996	49	26.79	1.218	59	*	*	44	35.34	2.441
101	25.53	1.020	107	28.18	1.088	70	32.67	1.639	92	37.32	1.104
76	28.34	1.425	108	28.51	0.670	141	34.03	1.144	136	40.86	1.852
328	26.81	0.669	262	32.31	1.020	264	34.50	1.618	248	38.65	0.808
578	27.98	0.450	682	31.96	0.536	610	35.62	0.486	663	40.30	0.630
231	28.55	0.533	157	32.36	0.943	210	33.59	0.636	129	40.27	1.091
155	27.28	0.814	135	31.40	1.009	142	38.26	0.848	188	40.47	0.951
130	28.37	0.931	124	32.16	0.860	107	34.55	1.194	92	40.73	1.519
29	27.19	1.929	34	32.64	4.842	24	*	*	8	*	*
Weight in kilograms											
1,739	129.8	0.29	1,729	135.5	0.50	1,692	140.3	0.37	1,661	145.7	0.30
45	127.3	28.55	31	130.1	3.38	59	137.2	5.30	54	140.4	2.35
59	126.8	1.32	117	132.8	1.35	102	138.4	1.53	89	144.3	1.35
109	128.4	0.90	90	133.8	1.08	103	138.4	1.47	125	145.2	1.07
263	129.1	1.04	325	135.4	0.85	247	139.8	0.93	262	145.3	0.59
759	130.4	0.32	683	135.9	0.47	663	140.3	0.41	646	146.1	0.49
193	130.0	0.83	145	136.0	1.48	210	142.2	0.83	162	146.5	1.00
163	130.2	0.94	212	137.3	0.85	151	140.9	1.07	166	147.7	0.90
128	131.1	0.60	106	136.1	2.11	138	142.2	0.88	141	145.2	0.80
16	127.5	3.69	16	131.3	1.06	13	*	*	11	*	*
1,674	129.4	0.39	1,663	135.1	0.36	1,632	140.8	0.34	1,605	147.3	0.27
41	126.2	28.50	49	128.5	1.82	59	137.5	30.96	44	140.3	2.82
101	128.0	1.35	107	132.1	1.06	70	139.3	1.73	92	146.5	1.25
76	128.0	0.87	108	132.7	0.80	141	139.2	0.95	136	146.8	0.97
328	127.9	0.73	262	135.4	0.89	264	138.4	1.19	248	147.2	0.80
578	129.9	0.33	682	135.6	0.43	610	141.7	0.60	663	147.1	0.52
231	130.5	1.16	157	135.8	0.97	210	140.1	0.56	129	150.0	0.99
155	129.8	1.18	135	136.1	1.07	142	144.0	0.90	188	148.1	1.15
130	131.1	1.42	124	137.4	1.18	107	142.5	1.46	92	148.3	1.37
29	127.5	1.21	34	133.7	5.08	24	142.5	32.18	8	*	*

Table 8. Height and weight for Negro children by age at last birthday, sex, and annual family income: weighted sample size, mean, and standard error of the mean, United States, 1963-65

Sex and annual family income	6 years			7 years		
	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
Boys	Height in centimeters					
All incomes	289	119.1	0.72	286	125.2	0.59
Less than $500	4	*	*	-	-	-
$500-$999	13	*	*	29	123.3	5.67
$1,000-$1,999	50	119.1	2.01	57	123.6	1.76
$2,000-$2,999	32	119.5	2.73	51	125.9	1.09
$3,000-$3,999	84	118.3	1.16	36	126.7	2.65
$4,000-$4,999	20	120.5	27.03	27	124.6	0.88
$5,000-$6,999	40	118.9	1.99	38	128.0	2.33
$7,000-$9,999	27	121.7	1.58	25	125.4	2.21
$10,000-$14,999	5	*	*	-	-	-
$15,000 or more	-	-	-	-	-	-
Don't know	2	*	*	18	123.2	3.01
No response	6	*	*	-	-	-
Girls						
All incomes	280	118.5	0.86	283	124.6	0.59
Less than $500	18	*	*	-	-	-
$500-$999	31	117.0	1.67	20	125.5	1.81
$1,000-$1,999	47	119.3	0.86	53	123.5	1.17
$2,000-$2,999	65	117.4	1.30	45	124.4	1.48
$3,000-$3,999	46	117.6	2.40	44	123.9	1.63
$4,000-$4,999	33	118.2	2.64	28	125.2	2.50
$5,000-$6,999	16	*	*	54	125.5	1.68
$7,000-$9,999	17	*	*	18	124.3	3.49
$10,000-$14,999	-	-	-	8	*	*
$15,000 or more	-	-	-	-	-	-
Don't know	3	*	*	5	*	*
No response	-	-	-	5	*	*
Boys	Weight in kilograms					
All incomes	289	21.76	0.37	286	24.04	0.32
Less than $500	4	*	*	-	-	-
$500-$999	13	*	*	29	23.39	2.95
$1,000-$1,999	50	21.99	1.04	57	23.24	1.07
$2,000-$2,999	32	21.43	1.87	51	24.71	0.94
$3,000-$3,999	84	20.95	0.51	36	23.51	1.02
$4,000-$4,999	20	23.88	5.66	27	24.34	0.89
$5,000-$6,999	40	20.69	0.73	38	24.61	1.16
$7,000-$9,999	27	25.00	1.55	25	24.42	1.45
$10,000-$14,999	5	*	*	-	-	-
$15,000 or more	-	-	-	-	-	-
Don't know	2	*	*	18	24.66	1.70
No response	6	*	*	-	-	-
Girls						
All incomes	280	21.09	0.36	283	23.69	0.47
Less than $500	18	*	*	-	-	-
$500-$999	31	20.49	0.62	20	24.13	0.89
$1,000-$1,999	47	21.69	0.76	53	23.50	1.10
$2,000-$2,999	65	20.91	0.95	45	23.97	1.72
$3,000-$3,999	46	20.94	1.35	44	21.98	0.66
$4,000-$4,999	33	21.04	1.27	28	24.69	1.12
$5,000-$6,999	16	*	*	54	24.01	1.33
$7,000-$9,999	17	*	*	18	24.69	1.24
$10,000-$14,999	-	-	-	8	*	*
$15,000 or more	-	-	-	-	-	-
Don't know	3	*	*	5	*	*
No response	-	-	-	5	*	*

NOTE: N = estimated number of children in thousands; $\bar{X}$ = mean; $s_{\bar{x}}$ = standard error of the mean.

Table 8. Height and weight for Negro children by age at last birthday, sex, and annual family income: weighted sample size, mean, and standard error of the mean, United States, 1963-65—Con.

8 years			9 years			10 years			11 years		
N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
				Height in centimeters							
279	131.3	0.57	268	135.0	0.67	264	139.6	0.97	254	145.7	0.50
4	*	*	4	*	*	7	*	*	-	-	-
14	*	*	28	133.3	3.64	12	*	*	16	146.7	3.70
41	131.1	1.70	46	132.2	2.34	51	137.5	1.56	55	145.1	0.89
69	131.3	0.86	27	134.7	3.22	33	139.4	2.30	38	144.0	4.75
56	130.5	0.94	46	135.4	2.61	62	136.7	1.60	32	143.4	2.50
28	131.1	0.80	17	*	*	25	144.8	3.40	36	150.3	1.90
34	131.5	1.51	48	135.2	1.46	31	140.3	31.62	36	146.0	3.11
19	*	*	29	136.9	2.32	20	143.8	4.40	25	143.8	3.45
3	*	*	-	-	-	7	*	*	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
7	*	*	16	138.2	31.09	10	*	*	12	*	*
-	-	-	3	*	*	-	-	-	-	-	-
280	129.4	0.52	265	137.5	0.90	265	141.8	0.65	252	149.2	0.69
-	-	-	4	*	*	4	*	*	3	*	*
4	*	*	28	136.4	3.63	27	142.5	2.97	30	148.4	33.46
45	126.5	31.07	28	138.4	2.62	52	139.8	2.62	32	148.3	1.60
50	130.1	2.42	57	135.6	2.09	64	142.8	2.21	36	151.7	1.34
63	129.4	1.36	47	135.6	1.47	32	137.8	5.08	27	149.4	1.88
17	132.7	3.62	35	140.6	3.42	12	144.3	4.30	34	146.7	2.27
58	129.1	1.44	36	135.5	1.86	39	142.9	2.27	44	149.7	1.85
11	132.7	3.60	18	144.4	3.80	19	*	*	19	149.8	33.59
4	*	*	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
18	126.5	4.60	8	*	*	9	*	*	17	148.1	2.35
6	*	*	-	-	-	3	*	*	6	*	*
				Weight in kilograms							
279	27.50	0.42	268	29.45	0.77	264	32.43	0.72	254	36.78	0.50
4	*	*	4	*	*	7	*	*	-	-	-
14	*	*	28	28.32	2.27	12	*	*	16	35.69	1.86
41	27.30	1.47	46	29.77	2.28	51	31.31	1.05	55	35.98	1.89
69	28.19	0.86	27	28.43	3.66	33	30.79	1.87	38	36.78	2.85
56	25.93	0.81	46	29.21	1.98	62	30.19	0.92	32	34.02	1.56
28	26.87	0.93	17	*	*	25	38.17	3.02	36	39.60	2.54
34	27.81	0.96	48	30.58	1.47	31	33.07	7.86	36	37.94	2.12
19	*	*	29	30.00	2.45	20	33.47	3.27	25	35.43	3.52
3	*	*	-	-	-	7	*	*	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
7	*	*	16	29.32	7.23	10	*	*	12	*	*
-	-	-	3	*	*	-	-	-	-	-	-
280	26.95	0.37	265	31.17	0.62	265	35.67	0.89	252	41.11	1.45
-	-	-	4	*	*	4	*	*	3	*	*
4	*	*	28	29.86	2.68	27	36.15	3.16	30	*	*
45	23.99	0.63	28	*	*	52	33.31	2.04	32	41.83	3.72
50	26.72	1.71	57	29.99	1.21	64	36.64	2.27	36	43.03	3.55
63	27.76	1.77	47	29.12	1.46	32	32.88	2.00	27	40.40	3.53
17	30.21	4.57	35	33.16	2.38	12	*	*	34	37.12	2.03
58	26.10	0.86	36	30.91	1.80	39	37.32	3.24	44	41.42	2.52
11	28.91	1.92	18	40.60	1.76	19	*	*	19	42.92	10.26
4	*	*	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
18	28.31	3.58	8	*	*	9	*	*	17	37.47	3.39
6	*	*	-	-	-	3	*	*	6	*	*

Table 9. Height and weight for Negro children by age at last birthday and sex and by education of parent: weighted sample size, mean, and standard error of the mean, United States, 1963-65

Sex and education of parent	6 years			7 years		
	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
Boys	Height in centimeters					
All education groups	289	119.1	0.72	286	125.2	0.59
Less than 5 years	17	117.4	0.40	22	125.5	0.32
5-7 years	29	*	*	35	124.1	3.16
8 years	23	119.6	2.69	16	*	*
9-11 years	82	118.1	1.73	77	124.7	0.79
12 years	105	119.7	0.74	102	126.7	0.98
13-15 years	18	122.0	2.24	6	*	*
16 years	8	*	*	7	*	*
17 years or more	-	-	-	-	-	-
Unknown	4	*	*	18	*	*
Girls						
All education groups	280	118.5	0.86	283	124.6	0.59
Less than 5 years	-	-	-	14	*	*
5-7 years	47	118.3	2.07	42	123.3	0.93
8 years	44	115.2	1.50	34	123.2	1.15
9-11 years	89	118.5	1.21	70	123.0	1.50
12 years	62	120.7	1.63	80	126.2	0.98
13-15 years	18	120.7	1.45	20	128.5	0.73
16 years	4	*	*	8	*	*
17 years or more	-	-	-	7	*	*
Unknown	13	*	*	6	*	*
Boys	Weight in kilograms					
All education groups	289	21.76	0.37	286	24.04	0.32
Less than 5 years	17	21.16	2.71	22	24.75	1.53
5-7 years	29	*	*	35	23.91	1.28
8 years	23	21.70	5.07	16	*	*
9-11 years	82	21.70	0.86	77	23.70	0.85
12 years	105	21.44	0.57	102	24.32	0.43
13-15 years	18	24.90	2.21	6	*	*
16 years	8	*	*	7	*	*
17 years or more	-	-	-	-	-	-
Unknown	4	*	*	18	*	*
Girls						
All education groups	280	21.09	0.36	283	23.69	0.47
Less than 5 years	-	-	-	14	*	*
5-7 years	47	20.21	0.85	42	22.83	0.69
8 years	44	19.79	0.73	34	23.61	1.09
9-11 years	89	21.11	0.45	70	23.19	0.99
12 years	62	22.41	0.88	80	23.60	0.63
13-15 years	18	22.02	0.65	20	26.67	1.07
16 years	4	*	*	8	*	*
17 years or more	-	-	-	7	*	*
Unknown	13	*	*	6	*	*

NOTE: N = estimated number of children in thousands; $\bar{X}$ = mean; $s_{\bar{x}}$ = standard error of the mean.

Table 9. Height and weight for Negro children by age at last birthday and sex and by education of parent: weighted sample size, mean, and standard error of the mean, United States, 1963-65—Con.

8 years			9 years			10 years			11 years		
N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
Height in centimeters											
279	131.3	0.57	268	135.0	0.67	264	139.6	0.97	254	145.7	0.50
8	*	*	19	138.1	1.38	8	*	*	14	*	*
54	130.1	1.26	68	133.1	2.09	36	138.6	3.45	47	143.7	4.40
29	131.3	3.15	22	136.3	3.15	28	139.8	2.59	33	145.2	1.88
87	131.0	0.82	70	134.1	1.25	83	138.7	2.00	74	144.6	1.37
71	131.2	1.56	63	135.5	1.83	70	139.5	1.23	64	148.3	1.83
20	134.5	2.57	15	135.4	5.31	11	*	*	2	*	*
3	*	*	4	*	*	14	*	*	2	*	*
3	*	*	-	-	-	-	-	-	3	*	*
-	-	-	4	*	*	10	*	*	13	*	*
280	129.4	0.52	265	137.5	0.90	265	141.8	0.65	252	149.2	0.69
6	*	*	15	*	*	11	*	*	18	150.1	3.36
47	130.4	2.64	20	137.7	6.27	50	142.1	2.13	44	151.0	1.63
23	125.9	1.70	38	136.7	3.32	21	142.7	3.97	37	148.6	1.16
75	128.1	0.75	66	136.0	2.16	101	144.0	1.85	73	149.4	1.51
71	131.4	0.99	84	138.3	2.14	55	139.5	3.87	62	147.6	1.31
17	128.2	2.33	11	*	*	14	*	*	6	*	*
13	131.6	2.94	7	*	*	-	-	-	-	-	-
1	*	*	2	*	*	10	*	*	-	-	-
23	128.0	3.36	17	137.9	3.72	-	-	-	9	*	*
Weight in kilograms											
279	27.50	0.42	268	29.45	0.77	264	32.43	0.72	254	36.78	0.50
8	*	*	19	30.02	1.69	8	*	*	14	*	*
54	26.96	0.67	68	28.97	1.57	36	34.32	3.03	47	38.79	3.11
29	28.82	2.91	22	30.99	3.14	28	32.31	2.42	33	35.76	1.50
87	27.22	0.76	70	27.73	0.89	83	32.33	1.00	74	34.45	0.96
71	26.61	0.83	63	29.13	0.80	70	31.60	1.06	64	39.06	1.76
20	30.28	1.93	15	33.59	6.03	11	*	*	2	*	*
3	*	*	4	*	*	14	*	*	2	*	*
3	*	*	-	-	-	-	-	-	3	*	*
-	-	-	4	*	*	10	*	*	13	*	*
280	26.95	0.37	265	31.17	0.62	265	35.67	0.89	252	41.11	1.45
6	*	*	15	*	*	11	*	*	18	41.17	9.95
47	26.78	1.25	20	31.34	5.29	50	35.07	1.41	44	42.65	1.91
23	23.86	1.10	38	29.18	1.22	21	35.38	2.95	37	37.40	1.88
75	26.70	0.83	66	29.86	1.74	101	36.13	1.79	73	44.22	3.84
71	27.69	1.10	84	31.56	1.63	55	34.49	2.03	62	38.07	1.21
17	27.48	2.61	11	*	*	14	*	*	6	*	*
13	28.14	6.59	7	*	*	-	-	-	-	-	-
1	*	*	2	*	*	10	*	*	-	-	-
23	28.01	1.24	17	29.63	2.12	-	-	-	9	*	*

Table 10. Use of the sign test and z-test to compare the mean height and weight of children of extreme family income and education groups, by age of child at last birthday and sex: United States, 1963-65

Age and sex	Annual family income						Education of parent					
	Less than $500		$15,000 or more		Sign test[1]	z-test[2]	Less than 5 years		17 years or more		Sign test[1]	z-test[2]
	$\bar{X}$	$s_{\bar{x}}$	$\bar{X}$	$s_{\bar{x}}$			$\bar{X}$	$s_{\bar{x}}$	$\bar{X}$	$s_{\bar{x}}$		
Boys	Height in centimeters											
6 years-----	115.2	1.12	119.6	0.86	-	†-3.12	115.7	2.68	119.5	0.76	-	-1.36
7 years-----	123.0	1.82	126.7	1.03	-	-1.77	121.5	2.82	123.6	0.77	-	-0.72
8 years-----	131.0	2.15	130.3	1.29	+	0.27	128.3	2.34	130.7	0.62	-	-0.99
9 years-----	134.0	2.35	138.2	1.14	-	-1.61	133.1	2.27	136.1	2.11	-	-0.97
10 years----	136.3	2.82	140.7	1.14	-	-1.45	137.0	3.63	142.0	0.86	-	-1.34
11 years----	144.7	2.06	146.9	0.78	-	-1.00	142.1	1.89	145.3	0.76	-	-1.57
Girls												
6 years-----	116.7	1.56	118.5	0.77	-	-1.03	115.7	2.42	118.6	0.54	-	-1.17
7 years-----	121.4	2.88	126.7	0.70	-	-1.79	121.1	2.99	125.8	1.03	-	-1.49
8 years-----	126.3	1.70	130.8	1.56	-	-1.95	126.1	3.01	131.3	1.43	-	-1.56
9 years-----	135.0	3.91	138.6	1.64	-	-0.85	130.7	1.54	137.7	1.27	-	†-3.51
10 years----	140.8	2.00	143.2	1.18	-	-1.03	136.3	3.76	142.5	1.29	-	-1.56
11 years----	144.2	2.17	145.5	2.12	-	-0.43	143.2	2.54	148.6	1.43	-	-1.85
Boys	Weight in kilograms											
6 years-----	20.19	0.645	22.08	0.484	-	†-2.34	20.30	1.623	21.85	0.519	-	-0.91
7 years-----	23.07	0.836	26.73	1.193	-	†-2.51	23.14	1.136	23.03	0.480	+	0.09
8 years-----	27.92	0.841	28.04	0.925	-	-0.10	26.78	1.840	28.07	0.651	-	-0.66
9 years-----	28.00	1.329	34.94	2.157	-	†-2.74	28.20	1.114	30.81	0.866	-	-1.85
10 years----	29.41	2.275	33.26	0.767	-	-1.60	30.75	2.343	34.84	0.660	-	-1.68
11 years----	36.90	1.806	39.20	1.003	-	-1.11	34.84	1.567	38.41	0.986	-	-1.93
Girls												
6 years-----	20.34	0.469	22.35	0.963	-	-1.88	20.43	0.912	21.48	0.644	-	-0.94
7 years-----	22.40	0.979	25.65	0.655	-	†-2.76	22.60	1.038	26.49	1.628	-	†-2.02
8 years-----	26.06	1.393	27.89	1.444	-	-0.91	26.86	2.721	28.46	0.928	-	-0.56
9 years-----	27.31	2.924	32.20	1.342	-	-1.52	28.76	1.527	32.31	0.810	-	†-2.05
10 years----	34.09	2.018	36.88	1.094	-	-1.22	32.62	2.859	34.30	1.046	-	-0.55
11 years----	38.51	3.290	40.19	1.635	-	-0.46	37.06	1.400	40.73	1.455	-	-1.82

[1]See discussion of "Test for consistency of a relationship" in appendix I.
[2]See discussion of "z-test" in appendix I.
NOTES: $\bar{X}$ = mean; $s_{\bar{x}}$ = standard error of the mean.

Underscoring denotes a pooled value necessitated by unreliable estimates computed from smaller groupings (see "Standards of reliability and precision" in appendix I). In the columns for income of less than $500 a year, the pooled means and standard errors represent incomes of less than $1,000 a year, and in the columns for income of $15,000 or more a year, the pooled values represent incomes of $10,000 or more.

Table 11. Summary of Daniel's Test for Trend[1] and weighted least squares[2] slopes for relationship of height and weight to annual family income, for children by age at last birthday, sex, and race: United States, 1963-65

Age, sex, and race	Height in cm. vs. annual family income					Weight in kg. vs. annual family income				
	Σdi^2	Spearman's r_s	Slope b	σ_b	z	Σdi^2	Spearman's r_s	Slope b	σ_b	z
TOTAL										
Boys										
6 years	22	†0.8167	0.031	0.007	†4.55	22	†0.8167	0.023	0.005	†4.88
7 years	14	†0.8833	0.018	0.007	†2.37	22	†0.8167	0.017	0.006	†3.01
8 years	178	-0.0788	0.015	0.009	1.72	122	0.2606	0.012	0.007	1.63
9 years	28	†0.8303	0.032	0.011	†2.96	16	†0.9030	0.022	0.007	†3.02
10 years	48	†0.1091	0.026	0.008	†3.05	52	†0.6848	0.025	0.008	†3.17
11 years	38	†0.6833	0.011	0.010	1.02	60	0.5000	0.018	0.011	1.63
Girls										
6 years	70	†0.5757	0.025	0.008	†3.18	35	†0.7878	0.020	0.006	†3.37
7 years	10	†0.9394	0.024	0.008	†2.99	16	†0.9030	0.026	0.006	†4.33
8 years	16	†0.8667	0.028	0.008	†3.56	28	†0.7667	0.021	0.008	†2.80
9 years	40	†0.7575	0.029	0.009	†3.11	14	†0.9151	0.040	0.009	†4.45
10 years	34	†0.7167	0.036	0.009	†4.11	44	†0.6333	0.016	0.009	1.81
11 years	74	0.3833	0.028	0.010	†2.81	94	0.2167	0.018	0.016	1.17
WHITE										
Boys										
6 years	24	†0.8000	0.037	0.007	†5.35	18	†0.8500	0.025	0.005	†5.30
7 years	16	†0.8666	0.017	0.008	†2.13	22	†0.8166	0.012	0.006	1.89
8 years	104	0.3697	0.019	0.009	†2.22	66	†0.6000	0.013	0.008	1.60
9 years	18	†0.8500	0.027	0.012	†2.37	22	†0.8166	0.019	0.008	†2.38
10 years	56	†0.6606	0.024	0.009	†2.64	50	†0.6969	0.019	0.009	†2.17
11 years	0	†1.0000	0.015	0.013	1.19	52	0.5666	0.010	0.012	0.81
Girls										
6 years	42	†0.6500	0.031	0.009	†3.56	52	0.5666	0.026	0.006	†4.02
7 years	18	†0.8909	0.037	0.009	†4.28	12	†0.9272	0.032	0.006	†5.35
8 years	28	†0.7666	0.030	0.009	†3.47	32	†0.7333	0.020	0.008	†2.30
9 years	16	†0.8666	0.029	0.009	†3.36	16	†0.8666	0.043	0.010	†4.30
10 years	8	†0.9333	0.044	0.010	†4.54	36	†0.7000	0.021	0.010	†2.00
11 years	58	0.5166	0.038	0.011	†3.63	66	0.4500	0.029	0.016	1.84
NEGRO										
Boys										
6 years	22	0.6071	0.047	0.029	1.61	38	0.3214	0.016	0.020	0.82
7 years	22	0.6071	0.014	0.033	0.43	24	0.5714	0.013	0.021	0.63
8 years	82	-0.4643	-0.011	0.036	-0.30	88	-0.5714	-0.013	0.029	-0.45
9 years	2	†0.9429	0.050	0.037	1.34	18	0.4857	0.027	0.034	0.80
10 years	34	0.3929	0.088	0.059	1.48	26	0.5357	0.030	0.041	0.73
11 years	68	-0.2143	0.028	0.038	0.74	38	0.3214	0.023	0.038	0.61
Girls										
6 years	22	0.3714	-0.001	0.069	0.02	20	0.4286	0.010	0.031	0.33
7 years	50	0.1071	0.014	0.013	1.11	66	-0.1786	0.009	0.017	0.51
8 years	14	0.6000	0.065	0.035	1.87	16	0.5429	0.054	0.020	2.76
9 years	48	0.1429	0.065	0.050	1.30	10	0.7143	0.144	0.030	4.78
10 years	36	-0.0286	0.032	0.059	0.53	14	0.3000	0.021	0.066	0.31
11 years	44	0.2143	-0.011	0.060	-0.19	82	-0.4643	-0.034	0.080	-0.43

[1]See discussion on "Test for Trend" in appendix I.
[2]See discussion on "Weighted least squares as a test for trend" in appendix I.
†Significant at .05.

Table 12. Summary of Daniel's Test for Trend[1] and weighted least squares[2] slopes for relationship of height and weight to education of parent, for children by age at last birthday, sex, and race: United States, 1963-65

Age, sex, and race	Height in cm. vs. annual family income					Weight in kg. vs. annual family income				
	Σdi^2	Spearman's r_s	Slope b	σ_b	z	Σdi^2	Spearman's r_s	Slope b	σ_b	z
TOTAL										
Boys										
6 years	12	†0.8571	0.280	0.090	†3.12	20	†0.7619	0.215	0.055	†3.89
7 years	32	0.6190	0.495	0.084	†5.86	58	0.3095	0.263	0.068	†3.88
8 years	6	†0.9285	0.225	0.104	†2.15	10	†0.8809	0.146	0.069	†2.11
9 years	8	†0.9047	0.409	0.107	†3.83	22	†0.7381	0.331	0.090	†3.67
10 years	6	†0.9285	0.388	0.120	†3.23	16	†0.8095	0.120	0.113	1.06
11 years	14	†0.8333	0.355	0.106	†3.34	46	0.4523	0.267	0.119	†2.24
Girls										
6 years	10	†0.8809	0.326	0.094	†3.47	20	†0.7619	0.175	0.050	†3.52
7 years	10	†0.8809	0.368	0.110	†3.35	8	†0.9047	0.229	0.059	†3.90
8 years	12	†0.8571	0.347	0.110	†3.15	20	†0.7619	0.191	0.085	†2.26
9 years	[3]7	†0.9226	0.424	0.094	†4.51	20	†0.7619	0.412	0.089	†4.61
10 years	18	†0.7857	0.240	0.109	†2.20	22	†0.7381	0.292	0.106	†2.77
11 years	20	†0.7619	0.204	0.112	1.81	8	†0.9047	0.222	0.100	†2.21
WHITE										
Boys										
6 years	10	†0.8809	0.328	0.105	†3.13	20	†0.7619	0.225	0.065	†3.48
7 years	24	†0.7142	0.526	0.087	†6.02	30	0.6428	0.293	0.074	†3.97
8 years	8	†0.9047	0.304	0.123	†2.48	10	†0.8809	0.153	0.086	1.77
9 years	2	†0.9762	0.451	0.124	†3.65	26	†0.6904	0.413	0.076	†5.47
10 years	6	†0.9285	0.384	0.143	†2.69	24	†0.7142	0.069	0.130	0.53
11 years	20	†0.7619	0.383	0.114	†3.36	44	0.4762	0.216	0.144	1.49
Girls										
6 years	12	†0.8571	0.345	0.106	†3.25	18	†0.7857	0.142	0.058	†2.46
7 years	8	†0.9047	0.464	0.111	†4.19	0	†1.0000	0.236	0.068	†3.45
8 years	14	†0.8333	0.348	0.134	†2.59	32	0.6190	0.205	0.106	1.94
9 years	0	†1.0000	0.533	0.103	†5.17	26	†0.6904	0.474	0.089	†5.32
10 years	12	†0.8571	0.342	0.123	†2.78	14	†0.7500	0.279	0.129	†2.16
11 years	8	†0.9047	0.352	0.123	†2.86	32	0.6190	0.349	0.120	†2.92
NEGRO										
Boys										
6 years	6	0.7000	0.248	0.080	†3.11	6	0.7000	0.146	0.249	0.59
7 years	8	0.6000	0.009	0.080	0.11	12	0.4000	-0.000	0.143	-0.00
8 years	6	0.7000	0.340	0.275	1.24	18	0.1000	0.085	0.162	-0.58
9 years	36	-0.0286	-0.334	0.194	-1.72	26	0.2571	-0.009	0.176	-0.50
10 years	6	0.7000	0.076	0.492	0.15	18	0.1000	-0.114	0.405	-0.28
11 years	12	-0.2000	-0.300	0.127	-2.37	8	0.2000	-0.035	0.279	-0.13
Girls										
6 years	4	0.8000	0.620	0.259	†2.39	4	0.8000	0.299	0.116	†2.58
7 years	32	0.0857	0.583	0.126	†4.62	8	0.7714	0.220	0.105	†2.10
8 years	16	0.5429	0.504	0.223	†2.26	4	†0.8857	0.318	0.172	1.85
9 years	8	0.6000	0.590	0.581	1.02	12	0.4000	0.566	0.413	1.37
10 years	22	-0.1000	0.120	0.606	0.20	12	0.4000	0.036	0.394	0.09
11 years	36	-0.8000	-0.405	0.331	-1.22	22	-0.1000	-0.474	0.358	-1.32

[1]See discussion on "Test for Trend" in appendix I.
[2]See discussion on "Weighted least squares as a test for trend" in appendix I.
[3]Sum rounded to nearest whole unit due to tie in ranks.
†Significant at .05.

Table 13. Percent of children falling below the lowest 10th percentile of heights and weights specific to each age-sex group, by annual family income: United States, 1963-65

Age[1] and sex	10th percentile cutoff	All incomes	Annual family income		
			Less than $500	$500-$900	$1,000-$1,999
Boys		Height in centimeters			
6 years	111.8	10.1	*	39.5	19.1
7 years	117.8	9.4	*	15.7	22.2
8 years	123.3	10.0	*	10.6	16.2
9 years	127.0	9.4	*	22.1	19.6
10 years	131.4	10.6	*	*	27.9
11 years	137.2	10.6	*	11.4	10.5
Girls					
6 years	110.6	8.8	*	0.0	20.4
7 years	116.3	10.2	*	11.2	16.6
8 years	121.4	9.7	*	27.4	14.0
9 years	127.1	10.4	*	12.8	19.1
10 years	132.0	10.7	*	8.5	19.3
11 years	138.9	10.3	*	11.8	16.1
Boys		Weight in kilograms			
6 years	18.15	10.2	*	34.6	7.0
7 years	20.38	8.0	*	15.7	21.7
8 years	22.62	8.7	*	7.9	7.8
9 years	24.46	8.7	*	17.5	19.9
10 years	26.70	9.9	*	*	24.0
11 years	30.05	9.1	*	5.2	12.0
Girls					
6 years	17.56	8.6	*	0.0	13.7
7 years	19.52	11.1	*	8.8	24.4
8 years	21.66	9.8	*	20.6	21.0
9 years	24.34	9.3	*	4.7	15.4
10 years	26.18	9.9	*	13.0	15.5
11 years	29.83	9.8	*	39.0	11.9

[1]Denotes age of child at last birthday; it is not the mean age for the group. See page 5 of text for discussion.

Table 13. Percent of children falling below the lowest 10th percentile of heights and weights specific to each age-sex group, by annual family income: United States, 1963-65—Con.

Annual family income—Con.						
$2,000-$2,999	$3,000-$3,999	$4,000-$4,999	$5,000-$6,999	$7,000-$9,999	$10,000-$14,999	$15,000 or more
Height in centimeters						
7.3	9.0	17.2	6.6	8.1	5.5	0.0
20.8	6.6	6.3	8.0	8.3	4.1	2.2
22.9	13.7	10.7	10.8	3.8	3.8	5.6
13.6	22.2	4.2	8.2	6.4	3.7	7.1
17.1	20.0	7.7	9.2	5.6	7.9	4.1
8.4	18.9	15.3	8.3	9.8	8.3	7.1
16.9	9.5	9.6	7.4	6.2	3.3	3.8
3.9	22.1	6.1	12.2	6.5	7.6	0.0
9.9	16.6	10.8	9.9	7.0	0.9	8.1
11.1	16.3	11.5	7.2	9.6	8.6	0.0
15.8	16.5	13.1	9.7	8.8	3.8	0.0
12.1	8.9	14.5	12.8	6.6	0.0	12.1
Weight in kilograms						
15.3	7.8	13.5	9.5	7.0	10.0	0.0
11.2	6.9	11.2	8.2	5.4	2.7	0.0
22.3	11.9	11.0	7.9	5.0	5.3	3.2
20.8	14.3	10.6	7.2	5.4	2.7	0.0
12.5	18.5	7.3	8.5	7.0	4.0	3.5
5.5	17.0	4.7	12.6	6.5	9.8	2.3
15.2	18.9	8.2	8.6	5.6	3.2	3.6
3.7	26.6	8.3	10.5	7.4	9.6	0.0
12.8	21.6	14.1	7.8	4.7	0.9	8.1
15.8	17.3	9.7	6.2	7.1	8.1	0.0
19.2	6.7	8.4	6.2	9.2	10.9	3.2
11.3	8.2	15.7	7.0	8.8	1.6	3.6

Table 14. Percent of children falling below the lowest 10th percentile of heights and weights specific to each age-sex group, by education of parent: United States, 1963-65

Age[1] and sex	10th percentile cutoff	Education of parent							
		Less than 5 years	5-7 years	8 years	9-11 years	12 years	13-15 years	16 years	17 years or more
Boys	Height in centimeters								
6 years	111.8	39.7	14.8	6.3	16.1	7.7	3.4	9.5	4.5
7 years	117.8	43.4	26.1	0.0	13.3	9.1	3.3	1.4	7.1
8 years	123.3	15.6	10.8	9.3	16.0	7.9	13.4	9.5	0.0
9 years	127.0	27.8	21.5	12.4	11.9	7.0	14.1	3.2	11.3
10 years	131.4	23.6	21.8	21.9	12.1	10.2	1.8	3.1	4.8
11 years	137.2	23.7	17.1	10.9	12.9	9.6	6.1	5.8	8.9
Girls									
6 years	110.6	21.4	17.4	13.9	14.8	9.1	2.0	3.9	0.0
7 years	116.3	13.0	15.9	14.7	11.5	9.2	3.8	6.7	7.5
8 years	121.4	27.8	6.4	19.1	12.2	7.8	6.4	12.0	8.2
9 years	127.1	30.0	28.5	12.4	7.4	6.5	9.9	11.8	3.5
10 years	132.0	18.9	12.5	8.2	15.9	9.2	11.2	3.4	4.0
11 years	138.9	30.0	10.1	11.2	11.6	10.4	4.6	4.7	5.6
Boys	Weight in kilograms								
6 years	18.15	16.4	8.9	6.3	13.7	8.3	4.6	9.4	10.1
7 years	20.38	24.7	25.0	2.3	9.8	5.7	9.1	1.4	7.8
8 years	22.62	6.5	11.6	13.5	14.2	7.1	12.8	7.2	0.0
9 years	24.46	15.7	21.6	19.7	8.8	7.3	10.2	2.9	0.0
10 years	26.70	23.2	18.3	20.4	11.0	9.5	2.7	2.2	6.1
11 years	30.05	20.2	9.3	15.4	13.9	7.8	8.6	9.0	3.5
Girls									
6 years	17.56	14.7	14.8	15.0	14.6	7.9	3.1	7.6	0.0
7 years	19.52	13.0	14.9	16.9	17.5	8.8	6.1	5.0	3.2
8 years	21.66	11.7	19.1	22.4	15.1	7.6	6.0	2.7	8.2
9 years	24.34	23.4	29.4	7.8	10.8	7.7	5.2	6.6	4.1
10 years	26.18	4.3	15.8	6.2	11.9	8.0	16.5	0.0	10.5
11 years	29.83	46.4	9.2	14.1	14.3	5.9	2.4	7.3	9.5

[1]Denotes age of child at last birthday; it is not the mean age for the group. See page of text for discussion.

Table 15. Summary of Daniel's Test for Trend[1] for percent of children falling below the lowest 10th percentile within each age-sex category for annual family income and education of parent: United States, 1963-65

Age[2] and sex	Annual family income				Education of parent			
	Height of children in cm.		Weight of children in kg.		Height of children in cm.		Weight of children in kg.	
	Σdi^2	Spearman's r_s	Σdi^2	Spearman's r_s	Σdi^2	Spearman's r_s	Σdi^2	Spearman's r_s
Boys								
6 years	18	†0.85	52	0.57	28	†0.67	68	0.19
7 years	24	†0.80	12	†0.90	36	0.57	34	0.60
8 years	40	†0.67	52	0.57	40	0.52	64	0.24
9 years	34	†0.72	14	†0.88	20	†0.76	12	†0.86
10 years	56	0.53	6	†0.95	10	†0.88	8	†0.90
11 years	36	†0.70	105	0.13	8	†0.90	14	†0.83
Girls								
6 years	46	†0.62	84	0.30	4	†0.95	10	†0.88
7 years	66	0.45	96	0.20	14	†0.83	20	†0.76
8 years	22	†0.82	30	†0.75	58	0.31	26	†0.69
9 years	20	†0.83	51	0.58	18	†0.79	6	†0.93
10 years	22	†0.82	42	†0.65	20	†0.76	88	0.05
11 years	44	†0.63	22	†0.82	22	†0.74	38	0.55

[1]See discussion on "Test for Trend" in appendix I.
[2]Denotes age of child at last birthday; it is not the mean age for the group. See page 5 of text for discussion.
†Significant at .05.

Table 16. Percent falling below the lowest 10th percentile vslue for height and weight for each age-sex group of children by four possible family income dichotomies, and the rstio of sbove to below within each dichotomy:[1] United States, 1963-65

Age[2] and sex	10th percentile cutoff	All incomes under cutoff	$2,000 dichotomy		
			Less than $2,000, percent under cutoff	$2,000 or more, percent under cutoff	Ratio of less thsn $2,000 to $2,000 or more
Boys	Height in centimeters				
6 years	111.8	10.1	25.9	8.2	3.16
7 years	117.8	9.4	20.5	8.1	2.53
8 years	123.3	10.0	13.5	9.5	1.42
9 years	127.0	9.4	18.6	8.3	2.24
10 years	131.4	10.6	21.4	9.4	2.28
11 years	137.2	10.6	12.3	10.4	1.18
Girls					
6 years	110.6	8.8	15.0	7.9	1.90
7 years	116.3	10.2	14.7	9.6	1.53
8 years	121.4	9.7	20.4	8.6	2.37
9 years	127.1	10.4	16.9	9.4	1.80
10 years	132.0	10.7	16.8	9.6	1.75
11 years	138.9	10.3	17.5	9.4	1.86
Boys	Weight in kilograms				
6 years	18.15	10.2	17.4	9.3	1.87
7 years	20.38	8.0	18.4	6.8	2.71
8 years	22.62	8.7	7.6	8.9	0.85
9 years	24.46	8.7	17.3	7.6	2.28
10 years	26.70	9.9	23.3	8.3	2.81
11 years	30.05	9.1	9.9	9.1	1.09
Girls					
6 years	17.56	8.6	8.8	8.6	1.02
7 years	19.52	11.1	17.3	10.3	1.68
8 years	21.66	9.8	20.4	8.7	2.34
9 years	24.34	9.3	12.1	8.9	1.36
10 years	26.18	9.9	14.8	9.1	1.63
11 years	29.83	9.8	25.0	7.9	3.16

[1]See discussion on "Test for best possible dichotomy" in appendix I.
[2]Denotes age of child at last birthday; it is not the mean sge for the group. See page 5 of text for discussion.

Table 16. Percent falling below the lowest 10th percentile value for height and weight for each age-sex group of children by four possible family income dichotomies, and the ratio of above to below within each dichotomy: United States, 1963-65—Con.

$3,000 dichotomy			$4,000 dichotomy			$5,000 dichotomy		
Less than $3,000, percent under cutoff	$3,000 or more, percent under cutoff	Ratio of less than $3,000 to $3,000 or more	Less than $4,000, percent under cutoff	$4,000 or more, percent under cutoff	Ratio of less than $4,000 to $4,000 or more	Less than $5,000, percent under cutoff	$5,000 or more, percent under cutoff	Ratio of less than $5,000 to $5,000 or more
				Height in centimeters				
18.8	8.2	2.29	15.2	8.1	1.88	15.8	6.2	2.55
20.6	6.8	3.03	16.3	6.8	2.40	13.9	6.9	2.01
18.1	7.8	2.32	16.8	7.1	2.37	15.4	6.6	2.33
16.9	7.9	2.14	18.7	6.3	2.97	14.9	6.6	2.26
19.6	8.6	2.28	19.7	7.3	2.70	16.5	7.2	2.29
10.6	10.6	1.00	13.5	9.6	1.41	14.0	8.7	1.61
15.8	6.7	2.36	14.0	6.4	2.19	13.1	5.9	2.22
10.8	10.1	1.07	14.7	8.4	1.75	12.3	8.8	1.40
15.7	8.5	1.85	16.0	7.3	2.19	14.8	6.8	2.18
14.5	9.2	1.58	15.0	8.4	1.79	14.1	7.8	1.81
16.4	8.9	1.84	16.4	8.0	2.05	15.7	7.3	2.15
15.3	9.2	1.66	13.1	9.2	1.42	13.5	8.4	1.61
				Weight in kilograms				
16.6	8.8	1.89	13.3	9.0	1.48	13.4	8.0	1.68
15.1	6.3	2.40	12.6	6.3	2.00	12.3	5.6	2.20
14.7	7.2	2.04	13.9	6.6	2.11	13.2	5.9	2.24
18.5	6.7	2.76	17.1	5.8	2.95	15.3	5.1	3.00
18.7	7.9	2.37	18.7	6.7	2.79	15.7	6.6	2.38
7.9	9.4	0.84	11.2	8.4	1.33	9.3	9.0	1.03
11.6	7.8	1.49	13.7	6.4	2.14	12.5	6.1	2.05
12.4	10.9	1.14	17.3	8.6	2.01	14.8	8.7	1.70
17.0	8.3	2.05	18.8	6.3	2.98	17.7	5.2	3.40
13.6	8.1	1.68	14.6	7.0	2.09	13.4	6.5	2.06
16.5	7.8	2.12	14.1	8.0	1.76	12.9	7.9	1.63
19.4	7.6	2.55	15.6	7.6	2.05	15.6	6.3	2.48

Table 17. Height for children by age at last birthday and sex and by education of parent: weighted sample size, mean, and standard error of the mean, United States, 1963-65

Sex and education of parent	6 years			7 years		
	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
Boys						
All education groups	487	119.5	0.34	494	124.5	0.47
Less than 5 years	2	*	*	-	-	-
5-7 years	11	*	*	5	119.1	5.10
8 years	18	119.0	2.45	17	124.7	28.03
9-11 years	109	118.7	0.88	99	122.8	0.90
12 years	246	119.4	0.50	269	124.6	0.69
13-15 years	40	121.5	1.68	62	126.6	1.63
16 years	43	120.3	1.51	30	125.5	1.14
17 years or more	7	*	*	6	*	*
Unknown	6	*	*	3	*	*
Girls						
All education groups	427	117.5	0.46	487	123.0	0.29
Less than 5 years	3	*	*	3	*	*
5-7 years	8	*	*	16	119.4	26.77
8 years	3	*	*	14	119.3	0.81
9-11 years	63	117.7	1.22	113	121.5	0.73
12 years	234	117.1	0.61	240	123.3	0.58
13-15 years	73	118.5	1.58	62	125.3	1.32
16 years	28	116.9	0.97	23	123.5	1.38
17 years or more	7	*	*	2	*	*
Unknown	3	*	*	9	*	*

NOTE: N = estimated number of children in thousands; $\bar{X}$ = mean height in centimeters; $s_{\bar{x}}$ = standard error of the mean.

Table 17. Height for children by age at last birthday and sex and by education of parent: weighted sample size, mean, and standard error of the mean, United States, 1963-65—Con.

8 years			9 years			10 years			11 years		
N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
439	130.3	0.38	449	136.1	0.58	396	140.8	0.52	422	145.7	0.66
-	-	-	-	-	-	3	*	*	-	-	-
14	*	*	20	128.6	1.62	19	141.8	4.50	10	*	*
31	131.2	1.68	23	134.1	1.80	16	141.1	31.85	38	147.5	1.34
86	130.5	0.92	99	135.4	1.24	102	140.3	0.62	102	145.1	1.58
208	130.0	0.65	235	136.6	0.76	166	139.8	0.84	197	146.2	1.08
66	129.9	1.76	40	138.0	1.76	51	143.0	1.08	36	142.8	2.32
16	131.9	0.33	24	139.9	2.21	16	143.0	32.26	17	147.3	2.92
14	*	*	2	*	*	15	*	*	19	146.9	1.97
-	-	-	2	*	*	4	*	*	-	-	-
431	128.2	1.08	397	135.6	0.55	406	140.5	0.59	455	147.3	0.58
-	-	-	-	-	-	-	-	-	4	*	*
11	*	*	8	*	*	7	*	*	13	*	*
11	125.5	28.78	16	*	*	32	141.2	3.50	33	148.4	3.56
103	127.1	1.19	94	136.8	1.13	76	140.2	1.91	102	145.8	1.22
203	129.2	0.50	230	135.7	0.64	221	140.8	0.81	242	147.3	1.18
60	127.8	3.95	29	134.0	1.85	38	138.9	2.03	39	146.5	1.65
25	124.1	3.77	8	*	*	16	141.3	2.15	13	149.3	33.62
7	*	*	3	*	*	14	*	*	12	151.1	4.67
8	*	*	6	*	*	-	-	-	3	*	*

Table 18. Weight for children with annual family income between $5,000 and $7,000, by age at last birthday and sex and by education of parent: weighted sample size, mean, and standard error of the mean, United States, 1963-65

Sex and education of parent	6 years			7 years		
	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
Boys						
All education groups	487	22.45	0.32	494	24.55	0.34
Less than 5 years	2	*	*	-	-	-
5-7 years	11	*	*	5	21.11	3.20
8 years	18	23.27	1.71	17	24.91	5.82
9-11 years	109	22.13	0.54	99	24.07	0.71
12 years	246	22.25	0.46	269	24.84	0.48
13-15 years	40	23.25	0.86	62	24.89	1.06
16 years	43	22.48	1.35	30	24.40	1.13
17 years or more	7	*	*	6	19.28	0.00
Unknown	6	*	*	3	*	*
Girls						
All education groups	427	20.92	0.26	487	24.30	0.27
Less than 5 years	3	*	*	3	*	*
5-7 years	8	*	*	16	21.97	5.21
8 years	3	*	*	14	22.57	1.29
9-11 years	63	21.19	0.61	113	23.86	0.49
12 years	234	20.63	0.35	240	24.43	0.45
13-15 years	73	21.00	0.63	62	25.42	0.86
16 years	28	21.74	0.78	23	24.91	1.25
17 years or more	7	*	*	2	*	*
Unknown	3	*	*	9	*	*

NOTE: N = estimated number of children in thousands; $\bar{X}$ = mean weight in kilograms; $s_{\bar{x}}$ = standard error of the mean.

Table 18. Weight for children with annual family income between $5,000 and $7,000, by age at last birthday and sex and by education of parent: weighted sample size, mean, and standard error of the mean, United States, 1963-65—Con.

8 years			9 years			10 years			11 years		
N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
439	28.09	0.39	449	32.21	0.56	396	33.97	0.46	422	38.97	0.84
-	-	-	-	-	-	3	*	*	-	-	-
14	*	*	20	28.05	3.47	19	38.36	5.38	10	*	*
31	28.17	1.42	23	30.45	1.98	16	31.95	10.21	38	42.77	3.87
86	29.34	1.08	99	32.13	1.07	102	33.34	0.64	102	38.98	1.68
208	27.67	0.67	235	31.94	0.62	166	33.20	0.91	197	37.63	1.05
66	26.55	0.84	40	35.79	2.00	51	34.48	0.89	36	39.43	3.46
16	32.07	2.89	24	33.28	2.93	16	32.12	7.61	17	40.53	3.87
14	*	*	2	*	*	15	38.42	1.79	19	41.17	2.26
-	-	-	2	*	*	4	*	*	-	-	-
431	26.85	0.48	397	31.57	0.56	406	35.34	0.70	455	40.02	0.55
-	-	-	-	-	-	-	-	-	4	*	*
11	*	*	8	*	*	7	*	*	13	*	*
11	*	*	16	27.65	1.98	32	35.61	1.91	23	43.10	0.49
103	25.36	0.90	94	33.30	1.50	76	30.84	2.43	102	37.79	1.83
203	26.89	0.44	230	31.25	0.70	221	35.11	0.66	242	40.57	0.96
60	28.03	1.76	29	30.89	0.88	38	33.08	1.23	39	37.73	2.31
25	26.19	1.73	8	*	*	16	39.87	1.61	13	43.11	10.14
7	*	*	3	*	*	14	*	*	12	45.35	6.87
8	*	*	6	*	*	-	-	-	3	*	*

Table 19. Height and weight for children with education of parent equal to 12 years, by age at last birthday, sex, and annual family income: weighted sample size, mean, and standard error of the mean, United States, 1963-65

Sex and annual family income	6 years			7 years		
	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
Boys	Height in centimeters					
All incomes	871	119.1	0.33	828	125.0	0.49
Less than $500	13	*	*	-	-	-
$500-$999	7	*	*	2	*	*
$1,000-$1,999	21	117.2	0.36	13	*	*
$2,000-$2,999	47	119.1	1.35	55	125.6	1.55
$3,000-$3,999	81	119.1	1.38	59	126.4	1.65
$4,000-$4,999	119	117.6	0.77	90	124.6	1.02
$5,000-$6,999	246	119.4	0.50	269	124.6	0.69
$7,000-$9,999	187	120.1	0.92	228	125.3	0.83
$10,000-$14,999	96	118.1	1.22	62	124.5	0.84
$15,000 or more	6	*	*	14	*	*
Don't know	28	121.1	2.39	27	123.9	1.59
No response	13	*	*	5	*	*
Girls						
All incomes	745	118.2	0.45	808	124.0	0.33
Less than $500	5	*	*	6	*	*
$500-$999	16	121.5	27.30	6	*	*
$1,000-$1,999	20	113.7	2.28	34	123.0	1.75
$2,000-$2,999	36	118.4	2.08	31	122.9	2.17
$3,000-$3,999	45	119.6	2.07	80	123.9	1.25
$4,000-$4,999	73	117.7	2.17	107	124.5	1.34
$5,000-$6,999	234	117.1	0.61	240	123.3	0.58
$7,000-$9,999	197	120.5	1.02	213	125.2	0.64
$10,000-$14,999	69	117.2	1.18	54	122.8	1.41
$15,000 or more	22	116.1	2.22	5	*	*
Don't know	23	115.7	2.57	20	122.4	1.40
No response	-	-	-	6	*	*
Boys	Weight in kilograms					
All incomes	871	22.32	0.17	828	24.95	0.28
Less than $500	13	*	*	-	-	-
$500-$999	7	*	*	2	*	*
$1,000-$1,999	21	21.48	2.17	13	19.98	4.79
$2,000-$2,999	47	21.74	0.68	55	24.57	0.66
$3,000-$3,999	81	22.01	0.59	59	25.70	0.76
$4,000-$4,999	119	21.91	0.45	90	24.98	0.95
$5,000-$6,999	246	22.25	0.46	269	24.84	0.48
$7,000-$9,999	187	22.78	0.51	228	25.12	0.54
$10,000-$14,999	96	22.32	0.93	62	24.54	0.70
$15,000 or more	6	24.11	2.28	14	27.25	6.80
Don't know	28	23.88	1.57	27	24.72	1.37
No response	13	*	*	5	*	*
Girls						
All incomes	745	21.98	0.32	808	24.42	0.27
Less than $500	5	*	*	6	*	*
$500-$999	16	22.87	5.67	6	*	*
$1,000-$1,999	20	19.47	1.44	34	23.64	1.66
$2,000-$2,999	36	20.96	0.87	31	24.21	1.81
$3,000-$3,999	45	22.63	1.41	80	24.07	0.58
$4,000-$4,999	73	22.66	1.82	107	24.70	0.79
$5,000-$6,999	234	20.63	0.35	240	24.43	0.45
$7,000-$9,999	197	23.49	0.69	213	24.81	0.50
$10,000-$14,999	69	21.62	1.03	54	23.71	1.09
$15,000 or more	22	23.42	2.95	5	28.18	5.49
Don't know	23	22.25	2.32	20	23.05	1.24
No response	-	-	-	6	*	*

NOTE: N = estimated number of children in thousands; $\bar{X}$ = mean; $s_{\bar{x}}$ = standard error of the mean.

Table 19. Height and weight for children with education of parent equal to 12 years, by age at last birthday, sex, and annual family income: weighted sample size, mean, and standard error of the mean, United States, 1963-65—Con.

8 years			9 years			10 years			11 years		
N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$
				Height in centimeters							
830	130.4	0.31	751	135.9	0.42	734	140.2	0.39	710	146.3	0.53
21	131.6	3.36	-	-	-	7	*	*	-	-	-
-	-	-	9	*	*	1	*	*	3	*	*
20	*	*	11	*	*	32	138.7	2.33	9	*	*
67	127.8	1.81	35	136.5	1.38	46	138.7	1.72	29	149.3	1.31
64	130.8	1.77	44	130.8	2.79	35	139.9	1.76	56	147.5	1.72
91	129.4	0.72	75	134.6	0.96	83	141.9	1.49	81	146.8	1.76
208	130.0	0.65	235	136.6	0.76	166	131.8	0.84	197	146.2	1.08
237	130.8	0.52	173	137.1	0.82	218	140.8	1.30	190	145.8	0.74
75	131.3	0.81	110	135.8	1.03	115	139.7	1.37	102	145.2	1.59
16	129.1	1.59	11	*	*	7	*	*	22	148.6	2.05
23	134.4	3.28	27	*	*	18	-	2.56	12	144.3	2.38
2	*	*	11	*	*	-	-	-	5	*	*
651	130.1	0.30	776	136.1	0.48	666	141.5	0.62	725	147.2	0.49
-	-	-	-	-	-	2	*	*	-	-	-
3	*	*	15	136.2	30.63	9	*	*	4	*	*
13	*	*	24	135.6	3.32	11	*	*	16	145.4	3.41
16	131.9	29.62	42	136.2	2.75	27	139.0	2.55	31	145.8	3.38
59	130.3	1.24	56	134.4	1.08	49	139.1	3.67	58	147.6	1.58
75	130.2	2.36	85	135.8	2.54	62	143.0	2.39	79	146.0	1.86
203	129.2	0.50	230	135.7	0.64	221	140.8	0.81	242	147.3	1.18
164	131.3	0.74	198	137.5	0.91	168	142.0	1.08	169	147.5	0.86
72	130.2	0.87	86	135.9	1.53	61	142.3	1.39	75	148.5	1.64
8	*	*	8	*	*	14	142.1	0.89	14	*	*
29	128.8	2.29	24	133.9	1.41	25	143.4	1.74	19	149.8	2.20
5	*	*	1	*	*	10	*	*	13	*	*
				Weight in kilograms							
830	28.02	0.27	751	31.02	0.34	734	33.91	0.55	710	38.19	0.35
21	28.20	0.93	-	-	-	7	*	*	-	-	-
-	-	-	9	*	*	1	*	*	3	*	*
20	*	*	11	*	*	32	31.18	1.55	9	*	*
67	25.78	0.88	35	29.66	1.45	46	31.76	1.59	29	39.35	1.89
64	26.84	1.04	44	29.70	0.85	35	30.39	0.66	56	39.16	1.93
91	27.17	0.56	75	29.94	0.97	83	35.80	1.77	81	38.14	1.48
208	27.67	0.67	235	31.94	0.62	166	33.20	0.91	197	37.63	1.05
237	29.06	0.63	173	31.39	0.84	218	35.81	1.19	190	38.85	1.01
75	28.32	0.92	110	30.07	0.56	115	33.21	1.12	102	37.15	1.30
16	27.44	1.20	11	35.14	2.02	7	33.27	2.48	22	40.97	2.76
23	30.66	3.26	27	29.10	1.90	18	33.65	2.97	12	35.82	2.98
2	*	*	16	29.91	7.48	-	-	-	5	*	*
651	28.00	0.41	776	31.95	0.49	666	35.52	0.44	725	40.11	0.64
-	-	-	-	-	-	2	*	*	-	-	-
3	*	*	15	29.78	7.10	9	*	*	4	*	*
13	*	*	24	30.16	2.72	11	38.40	9.58	16	37.33	4.78
16	31.36	8.07	42	31.42	2.26	27	32.31	3.30	31	38.36	3.43
59	27.91	1.41	56	31.02	2.44	49	38.93	4.29	58	48.87	3.09
75	28.25	1.77	85	32.56	1.42	62	35.55	1.98	79	39.08	1.75
203	26.89	0.44	230	31.25	0.70	221	35.11	0.66	242	40.57	0.96
164	28.64	0.75	198	33.96	1.24	168	34.63	1.15	169	39.59	1.99
72	28.23	1.33	86	30.74	0.72	61	36.67	2.28	75	40.62	1.15
8	*	*	8	*	*	14	37.15	1.20	14	*	*
29	27.50	1.92	24	32.02	3.01	25	35.09	1.80	19	44.09	3.98
5	*	*	1	*	*	10	*	*	13	*	*

Table 20. Summary of Daniel's Test for Trend[1] when either annual family income or education of parent is held constant at the modal class and the other allowed to vary, by age at last birthday and sex: United States, 1963-65

Age and sex	High school graduates only, income varying				$5,000-$7,000 income only, education varying			
	Height in cm.		Weight in kg.		Height in cm.		Weight in kg.	
	Σdi^2	Spearman's r_s	Σdi^2	Spearman's r_s	Σdi^2	Spearman's r_s	Σdi^2	Spearman's r_s
Boys								
6 years	34	0.5952	4	†0.9524	16	0.5429	22	0.3714
7 years	38	0.3214	24	0.5714	4	0.8000	6	0.7000
8 years	98	-0.1667	70	0.1667	20	0.4286	18	0.4857
9 years	32	0.4286	50	0.1071	0	†1.0000	4	†0.8857
10 years	30	0.4643	20	0.6429	20	0.4286	50	-0.4286
11 years	70	-0.2500	54	0.0357	16	0.5429	32	0.0857
Girls								
6 years	146	-0.2167	62	0.4833	4	0.8000	16	0.2000
7 years	48	0.1429	26	0.5357	4	†0.8857	2	†0.9429
8 years	40	0.2857	76	-0.3571	24	-0.2000	22	-0.1000
9 years	74	0.1190	40	0.5238	8	0.2000	6	0.4000
10 years	78	0.0714	94	-0.1190	36	-0.8000	36	-0.8000
11 years	76	0.0952	78	0.7143	44	-0.2571	36	-0.0286

[1] See discussion on "Test for Trend" in appendix I.
† Significant at .05.

Table 21. Height and weight for white children living in the central city of an SMSA, by age at last birthday, sex, and annual family income: mean, standard error of the mean, and weighted sample size, United States, 1963-65

Age and sex	All incomes			Less than $3,000			$3,000 or more		
	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N
Boys	Height in centimeters								
6 years	118.1	0.64	408	115.1	2.26	48	118.2	0.47	335
7 years	124.4	0.75	440	122.0	2.92	57	125.0	0.47	364
8 years	129.8	0.51	405	125.8	3.27	45	130.2	0.52	345
9 years	135.5	0.85	446	131.3	0.98	51	136.5	0.64	374
10 years	139.9	1.32	394	136.3	4.61	52	140.6	1.20	316
11 years	146.0	0.65	418	144.0	1.86	59	146.6	0.54	331
Girls									
6 years	117.9	0.67	420	118.8	3.25	37	118.2	0.69	356
7 years	123.3	0.43	431	120.9	2.81	48	123.6	0.33	371
8 years	129.6	0.48	386	126.7	2.92	70	130.3	0.54	294
9 years	135.5	0.57	422	130.5	1.95	52	136.5	0.52	349
10 years	140.6	0.60	379	136.7	1.57	64	141.4	0.76	299
11 years	147.1	0.65	406	*	*	21	147.5	0.64	365
Boys	Weight in kilograms								
6 years	21.80	0.461	408	19.91	1.492	48	21.90	0.389	335
7 years	24.67	0.401	440	23.56	1.484	57	24.99	0.341	364
8 years	27.78	0.485	405	24.63	1.771	45	28.01	0.477	345
9 years	30.28	0.668	446	26.90	1.148	51	30.95	0.671	374
10 years	33.97	1.139	394	31.08	5.432	52	34.59	1.064	316
11 years	39.12	0.947	418	38.06	1.837	59	39.66	1.039	331
Girls									
6 years	21.64	0.535	420	21.36	1.951	37	21.80	0.583	356
7 years	24.45	0.354	431	23.38	2.511	48	24.49	0.338	371
8 years	27.90	0.495	386	25.88	2.059	70	28.34	0.462	294
9 years	31.82	0.807	422	29.19	2.488	52	32.54	0.858	349
10 years	35.26	0.947	379	31.41	2.700	64	36.29	1.069	299
11 years	39.87	0.915	406	*	*	21	40.04	0.972	365

NOTE: $\bar{X}$ = mean; $s_{\bar{x}}$ = standard error of the mean; N = estimated number of children in thousands.

Table 22. Height and weight for white children living on farms of any size in rural areas, by age at last birthday, sex, and annual family income: mean, standard error of the mean, and weighted sample size, United States, 1963-65

Age and sex	All incomes			Less than $3,000			$3,000 or more		
	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N
Boys	Height in centimeters								
6 years	118.6	1.46	133	116.7	1.85	53	120.1	1.83	76
7 years	122.8	1.03	140	121.8	27.37	53	124.7	1.34	62
8 years	128.7	1.11	141	128.8	3.10	52	128.4	0.75	78
9 years	131.9	2.82	123	133.0	1.60	24	133.4	2.35	81
10 years	138.9	1.10	115	138.7	31.07	43	139.1	1.24	63
11 years	146.0	1.14	116	144.4	2.82	40	146.7	1.00	72
Girls									
6 years	117.9	1.26	117	117.8	2.43	36	118.4	1.19	67
7 years	122.1	0.95	155	120.8	27.12	48	122.7	1.18	91
8 years	128.5	1.23	137	127.0	2.50	44	129.3	1.51	80
9 years	134.6	1.76	127	133.6	2.97	60	135.9	1.22	61
10 years	141.1	1.87	146	135.9	3.63	39	143.6	2.22	91
11 years	146.1	2.24	128	142.0	3.30	43	149.5	3.55	70
Boys	Weight in kilograms								
6 years	22.38	0.718	133	21.38	0.998	53	23.14	0.784	76
7 years	24.29	0.638	140	22.96	5.158	53	26.06	1.101	62
8 years	27.27	0.766	141	27.06	2.635	52	27.17	0.723	78
9 years	30.36	0.961	123	29.10	1.201	24	31.13	1.469	81
10 years	33.24	1.136	115	33.56	7.750	43	32.87	1.458	63
11 years	39.16	1.616	116	38.78	3.348	40	39.45	1.172	72
Girls									
6 years	22.20	0.777	117	21.02	0.584	36	23.19	1.199	67
7 years	23.54	0.733	155	22.89	5.215	48	23.96	0.944	91
8 years	27.63	0.854	137	27.36	2.242	44	27.99	1.208	80
9 years	30.40	1.325	127	28.97	2.107	60	32.01	0.982	61
10 years	36.72	2.166	146	32.15	4.608	39	38.97	3.058	91
11 years	39.35	1.874	128	33.33	2.101	43	44.71	2.908	70

NOTE: $\bar{X}$ = mean; $s_{\bar{x}}$ = standard error of the mean; N = estimated number of children in thousands.

Table 23. Height and weight for white children living in suburban areas, by age at last birthday, sex, and annual family income: mean, standard error of the mean, and weighted sample size, United States, 1963-65

Age and sex	All incomes			Less than $3,000			$3,000 or more		
	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N	$\bar{X}$	$s_{\bar{x}}$	N
Boys	Height in centimeters								
6 years	119.3	0.39	622	117.6	3.74	21	119.2	0.42	557
7 years	124.9	0.48	606	122.8	5.87	19	125.1	0.50	553
8 years	130.3	0.46	600	127.0	3.19	28	130.4	0.50	547
9 years	136.5	0.75	604	136.3	4.38	25	136.7	0.81	528
10 years	140.7	0.36	543	140.5	31.57	18	140.8	0.42	501
11 years	146.2	0.54	524	147.3	32.97	18	146.1	0.58	483
Girls									
6 years	118.1	0.32	545	116.4	26.10	20	118.2	0.38	496
7 years	124.0	0.35	584	125.6	2.13	19	124.0	0.37	523
8 years	129.3	0.38	597	127.0	1.89	35	129.2	0.33	508
9 years	136.4	0.65	512	136.6	30.66	20	136.4	0.71	447
10 years	141.3	0.56	521	137.5	4.38	25	141.5	0.61	483
11 years	147.7	0.56	539	*	*	23	147.6	0.66	470
Boys	Weight in kilograms								
6 years	22.24	0.199	622	21.70	2.033	21	22.06	0.235	557
7 years	24.98	0.307	606	23.87	3.811	19	25.02	0.314	553
8 years	27.94	0.463	600	26.06	1.288	28	28.05	0.462	547
9 years	32.47	1.177	604	31.11	2.852	25	32.39	0.960	528
10 years	33.61	0.530	543	35.20	8.427	18	33.68	0.570	501
11 years	38.97	0.614	524	41.10	10.535	18	38.85	0.703	483
Girls									
6 years	21.83	0.295	545	20.51	4.632	20	21.84	0.275	496
7 years	24.59	0.465	585	23.99	2.673	19	24.71	0.505	523
8 years	27.16	0.402	597	25.48	0.688	35	27.10	0.372	508
9 years	32.30	0.719	512	30.20	7.239	20	32.48	0.827	447
10 years	35.13	0.674	521	33.17	4.738	25	35.28	0.721	483
11 years	39.92	0.518	539	*	*	23	39.83	0.771	470

NOTE: $\bar{X}$ = mean; $s_{\bar{x}}$ = standard error of the mean; N = estimated number of children in thousands.

Table 24. 10th, 50th, and 90th percentiles of height and weight distributions of children, by age at last birthday and sex for the following income groups: U.S. total, U.S. less than $3,000, U.S. $10,000 or more, and total incomes for India and U.A.R.: United States, 1963-65; India, 1956-65; and U.A.R., 1962-63

Age and sex	Distribution at the 10th percentile				
	U.S. total	U.S. less than $3,000	U.S. $10,000 or more	India	U.A.R.
Boys	Height in centimeters				
6 years	111.4	110.6	112.7	100.7	106.0
7 years	117.0	115.5	120.3	106.1	110.0
8 years	122.4	119.8	123.8	111.5	114.7
9 years	126.7	125.5	130.2	115.6	119.1
10 years	131.2	128.2	132.0	120.4	122.4
11 years	136.7	137.4	138.8	124.4	126.3
Girls					
6 years	110.4	108.6	113.0	99.5	105.3
7 years	115.7	115.9	117.6	104.8	109.4
8 years	121.2	119.6	124.6	109.9	114.1
9 years	126.4	125.6	129.1	114.1	118.4
10 years	131.5	130.1	135.5	119.5	122.2
11 years	138.1	136.4	141.1	123.8	126.8
Boys	Weight in kilograms				
6 years	16.8	17.3	18.4	13.7	16.1
7 years	20.2	19.4	21.4	15.1	18.0
8 years	21.4	21.6	23.3	16.3	18.9
9 years	23.8	22.4	26.4	17.9	20.4
10 years	26.3	25.6	27.6	18.5	22.4
11 years	30.0	31.1	30.9	20.9	23.7
Girls					
6 years	16.3	16.6	18.5	12.9	15.7
7 years	18.7	19.0	20.1	13.8	17.6
8 years	21.0	21.2	23.1	15.9	18.8
9 years	23.4	23.5	25.3	17.3	20.1
10 years	25.9	24.8	27.2	19.0	22.4
11 years	29.7	28.2	32.6	20.7	23.8

Table 24. 10th, 50th, and 90th percentiles of height and weight distributions of children, by age at last birthday and sex for the following income groups: U.S. total, U.S. less than $3,000, U.S. $10,000 or more, and total incomes for India and U.A.R.: United States, 1963-65; India, 1956-65; and U.A.R., 1962-63--Con.

Distribution at the 50th percentile					Distribution at the 90th percentile				
U.S. total	U.S. less than $3,000	U.S. $10,000 or more	India	U.A.R.	U.S. total	U.S. less than $3,000	U.S. $10,000 or more	India	U.A.R.
				Height in centimeters					
118.6	116.4	118.9	108.4	114.0	125.9	123.6	126.6	117.2	122.2
124.4	122.5	125.5	114.0	117.8	132.7	132.4	132.8	122.6	126.3
130.0	129.2	130.5	119.8	122.6	137.8	137.8	136.7	129.8	131.2
135.9	133.1	137.1	123.8	127.2	143.9	140.8	145.5	133.0	136.1
140.7	139.0	140.8	128.8	131.7	149.0	147.3	149.1	138.0	141.2
146.0	145.8	146.9	133.3	135.9	154.6	151.8	154.7	143.4	145.1
117.9	116.8	119.1	107.2	113.1	125.1	124.5	123.5	115.9	121.7
123.5	121.8	125.3	113.0	117.1	131.3	129.5	130.7	121.4	126.0
129.7	128.6	130.7	117.8	122.3	137.8	135.3	136.7	127.1	130.7
135.5	134.3	136.5	122.5	126.8	144.9	142.7	146.1	131.5	135.1
141.1	139.1	142.8	128.1	131.5	150.4	149.7	150.6	137.7	141.3
147.4	146.6	147.3	133.4	136.6	157.9	156.5	159.2	144.0	147.3
				Weight in kilograms					
22.0	20.5	22.0	16.7	20.2	26.8	23.1	26.3	21.1	24.6
24.1	23.1	25.1	18.4	21.2	29.7	28.6	30.8	23.0	25.7
27.1	26.4	26.8	19.6	23.4	34.1	32.5	33.3	23.9	28.8
29.7	28.5	31.2	21.2	25.2	39.2	35.2	39.6	26.0	31.2
32.9	30.6	32.7	22.9	27.6	42.1	39.4	40.5	28.1	33.9
36.9	35.6	37.5	25.4	30.2	49.3	44.4	47.0	31.6	36.9
21.3	20.7	22.1	15.8	19.9	26.6	23.9	27.2	19.0	24.4
23.6	22.4	25.2	17.3	20.9	29.8	26.6	30.6	21.0	25.7
26.8	25.8	27.7	19.2	23.2	34.7	32.3	34.7	23.4	28.8
29.8	27.7	31.1	21.0	25.0	41.7	37.8	43.7	25.7	31.7
33.9	31.9	36.1	23.2	27.7	45.7	46.4	44.1	28.6	34.5
38.2	37.8	38.8	25.7	30.7	53.1	55.9	51.6	32.9	39.0

Table 25. Cross-cultural comparison of age of children upon attaining equivalent height or weight:
A. U.S. child in income group of less than $3,000 to U.S. child in income group of $10,000 or more;[1]
B. U.A.R. child to U.S. child, all incomes;
C. Indian child to U.S. child, all incomes.

Income group	Age of children upon reaching comparable height and weight						Average difference, all ages[2]
A. U.S., less than $3,000	6.50	7.50	8.50	9.50	10.50	11.50	...
U.S., $10,000 or more:							
Height, boys	(3)	7.05	8.25	8.90	10.02	11.32	-0.39
Height, girls	(3)	6.93	8.11	9.12	9.92	11.34	-0.42
Weight, boys	(3)	6.86	8.23	8.88	9.36	11.11	-0.61
Weight, girls	(3)	6.60	7.75	8.52	9.65	11.14	-0.77
B. United Arab Republic	6.50	7.50	8.50	9.50	10.50	11.50	...
U.S., all incomes:							
Height, boys	(3)	(3)	7.20	8.00	8.80	9.57	-1.61
Height, girls	(3)	(3)	7.28	8.03	8.83	9.72	-1.54
Weight, boys	(3)	(3)	7.24	7.85	8.64	9.70	-1.64
Weight, girls	(3)	(3)	7.38	7.93	8.84	9.71	-1.52
C. India	6.50	7.50	8.50	9.50	10.50	11.50	...
U.S., all incomes:							
Height, boys	(3)	(3)	6.72	7.40	8.28	9.09	-2.13
Height, girls	(3)	(3)	6.51	7.32	8.25	9.16	-2.19
Weight, boys	(3)	(3)	(3)	(3)	6.94	7.92	-3.57
Weight, girls	(3)	(3)	(3)	(3)	7.38	8.20	-3.21

[1] Values in this table were derived from table 24 by determining, for each particular age and sex group, the median height (or weight) of those children in income group of less than $3,000 and estimating by interpolation at what age children in income group of more than $10,000 attained this height (or weight).
[2] These are the average differences in years, over all ages, between the two groups under consideration when heights (or weights) are equivalent.
[3] Value could not be interpolated; extrapolation would have been required.

APPENDIX I

STATISTICAL NOTES

The Survey Design

The sampling plan of the second cycle of the Health Examination Survey followed a highly stratified, multistage probability design in which a sample of the U.S. population (including Alaska and Hawaii) from the ages of 6-11 years, inclusive, was selected. Excluded were those children confined to an institution or residing upon any of the reservation lands set up for the American Indians.

In the first stage of this design, the nearly 2,000 primary sampling units (PSU's), geographic units into which the United States was divided, were grouped into 357 strata for the use of the Health Interview Survey and the Current Population Survey of the Bureau of the Census and were then further grouped into 40 superstrata for use in Cycle II of the Health Examination Survey.

The average size of each Cycle II stratum was 4.5 million persons, and all strata fell between the limits of 3.5 and 5.5 million. Grouping into 40 strata was done in a way that maximized homogeneity of the PSU's included in each stratum, particularly with regard to the degree of urbanization, geographic proximity, and degree of industrialization. The 40 strata were classified into four broad geographic regions (each with 10 strata) of approximately equal population and cross-classified into four broad population density groups (each having 10 strata). Each of the resultant 16 cells contained either two or three strata. A single stratum might include only one PSU, only part of a PSU (e.g., New York City, which represented two strata), or several score PSU's.

To take account of the possible effect that the rate of population change between the 1950 and 1960 census might have had on health, the 10 strata within each region were further classified into four classes ranging from those with no increase to those with the greatest relative increase. Each such class contained two or three strata.

One PSU was then selected from each of the 40 strata. A controlled selection technique was used in which the probability of selection of a particular PSU was proportional to its 1960 population. In the controlled selection an attempt was also made to maximize the spread of the PSU's among the States. While not every one of the 64 cells in the 4x4x4 grid contributes a PSU to the sample of 40 PSU's, the controlled selection technique ensured the sample's matching the marginal distributions in all three dimensions and being closely representative of all cross-classifications.

Generally, within a particular PSU, 20 census enumeration districts (ED's) were selected with the probability of selection of a particular ED proportional to its population in the age group 5-9 years in the 1960 census, which by 1963 roughly approximated the population in the target age group for Cycle II. A similar method was used for selecting one segment (cluster of households) in each ED. Each of the resultant 20 segments was either a bounded area or a cluster of households (or addresses). All the children in the age range properly resident at the address visited were eligible children (EC's). Operational considerations made it necessary to reduce the number of prospective examinees at any one location to a maximum of 200. The EC's to be excluded for this reason from the sample child (SC) group were determined by systematic subsampling. If one of the sample children had a twin who was not a sample child, this other twin was brought in for examination; although the results were recorded for use in a special substudy of twins, this twin was not included in the 7,119 children under the present analysis.

The total sample included 7,417 children 6-11 years old, of which 96 percent were finally examined. These 7,119 examined children were said to represent the 24,000,000 children in the United States who met the general criteria for inclusion into the sampling universe as of mid-1964.

All data presented in this publication are based on "weighted" observations. That is, data recorded for each

sample child are inflated in the estimation process to characterize the larger universe of which the sample child is representative. The weights used in this inflation process are a product of the reciprocal of the probability of selecting the child, an adjustment for nonresponse cases, and a poststratified ratio adjustment which increases precision by bringing survey results into closer alignment with known U.S. population figures by color and sex for each single year of age 6 through 11.

In the second cycle of the Health Examination Survey the sample was the result of three stages of selection—the single PSU from each stratum, the 20 segments from each sample PSU, and the sample children from the eligible children. The probability of selecting an individual child is the product of the probability of selection at each stage.

Since the strata are roughly equal in population size and a nearly equal number of sample children were examined in each of the sample PSU's, the sample design is essentially self-weighting with respect to the target population; that is, each child 6-11 years old had about the same probability of being drawn into the sample.

The adjustment upward for nonresponse is intended to minimize the impact of nonresponse on final estimates by imputing to nonrespondents the characteristics of "similar" respondents. Here "similar" respondents were judged to be examined children in a sample PSU having the same age (in years) and sex as children not examined in that sample PSU.

The poststratified ratio adjustment used in the second cycle achieved most of the gains in precision which would have been attained if the sample had been drawn from a population stratified by age, color, and sex and made the final sample estimates of population agree exactly with independent controls prepared by the Bureau of the Census for the noninstitutional population of the United States as of August 1, 1964 (approximate midsurvey point), by color and sex for each single year of age 6 through 11. The weight of every responding sample child in each of the 24 age, race, and sex classes is adjusted upward or downward so that the weighted total within the class equals the independent population control.

A more detailed description of the sampling plan and estimation procedures is included in *Vital and Health Statistics*, Series 1, Number 5, 1967: "Plan, Operation, and Response Results of a Program of Children's Examinations," and in *Vital and Health Statistics*, Series 11, Number 1, 1964: "Cycle I of the Health Examination Survey, Sample Response," where, in the latter, the techniques used in Cycle I are similar to those in Cycle II.

Replication and Training for the Measurement Process

The only good replication data available for the standing height measurement from Cycle II come from the Chicago stand. In this particular replication study 100 of the original 283 children examined were brought back for reexamination. Fifty of these children were originally examined by Caravan I and were reexamined by Caravan II;[4] the other 50 were originally examined by Caravan II and reexamined by Caravan I. As a result of this planning, all replicature comparisons are between observers who were unaware of the original measurements.

The replicate sample was chosen in terms of convenience of transportation to and from the examination center rather than in a strictly random manner. The technicians were specially instructed to use the same procedures as they did in the original examinations.

All body measurements were replicated except for weight. Weight was not replicated because of the 2-week interval between the dates of the original examination and the replicate examination and because of high day-to-day variability of weight.

These data suggest that after accounting for growth there is not more than a 3-millimeter average interobserver difference for the standing height measurement.

This result is consistent with results of another Health Examination Survey that used similar procedures. The data in this other survey (Cycle III) suggest that the inter- and intra-examiner differences found on replication of height measurements of the same subjects had median absolute differences of only 3 or 4 millimeters.

Training and retraining in body measurement techniques were accomplished in several ways. The initial training was given by Dr. Francis E. Johnston, Professor of Anthropology at Temple University, in the pretests conducted in Washington, D.C., and Wilmington, Delaware, prior to the beginning of Cycle II. Two formal retraining sessions were held with Dr. Johnston at Philadelphia in November 1963 and at Washington in January 1964. Besides these sessions with Dr. Johnston, there were practice sessions once a month among the technicians supervised by the supervisory staff physician during the dry runs conducted the day before each stand.

Further reduction of interobserver variability was achieved by using the small number of observers who

---

NOTE: The list of references follows the text.

could be well trained. The same four technicians were used throughout the entire survey of 2½ years and 7,119 sample children.

Parameter and Variance Estimation

As each of the 7,119 sample children has an assigned statistical weight, all estimates of population parameters presented in HES publications are computed taking this weight into consideration. Thus, the estimate of a population mean "μ" is computed as follows: $\bar{X}=\sum_{i=1}^{n} W_i X_i / \Sigma W_i$; where X_i is the observation or measurement taken on the i^{th} person and W_i is the weight assigned to that person.

The Health Examination Survey has an extremely complex sampling plan, and obviously the estimation procedure is, by the very nature of the sample, complex as well. A method is required for estimating the reliability of findings which "reflects both the losses from clustering sample cases at two stages and the gains from stratification, ratio estimation, and post-stratification."[35]

The method for estimating variances in the Health Examination Survey is the half-sample replication technique. The method was developed at the U.S. Bureau of the Census prior to 1957 and has at times been given limited use in the estimation of the reliability of results from the Current Population Survey. This half-sample replication technique is particularly well suited to the Health Examination Survey because the sample, although complex in design, is relatively small (7,119 cases) and is based on but 40 strata. This feature permitted the development of a variance estimation computer program which produces tables containing desired estimates of aggregates, means, or distributions together with a table identical in format but with the estimated variances instead of the estimated statistics. The computations required by the method are simple, and the internal storage requirements are well within the limitation of the IBM 360-50 computer system utilized at the National Center for Health Statistics (NCHS).

Variance estimates computed for this report were based on 20 balanced half-sample replications. A half sample was formed by choosing one sample PSU from each of 20 pairs of sample PSU's. The composition of the 20 half samples was determined by an orthogonal plan. To compute the variance of any statistic, this statistic is computed for each of the 20 half samples. Using the mean as an example, this is denoted $\bar{X}_i$. Then the weighted mean of the entire, undivided sample ($\bar{X}$) is computed. The variance of the mean is the mean square deviation of each of the 20 half-sample means about the overall mean. Symbolically, $Var(\bar{X})=\frac{\sum(\bar{X}-\bar{X})^2}{20}$ and the standard error of the mean is simply the square root of this. In a similar manner, the standard error of any statistic may be computed.

A detailed description of this replication process is contained in Vital and Health Statistics, Series 2, Number 14, "Replication: An Approach to the Analysis of Data from Complex Surveys," April 1966, by Philip J. McCarthy, Ph.D.

Standards of Reliability and Precision

All means, variances, and percentages appearing in this report had to meet certain standards before they could be considered precise, reliable, and suitable for publication.

For reporting means, two basic criteria were used. The first criterion was that a sample size of at least five was required. If this was not the case (e.g., there are only three 10-year-old Negro males coming from families with income between $500-$1,000), asterisks (*) are used instead of means and standard errors of means in the tables. If, on the other hand, the first criterion of sample size five was satisfied, then the second criterion must have been demonstrated as well. If the coefficient of variation, that is, the standard error of the mean divided by the mean ($s_{\bar{x}}/\bar{X}$), was greater than 25 percent, the variation with respect to the mean was considered too large and the estimate was neither precise nor reliable enough to meet the standards; the asterisks (*) in the tables denote failure to meet the second criterion.

Where percentages are reported there is only one criterion used and that is that the number of people from which the percentage is calculated was at least 10. An asterisk again points out where this was not the case.

All the procedures described in the discussion to follow utilized certain rules which should be mentioned here. When a mean (or percentage) was considered unreliable, the cell containing the unreliable mean was pooled with an adjacent cell. The mean used in the analysis was thus a weighted mean computed by multiplying each of the means by its weighted sample size and dividing by the sum of the weighted sample sizes. Pooling was carried out until all the means reported met the specified criterion for inclusion.

Hypothesis Testing

Several methods of hypothesis testing have been used in the report:

z-test.—If one independent sample is drawn from each of two univariate normal distributions with means μ_1 and μ_2 a method is sought to test the hypothesis that their means are equal, i.e., $\mu_1 = \mu_2$. The null hypothesis is $H_0: \mu_1 = \mu_2$ with the alternative $H_A: \mu_1 \neq \mu_2$. Ordinarily, to test a hypothesis concerning means from two independent samples, a *t*-test is done which makes the

NOTE: The list of references follows the text.

assumption that $\sigma_1^2 = \sigma_2^2$. In the data at HES, since the sample sizes are generally large, if it is found that $S_1^2 \neq S_2^2$, then for all practical purposes it may be assumed that $\sigma_1^2 \neq \sigma_2^2$. ($S^2$ refers to the variance computed from a sample, whereas σ^2 refers to the true variance in a population.) Indeed, it will henceforth be assumed that $S_1^2 = \sigma_1^2$, $S_2^2 = \sigma_2^2$ and that each may be treated as constants. In this sense, $DF = \infty$ and $t = z$.

The standard normal test can now be performed to determine whether or not to reject the null hypothesis. Since a difference between two means is being examined, a measure for the standard error of this difference is needed. Using the replicate half-sample method, $\sqrt{V(\bar{X}_1)}$ is obtained from the first sample and $\sqrt{V(\bar{X}_2)}$ from the second sample. Now, if sample 1 and sample 2 are assumed independent then, since the covariance between $\bar{X}_1$ and $\bar{X}_2$ is zero, $V(\bar{X}_1 - \bar{X}_2) = V(\bar{X}_1) + V(\bar{X}_2)$. Thus the logic behind the test statistic:

$$z = \bar{X}_1 - \bar{X}_2 / \sqrt{V(\bar{X}_1) + V(\bar{X}_2)}.$$

If one is willing to accept the above assumptions as well as the one of normally distributed estimators, the z-statistic can then be used to test the difference between two means.

Test for consistency of a relationship.—The nonparametric procedure known as the *Sign Test*, as its name implies, is concerned with the directions of differences rather than the magnitude of these differences. *Consistency* of direction of change is the important factor to be tested. Although it is not an extremely powerful procedure, use in the analysis of these data merely as a quick indicator of consistency of a particular relationship makes it quite useful. In application to HES data, independence of each of the 12 age-sex groups is assumed. For each of these 12 groups two statistics are selected (e.g., for each age-sex category the analysis may compare the mean height of children from families earning less than $500 with that from families earning $15,000 or more; or the percentage falling below some designated cutoff height may be considered for those families earning less than $3,000 compared with those earning $3,000 or more; or the normal deviate of slope for the relationship between income and height may be compared with the normal deviate of slope for the relationship between education of parent and height). In all cases, within each age-sex break the direction of the difference is recorded (i.e., the weight of 6-year-old males from families earning $15,000 may exceed the weight of those from families earning less than $500, but for 8-year-old males the opposite may be the case). The number of positive or negative differences is recorded, and this is compared with a critical value determined by the binomial distribution.

The null hypothesis tested by the sign test is that $P(X_A > X_B) = P(X_B > X_A) = \frac{1}{2}$ where X_A is the parameter under the first condition and X_B is the parameter under the second condition. Thus, $\hat{X}_A$ and $\hat{X}_B$ are scores under various conditions for a particular age-sex category, where $\hat{X}_A$ and $\hat{X}_B$ are statistics estimating the parameters.

Obviously, six pluses and six minuses out of the 12 groups would dictate that the null hypothesis cannot be rejected and this lack of consistency indicates that there is no difference in the two conditions. On the other hand, if it is found that of 12 groups the statistic of one of the two conditions is greater than that from the other 11 times, the binomial distribution indicates that this could happen less than 1 percent of the time if the null hypothesis were true, and thus the null hypothesis is rejected which indicates that one of the conditions yields higher means (or what-have-you) than does the other.

As an example, consider the mean heights recorded for each age-sex category. A comparison is to be made between the extreme education categories (i.e., less than 5 years versus 17 years or more (table I),

Table I. Mean height in centimeters of extreme education groups, by age and sex: United States, 1963-65

Age and sex	I less than 5 years	II 17 years or more	I-II
Boys	Mean height		
6 years--	115.7	119.5	-
7 years--	121.5	123.6	-
8 years--	128.3	130.7	-
9 years--	133.1	136.1	-
10 years-	137.0	142.0	-
11 years-	142.1	145.3	-
Girls			
6 years--	115.7	118.6	-
7 years--	121.1	125.8	-
8 years--	126.1	131.3	-
9 years--	130.7	137.7	-
10 years-	136.3	142.5	-
11 years-	143.2	148.6	-

This clearly leads to rejection of the null hypothesis that $P(X_A > X_B) = P(X_B > X_A) = \frac{1}{2}$. The higher education group's means are greater than the corresponding means of the lower education group in all 12 cases.

Test for Trend.—There have been several procedures proposed in the literature for handling the analysis of trend. The one chosen for the analysis of

data in this report is the nonparametric procedure known as Daniel's Test for Trend[36] which is, in effect, Spearman's Correlation Test.[37] Spearman's Correlation Test measures the degree of correlation between two numerical variables. In our trend analysis, the first variable is the socioeconomic one under consideration.

In the analyses of the present report, all children within a particular age-sex category are distributed by the appropriate socioeconomic categories. The statistic of interest (be it mean or percentage) is calculated for each socioeconomic category, and the statistic is listed next to the appropriate socioeconomic category (from which it was computed). Obviously, an increasing trend or, put another way, a monotonically increasing relationship between a socioeconomic variable and the variable under consideration could be demonstrated if, as the socioeconomic variable increased in magnitude, the statistic representing the variable under consideration increased as well.

To be more specific, within each age-sex category the mean height (or weight) was computed for each income (or education) category. A rank of "1" is assigned to the lowest income category "less than $500,"[2] "2" to the next highest ($500-$1,000), and so on until a rank of "10" is assigned to the highest income category "more than $15,000." This is called the theoretical rank. Then, if it is hypothesized that as income increases so does height, it would be expected that assigning ranks to the means at each level of income would, similarly, show a rank of 1 (indicating the smallest mean) corresponding to the lowest income category and upward until finally the largest mean is observed for the largest income category and is assigned a rank of 10. At each level of income the value d_i (difference between the theoretical rank under the null hypothesis and the rank of the mean observed for that income category) is determined. Each d_i is squared and the sum of these squared differences $\sum_{i=1}^{10} d_i^2$ is calculated. Spearman's Rank Correlation Coefficient r_s is then computed by the following formula: $r_s = 1 - \frac{6\Sigma d_i^2}{N^3 - N}$, where N=number of categories of the socioeconomic variable under consideration.

Tables are available of the probability distribution of various values for r_s for different levels of N. Use of such tables enables tests of the null hypothesis $r_s = 0$ against the alternative $r_s \neq 0$. Obviously as N increases, smaller values for r_s would be considered significant where they might not have been for smaller values of N. Example: Consider the mean heights corresponding to the various income levels for 6-year-old boys (table II).

Note that $\Sigma d_i^2 = 22$. Using Spearman's formula for computing the correlation coefficient, $r_s = 1 - \frac{6(22)}{9^3 - 9} = .8167$. Tables indicate that for $N=9$ the 99-percent critical value is 0.783 and the 95-percent critical value is 0.600. Thus a correlation coefficient of 0.8167 indicates that a positive trend does exist—and does so with 99-percent confidence.

Weighted least squares as a test for trend.—If there indeed exists a positive relationship between income

[2]Recall here that if the sample size were less than 5 or if the coefficient of variation $s_{\bar{x}}/\bar{x}$ were greater than .2500, this first group would be a pooled one which did meet the criteria (e.g., $1,000).

NOTE: The list of references follows the text.

Table II. Worksheet for Spearman's Test on mean heights of 6-year-old boys, by family income group: United States, 1963-65

Income	Theoretical rank	Mean height	II rank	I-II d_i	d_i^2
Less than $1,000---------	1	[1]115.2	1	0	0
$1,000-$1,999----------	2	117.0	3	-1	1
$2,000-$2,999----------	3	117.4	4	-1	1
$3,000-$3,999----------	4	118.5	5	-1	1
$4,000-$4,999----------	5	116.8	2	3	9
$5,000-$6,999----------	6	119.5	7	-1	1
$7,000-$9,999----------	7	120.1	9	-2	4
$10,000-$14,999--------	8	118.7	6	2	4
$15,000 or more--------	9	119.6	8	1	1
				0	22

[1]This is a pooled mean, made up of 23 persons, which meets the criteria for precision and reliability. In this case, as is seen in table 1, the mean for the category "less than $500" alone did not meet the criteria and so pooling the first two categories was called for.

(or education) and height (or weight), then a useful test for this relationship would be to fit a regression line to the data to determine the slope and then to determine whether or not this slope is significantly greater than zero. That is, a regression line of the form $Y=\alpha+\beta_1 X_1+\epsilon_1$ is to be fit to the data where, in this case Y = height (or weight), X = income (or education), α = "Y-intercept," i.e., value of height (or weight) if income (or education) equaled zero, β = slope of Y on X, i.e., the rate of change in height (or weight) per unit change in income (or education), and finally, ϵ = unexplained error.

The data available from the Health Examination Survey present certain very basic problems which discourage the use of classical regression procedures. Among these problems are violation of the assumptions of independence of the original observations, violation of homoscedasticity, i.e., equal variances of the dependent variable within each category of the independent variable, perhaps violation of the normality assumption, etc. Dr. Paul Levy of the Office of Statistical Methods of NCHS has worked out a "modified regression model which makes no assumptions about the original observations and which makes no stronger assumptions about the sample estimates than are made in testing whether two means are equal when the estimated means and their standard errors are obtained from complex surveys."[aa]

The proposed model is as follows:

1. Let $\bar{Y}_i$ be the estimated mean and $s_{\bar{x}}$ be its estimated standard error for the i^{th} group.
2. Let X_i be the midpoint of the independent variable for the group.
3. Assume $S_{\bar{y}_i}$ is based on a large enough number of observations that it can be assumed it is, in fact, equal to $\sigma_{\bar{y}_i}$ and thus has no sampling error.
4. Further assume that

$$E(\bar{y}_i)=\alpha+\beta X_i$$

$$V(\bar{y}_i)=S^2_{\bar{y}_i} \quad \text{for } i=1, 2, \ldots, K, \text{ where } K \text{ is the number of groups.}$$

5. Finally, it is assumed that the $\bar{y}_i$'s are normally distributed and they are statistically independent of each other.

The weighting procedure proposed weights all observations by the reciprocal of the variance. That is, $W_i=1/S^2_{\bar{y}_i}$ and the mean $\bar{X}=\Sigma w_i X_i/\Sigma w_i$ and the mean $\bar{Y}=\Sigma w_i \bar{Y}_i/\Sigma w_i$.

The slope is computed in a manner similar to the classical least squares regression, by the following formula:

$$b=\frac{\Sigma w_i(X_i-\bar{X})\bar{Y}_i}{\Sigma w_i(X_i-\bar{X})^2}$$

Computationally, this is easily computed by

$$b=\frac{\Sigma w_i X_i\bar{Y}_i-(\Sigma w_i)(\bar{X})(\bar{Y})}{\Sigma w_i X_i^2-(\Sigma w_i)\bar{X}^2}$$

The variance of the slope is

$$\sigma^2_b=\frac{\Sigma w_i(X_i-\bar{X})^2\sigma^2_{\bar{y}}}{[\Sigma w_i(X_i-\bar{X}^2)]^2}$$

Now, since $W_i=1/\sigma^2_{\bar{y}i}$, this formula can be simplified to

$$\sigma^2_b=\frac{\Sigma w_i(X_i-\bar{X})^2}{[\Sigma w_i(X_i-\bar{X})^2]^2}=\frac{1}{\Sigma w_i(X_i-\bar{X})^2}$$

and computationally

$$S_b=\sqrt{\frac{1}{\Sigma w_i X_i^2-(\Sigma w_i)\bar{X}^2}}$$

[aa] From an unpublished memorandum by Dr. Levy.

Table III. Worksheet for weighted least squares regression of mean heights of 6-year-old boys, by education of parent: United States, 1963-65

Education of parent	Midpoint of education group	Mean height	Standard error of mean	$S^2_{\bar{y}_i}$	$W_i = 1/S^2_{y_i}$
0-4.99 years	2.5	115.7	2.68	7.1824	0.1393
5-7.99 years	6.5	117.2	.92	.8464	1.1815
8 years	8.0	117.8	.86	.7396	1.3521
9-11.99 years	10.5	117.7	.50	.2500	4.4000
12 years	12.0	119.1	.33	.1089	9.1828
13-15.99 years	14.5	120.4	.71	.5041	1.9838
16 years	16.0	118.9	.68	.4624	2.1627

An approximate normal deviate test can now be performed by $z = b/S_b$. This would test the hypothesis that $\beta = 0$ or, alternatively, compute confidence intervals for β.

As an example, suppose for every education level the mean height of 6-year-old boys is recorded as shown in table III. Applying this described method to the data shown, we have:

$\Sigma w_i X_i \bar{Y}_i = 27859.7$	$\bar{X} = 11.7191$
$\Sigma w_i = 20.0022$	$\bar{Y} = 118.7036$
$\Sigma w_i X_i = 234.4068$	$b = .28$
$\Sigma w_i \bar{Y}_i = 2374.3325$	$S_b = .0897$
$\Sigma w_i X_i^2 = 2871.3919$	$z = b/S_b = 3.12$

Thus, since the z-value is quite large, a positive association is demonstrated between height and education.

Test for best possible dichotomy.—The problem suggesting this analysis was an attempt to isolate a "best" dichotomy of family income level. In other words, it was found that as family income level increased (within any age-sex category), the percentage of children within a family income level falling below the lowest 10th percentile value for that age-sex category decreased. Four dichotomies were used: $2,000, $3,000, $4,000, and $5,000. That is, for any age-sex category the percentage falling below the lowest 10th percentile was computed for eight income categories: less than $2,000, $2,000 or more; less than $3,000, $3,000 or more: less than $4,000, $4,000 or more; and finally, less than $5,000, $5,000 or more. This was done for each of the 12 age-sex categories for both height and weight, and the ratio of the percent falling under the cutoff point for those earning less than the dichotomy was divided by the corresponding percentage for those earning more than that family income level. The results for the height analysis are shown in table IV. Each row of table IV gives the scores of one age-sex group under the four possible dichotomies. Since the four possible dichotomies are not independent, conventional statistical analyses must give way to a more general examination of the data.

Table IV. Resulting ratios by age and sex for each of the four dichotomies under consideration: United States, 1963-65

Age and sex	Possible dichotomy			
	$2,000	$3,000	$4,000	$5,000
Mean ratio	2.00	1.95	2.09	2.03
Boys				
6 years	3.16	2.29	1.88	2.55
7 years	2.53	3.03	2.40	2.01
8 years	1.42	2.32	2.37	2.33
9 years	2.24	2.14	2.97	2.26
10 years	2.28	2.28	2.70	2.29
11 years	1.18	1.00	1.41	1.61
Girls				
6 years	1.90	2.36	2.19	2.22
7 years	1.53	1.07	1.75	1.40
8 years	2.37	1.85	2.19	2.18
9 years	1.80	1.58	1.79	1.81
10 years	1.75	1.85	2.05	2.15
11 years	1.86	1.66	1.42	1.61

Table V. Ranks of resulting ratios within each age and sex: United States, 1963-65

Age and sex	Rank			
	$2,000	$3,000	$4,000	$5,000
Mean ratio	29	24	33	34
Boys				
6 years	4	2	1	3
7 years	3	4	2	1
8 years	1	2	4	3
9 years	2	1	4	3
10 years	1	2	4	3
11 years	2	1	3	4
Girls				
6 years	1	4	2	3
7 years	3	1	4	2
8 years	4	1	3	2
9 years	3	1	2	4
10 years	1	2	3	4
11 years	4	3	1	2

A preliminary analysis involved obtaining the mean ratio at each possible dichotomy. As illustrated in table IV the mean ratios for the four dichotomies are extremely close, and this would lead to the conclusion that each of the possible breaks gives a similar differentiation. Another tack is to rank the data within each row—the lowest ratio receiving a rank of 1 and the largest a rank of 4. This was done for each of the 12 age-sex categories (table V). If no single dichotomy was better than any of the others, one would expect that summarizing the ranks over all age-sex groups within each of the dichotomies would yield similar sums. Alternatively, if one were constantly better than the others, the sum of the ranks would be relatively high since ranks of 4 should have prevailed within that column. As the above analysis illustrates, the ranks are fairly well distributed and it was felt that the differences among the sums were not large enough to dictate that any one of the dichotomies was better or worse than any of the others.

A standard nonparametric procedure such as Freedman's chi-square was not used in this problem because the various dichotomies are not independent. Thus, an alternative procedure was sought which made no assumption of independence. The W_n Statistic described in "Some Aspects of the Statistical Analyses of the 'Mixed Model'" by Gary G. Koch and Pranab Kumar Sen which appeared in *Biometrics*, March 1968, is most appropriate here and is based on the ranks described above.

Testing the differences between the various income dichotomies, for heights, $W_n=2.61$ with 3 degrees of freedom, and for weights, $W_n=1.28$ with 3 degrees of freedom. Since W_n is distributed as x^2, all dichotomies appear to be performing an equal job of differentiation.

—o o o—

APPENDIX II

DEMOGRAPHIC VARIABLES

Definitions of Demographic Coding Terms From HES Procedures Manual

Age.—Age was computed using the date of birth stated at the interview. This was confirmed by comparing it with the date of birth as given on the child's birth certificate. The age recorded for each child was the age at his last birthday on the date of examination.

NOTE: The age criterion for inclusion in the sample was defined in terms of age on the day of interview. Since the examination usually took place 2 to 4 weeks after the interview some of those who were 11 years old at the time of interview became 12 years old by the time of the examination. There were 72 such cases. In the adjustment and weighting procedures these 72 were included in the 11-year-old group.

Race.—The race classification recorded by observation was confirmed by comparison with the race classification on the child's birth certificate. Race was recorded as "white," "Negro, " or "other." "Other" included American Indians, Chinese, Japanese, and all races other than white or Negro. Mexican persons were included with "white" unless definitely known to be American Indian or of another race. Negroes and persons of mixed Negro and other parentage were recorded as "Negro."

Parent.—A parent was the natural parent or, in the case of adoption, the legal parent of the child.

Guardian.—A guardian was the person responsible for the care and supervision of the child. He (or she) did not have to be the legal guardian to be considered the guardian in this survey. A guardianship could exist only when neither parent of the child resided in the sample household.

Head of household.—Only one person in each household was designated as the "head." He (or she) was the person who was regarded as the "head" by the members of the household. In most cases the head was the chief breadwinner of the family although this was not always true. In some cases the head was the parent of the chief earner, or the only adult member of the household.

Household member.—A household member was a person whose usual place of residence was in the interviewed household. Persons who lived away from their usual place of residence for the purpose of attending school were not considered "household members" at their usual place of residence except during summer vacation periods.

Marital status of parent or guardian.—The marital status classification consisted of five major categories: "married," "widowed," "divorced," "separated," and "never married." Persons with common-law marriages were considered married. "Separated" was defined as referring only to married persons who had a legal separation or a de facto separation for reasons such as marital discord. Thus, absence of spouse solely because of military service, employment in another location, or similar reasons was not basis for classification as "separated."

Usual activity of parent or guardian.—This item was defined as that activity ("working," "keeping house," or "doing something else") in which the person had been engaged for most of the time between the date of interview and the same date 3 months earlier. "Working" included paid work as an employee for someone else for wages, salary, commission, or pay in kind (meals, living quarters, or supplies provided in place of cash wages). Also included was work in the person's own business, professional practice, or farm, and work without pay in a business or farm run by a relative. Work performed around a person's own house or volunteer unpaid work for a church or charity was not included in the "working" category.

Family income.—The income recorded was the total income during the past 12 months received by the head of the household and all other household members related to the head by blood, marriage, or adoption. This income was the gross cash income (excluding pay in kind, e.g., meals, living quarters, or supplies provided in place of cash wages) except in the case of a family with its own farm or business, in which case net income was recorded. Also included in the family in-

come figure were allotments and other money received by the family from a member of the Armed Forces whether he was living at home or not.

Education of parent or guardian.—This item was recorded as the highest grade that had been completed in school. The only grades counted were those which had been completed in a regular school where persons were given formal education in graded or private schools, either day or night schools, with either full-time or part-time attendance. A "regular" school is one which advances a person toward an elementary or high school diploma, or a college, university, or professional school degree. Education in vocational, trade, or business schools outside the regular school system was not counted in determining the highest grade of school completed.

Grade in school (eligible child).—The grade that the child was attending at the time of interview was taken. The grade of those children on summer vacation was considered to be the grade that they would enter when school resumed.

Geographic region.—For purposes of stratification the United States was divided into four broad geographic regions of approximately equal population. These regions, which correspond closely to those used by the Bureau of the Census, are as follows:

Region	*States Included*
Northeast	Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, and Pennsylvania
South	Delaware, Maryland, District of Columbia, West Virginia, Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Arkansas
Midwest	Ohio, Illinois, Indiana, Michigan, Wisconsin, Minnesota, Iowa, and Missouri
West	Washington, Oregon, California, Nevada, New Mexico, Arizona, Texas, Oklahoma, Kansas, Nebraska, North Dakota, South Dakota, Idaho, Utah, Colorado, Montana, Wyoming, Alaska, and Hawaii

Population density.—Four population density groups were used to divide the U.S. population into four approximately equal parts. These groups were defined differently for the four geographic regions, in an attempt to obtain a division of each region into the following four classes (1) the largest metropolitan areas; (2) standard metropolitan statistical areas (SMSA's) of specified size; (3) other SMSA's or specified highly urban areas; and (4) all other urban and rural areas.

Region	*Class Composition*
Northeast	1. New York City's two SMSA's and the Philadelphia SMSA
	2. Other SMSA's over 1,000,000 population
	3. Remaining SMSA's
	4. All other urban and rural areas
South	1. SMSA's over 700,000 population
	2. All other SMSA's
	3. Specified highly urban areas
	4. All other urban and rural areas
Midwest	1. Chicago and Detroit SMSA's
	2. Other larger SMSA's, most of them over 500,000 population
	3. Remaining SMSA's
	4. All other urban and rural areas
West	1. The two Los Angeles SMSA's and the San Francisco and Seattle SMSA's
	2. All other SMSA's over 550,000 population
	3. Remaining SMSA's
	4. All other urban and rural areas

Urban-rural.—The classification of urban-rural areas was the same as that used in the 1960 census. According to the 1960 definition, those areas considered urban were (a) places of 2,500 inhabitants or more incorporated as cities, boroughs, villages, and towns (except towns in New England, New York, and Wisconsin); (b) the densely settled urban fringe, whether incorporated or unincorporated, of urbanized areas; (c) towns in New England and townships in New Jersey and Pennsylvania which contained no incorporated municipalities as subdivisions and had either 2,500 inhabitants or more, or a population of 2,500 to 25,000 and a density of 1,500 persons or more per square mile; (d) counties in States other than the New England States, New Jersey, and Pennsylvania that had no incorporated municipalities within their boundaries and had a density of 1,500 persons or more per square mile; and (e)

unincorporated places of 2,500 inhabitants or more which were not included in any urban fringe. The remaining population was classified as rural.

Place description.—The SMSA population was classified as living "in central city" or "not in central city" of a standard metropolitan statistical area (SMSA). The remaining population was classified as "not in SMSA."

The definitions and titles of SMSA's are established by the U.S. Bureau of the Budget with the advice of the Federal Committee on standard metropolitan statistical areas.

The definition of an individual standard metropolitan statistical area involved two considerations: First, these must be a city or cities of specified population which constitute the central city and which identify the county in which it was located as the central county; and, second, these must be economic and social relationships with contiguous counties which were metropolitan in character so that the periphery of the specific metropolitan area could be determined.

Persons "in central city" of an SMSA were therefore defined as those whose residency was in the city or cities of the standard metropolitan statistical area title. Persons who resided in an SMSA but not in the city given in the SMSA title were considered "not in central city."

The remaining population was allocated into urban (not SMSA), rural-farm, and rural-nonfarm groups. The farm population included all persons living in rural territory on places of 10 acres or more from which sales of farm products had amounted to $50 or more during the preceding 12 months or on places of less than 10 acres from which sales of farm products had amounted to $250 or more during the preceding 12 months. Other persons living in rural territory were classified as nonfarm. Persons were also classified as nonfarm if their household paid rent for the house but their rent did not include any land used for farming.

The location number and the 1960 population of the SMSA central cities in the HES sample are shown in the table below.

City	Location number	1960 population
Portland, Me	01	72,566
Boston, Mass	05	697,197
Denver, Colo	06	493,887
Philadelphia, Pa	07	2,002,512
Charleston, S.C	09	65,925
Los Angeles, Calif	10	2,479,015
Los Angeles, Calif	12	
Atlanta, Ga	13	487,455
San Francisco, Calif	14	740,316
Baltimore, Md	15	934,024
New York, N.Y	17	7,781,984
New York, N.Y	19	
Minneapolis, Minn	20	482,872
Grand Rapids, Mich	21	177,313
Chicago, Ill	23	3,550,404
Des Moines, Iowa	24	208,982
Wichita, Kans	26	381,626
Brownsville, Tex	28	48,040
Houston, Tex	29	938,219
Birmingham, Ala	30	340,887
Detroit, Mich	31	1,670,144
Cleveland, Ohio	33	876,050
Allentown, Pa	35	108,347
Newark, N. J	37	405,220
Jersey City, N.J	38	276,101
Columbia, S.C	40	97,433

APPENDIX III

HOUSEHOLD INTERVIEW QUESTIONNAIRE

CONFIDENTIAL - The National Health Survey is authorized by Public Law 652 of the 84th Congress (70 Stat. 489; 42 U.S.C. 305). All information which would permit identification of the individual will be held strictly confidential, will be used only by persons engaged in and for the purposes of the survey and will not be disclosed or released to others for any other purposes (22 FR 1687).

BUDGET BUREAU NO. 68-R020.54.5
APPROVAL EXPIRES JULY 31, 1965

FORM NHS-HES-2
(11-15-63)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS
ACTING AS COLLECTING AGENT FOR THE
U.S. PUBLIC HEALTH SERVICE

NATIONAL HEALTH SURVEY

1. Questionnaire _____ of _____ Questionnaires

2. (a) Address or description of location (include city, zone, and State)

2. (b) Mailing address if not shown in 2(a) OR ☐ Same as shown in 2(a)

2. (c) Name of special dwelling place | Code

3. Identification code	4. PSU number	5. Segment number	6. Serial number

E If this questionnaire is for an "EXTRA" unit in a B or NTA Segment, enter:

Serial No. of original Sample Unit	Item No. by which found	If in NTA Segment, also enter for FIRST unit listed on property	
		Segment List: Sheet No.	Line No.

7. Type of living quarters *(Check one box)*
☐ Housing unit ☐ Other unit

L Ask items 8 and 9 only if "Rural" box is marked
1 ☐ Rural 2 ☐ All other *(SKIP to Item 10)*

8. Do you own or rent this place?
1 ☐ Own *(Ask 9(a))* 2 ☐ Rent *(Ask 9(b))* 3 ☐ Rent free *(Ask 9(c))*

9. (a) If Own or Rent free, ask - Does this place have 10 or more acres?
(b) If Rent, ask - Does the place you rent have 10 or more acres?

1 ☐ Yes → (c) During the past 12 months did sales of crops, livestock, and other farm products from the place amount to $50 or more? 1 ☐ Yes 2 ☐ No

2 ☐ No → (d) During the past 12 months did sales of crops, livestock, and other farm products from the place amount to $250 or more? 1 ☐ Yes 2 ☐ No

ALL segments (ask if Item 2(a) address identifies a SINGLE-UNIT structure).

10. Are there any occupied or vacant living quarters **BESIDES YOUR OWN**--
--In the basement? .... ☐ Yes--S_____ L_____ ☐ No
--on this floor? ..... ☐ Yes--S_____ L_____ ☐ No
--on any other floor of this building? .... ☐ Yes--S_____ L_____ ☐ No
(Fill Table X for each quarters NOT listed)

ALL segments (ask if Item 2(a) identifies entire floor or unnumbered part of floor in a MULTI-UNIT structure).

11. Are there any occupied or vacant living quarters **BESIDES YOUR OWN**--
If Item 2(a) identifies entire floor --on this floor?
If Item 2(a) identifies part of the floor, specify part --In the--of this floor?
☐ Yes--S_____ L_____ ☐ No
(Fill Table X for each quarters NOT listed.)

TA and NTA segments (ask at all units EXCEPT APARTMENT HOUSES).

12. Is there any other building on this property for people to live in - either occupied or vacant?
☐ Yes--S_____ L_____ ☐ No
(Fill Table X for each quarters NOT listed.)

13. What is the telephone number here? Telephone No. _____ OR ☐ No telephone

(INTERVIEWER): If eligible child in household enter child's name, segment, serial, and column number on Medical History Form.

(READ TO RESPONDENT)
In addition to the information you have already given me, I would like to leave this form to be filled out about--. The form is self-explanatory. A representative of the U.S. Public Health Service will come by to pick up the form in a week or so. *(Ask Item 14)*

14. What would be the best time of day for the representative to come? .....

Medical histories left for--	Person with whom form left--
Column No(s).	Column No. and relationship

15. RECORD OF CALLS AT HOUSEHOLD

Item		1	Com.	2	Com.	3	Com.	4	Com.	5	Com.
Entire household	Date										
	Time										

16. REASON FOR NON-INTERVIEW

TYPE	A	B	C	Z
Reason	☐ Refusal *(Describe in footnotes)* ☐ No one at home--repeated calls ☐ Temporarily absent ☐ Other *(Specify)* *(Go to 17)*	☐ Vacant--non-seasonal ☐ Vacant--seasonal ☐ Usual residence elsewhere ☐ Other *(Specify)*	☐ Demolished ☐ In sample by mistake ☐ Eliminated in sub-sample ☐ Other *(Specify)*	Interview not obtained for Cols. ___ ___ ___ ___ ___ because:

17. TYPE A FOLLOW-UP PROCEDURE

If final call results in a Type A non-interview (except Refusals) take the following steps:
1. Contact neighbors (caretakers, etc.) until you find someone who knows the family.
2. Find out the number of people in the household, their names and approximate ages; if names of all members not known, ascertain relationships. Record this information in the regular spaces inside the questionnaire.

18. Signature of interviewer

19. Code

USCOMM-DC 22318 P-65

ALL

1. (a) What is the name of the head of this household? *(Enter name in first column.)*
   (b) What are the names of all other persons who live here? *(List all persons who live here.)*
   (c) I have listed (Read names) is there anyone else staying here now such as friends, relatives, or roomers? ☐ Yes *(List)* ☐ No
   (d) Have I missed anyone who usually lives here but is now -- Temporarily in a hospital? ☐ Yes *(List)* ☐ No
   -- Away on business? ☐ Yes *(List)* ☐ No
   -- On a visit or vacation? ☐ Yes *(List)* ☐ No
   (e) Do any of the people in this household have a home anywhere else?
   ☐ Yes *(Apply household membership rules, if not a household member delete)* ☐ No *(Leave on questionnaire)*

   Last name (1)
   First name

2. How are(is)--related to the head of the household?
   (Enter relationship to head, for example: wife, daughter, stepson, grandson, mother-in-law, partner, roomer's wife, etc.)

   Relationship HEAD

3. Race *(Mark one box for each person)*

   ☐ White ☐ Negro ☐ Other

4. Sex *(Mark one box for each person)*

   ☐ Male ☐ Female

5. (a) How old were you on your last birthday?

   Age ☐ Under 1 year

   For each child age 5--12 listed on the questionnaire, ask:
   (b) What is the month, day, and year of--'s birth?
   (Check with Question 5(a) for consistency)

   Month | Day | Year

TO INTERVIEWER: Mark "EC" box for each eligible child (age 6--11) listed on the questionnaire. If no EC, ask coverage questions on Page 1.
NOTE: Questions 6--14 must be asked only of parent(s) or guardian(s) of EC. If no parent or guardian is at home, arrange to call back when they will be home.

☐ EC ☐ Not EC

ASK FOR EC

Ask only for EC (children 6--11 years of age)

☐ No school

6. What is the name and location of the school--goes to?

   Name and location

   (a) What grade is--in?

   Grade

ALL

Please look at this card (Hand respondent HES-2(a) card and pencil).

7. Do any of the questions on that card apply to any members of the family? Please mark "Yes" or "No" for each question.
   (For each "Yes" marked, ask):
   (a) You have checked--. Who was this?
   (b) When was this?

   NOTE: If "I" marked, enter name of hospital or institution.

Statement No.	
1	
2	
3	

ASK FOR PARENTS OR GUARDIANS OF EC

8. Where were you born?
   (Check U.S. box or write in name of country)

   ☐ U.S.
   Foreign country

9. Are you primarily right handed, primarily left handed, or both?

   ☐ Right ☐ Left ☐ Both

10. What is the highest grade you attended in school?
    (Circle highest grade attended or mark "None.")
    (If attended, ask):
    (a) Did you finish this grade (year)?

    ☐ None
    Elem.... 1 2 3 4 5 6 7 8
    High.... 1 2 3 4
    College 1 2 3 4 5+
    ☐ Yes ☐ No

11. What were you doing most of the past 3 months -- working, keeping house, or doing something else?
    (If "Doing something else," ask):
    (a) What were you doing? *(Enter reply verbatim and ask 11(b))*
    (If "Keeping house" OR "Doing something else," ask):
    (b) Did you work at a job or business at any time during the past 3 months?
    (If "Working" in 11 OR "Yes" in 11(b), ask):
    (c) Did you work full-time or part-time?

    ☐ Working ☐ Keeping house ☐ Something else
    ☐ Yes ☐ No
    ☐ Full-time ☐ Part-time

12. Are you now married, widowed, divorced, or separated?
    (If "Married," ask):
    (a) Have you(your husband) been married more than once?

    ☐ Married ☐ Divorced ☐ Widowed ☐ Separated
    ☐ Yes ☐ No

13. Besides (Read names of children entered in Question 1) have you and(or) your husband(wife) ever had any other children?
    ☐ Yes ☐ No
    (If "Yes," ask):
    (a) What are their names?
    (b) How old is--?
    (c) Where does he(she) live now?

	Name
1	
2	
3	

ALL

14. Which of these income groups represents your total combined family income for the past 12 months, that is, your's, your--'s, etc? (Show Income Flash Card HES-2(b).) Include income from all sources, such as wages, salaries, rents from property, Social Security, or retirement benefits, help from relatives, etc.
    (Go to Question 15 on Page 4)

    Group

FORM NHS.HES-2 (5-13-63)

Last name (2)	Last name (3)	Last name (4)	Last name (5)	Last name (6)
First name	First name	First name	First name	First name
Relationship	Relationship	Relationship	Relationship	Relationship
☐ White ☐ Negro ☐ Other	☐ White ☐ Negro ☐ Other	☐ White ☐ Negro ☐ Other	☐ White ☐ Negro ☐ Other	☐ White ☐ Negro ☐ Other
☐ Male ☐ Female	☐ Male ☐ Female	☐ Male ☐ Female	☐ Male ☐ Female	☐ Male ☐ Female
Age ☐ Under 1 year	Age ☐ Under 1 year	Age ☐ Under 1 year	Age ☐ Under 1 year	Age ☐ Under 1 year
Month / Day / Year	Month / Day / Year	Month / Day / Year	Month / Day / Year	Month / Day / Year
☐ EC ☐ Not EC	☐ EC ☐ Not EC	☐ EC ☐ Not EC	☐ EC ☐ Not EC	☐ EC ☐ Not EC
☐ No school	☐ No school	☐ No school	☐ No school	☐ No school
Name and location	Name and location	Name and location	Name and location	Name and location
Grade	Grade	Grade	Grade	Grade
☐ U.S.	☐ U.S.	☐ U.S.	☐ U.S.	☐ U.S.
Foreign country	Foreign country	Foreign country	Foreign country	Foreign country
☐ Right ☐ Left ☐ Both	☐ Right ☐ Left ☐ Both	☐ Right ☐ Left ☐ Both	☐ Right ☐ Left ☐ Both	☐ Right ☐ Left ☐ Both
☐ None Elem... 1 2 3 4 5 6 7 8 High... 1 2 3 4 College 1 2 3 4 5+	☐ None Elem... 1 2 3 4 5 6 7 8 High... 1 2 3 4 College 1 2 3 4 5+	☐ None Elem... 1 2 3 4 5 6 7 8 High... 1 2 3 4 College 1 2 3 4 5+	☐ None Elem... 1 2 3 4 5 6 7 8 High... 1 2 3 4 College 1 2 3 4 5+	☐ None Elem... 1 2 3 4 5 6 7 8 High... 1 2 3 4 College 1 2 3 4 5+
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Working ☐ Keeping house ☐ Something else	☐ Working ☐ Keeping house ☐ Something else	☐ Working ☐ Keeping house ☐ Something else	☐ Working ☐ Keeping house ☐ Something else	☐ Working ☐ Keeping house ☐ Something else
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Full-time ☐ Part-time	☐ Full-time ☐ Part-time	☐ Full-time ☐ Part-time	☐ Full-time ☐ Part-time	☐ Full-time ☐ Part-time
☐ Married ☐ Divorced ☐ Widowed ☐ Separated ☐ Yes ☐ No	☐ Married ☐ Divorced ☐ Widowed ☐ Separated ☐ Yes ☐ No	☐ Married ☐ Divorced ☐ Widowed ☐ Separated ☐ Yes ☐ No	☐ Married ☐ Divorced ☐ Widowed ☐ Separated ☐ Yes ☐ No	☐ Married ☐ Divorced ☐ Widowed ☐ Separated ☐ Yes ☐ No

Age	Present whereabouts

Name	Relationship	Year(s)	Name of Institution

Group	Group	Group	Group	Group

USCOMM-DC 22318 P-63

INCOME FLASH CARDS

FORM NHS-HES-2b
(5-14-63)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS
ACTING AS COLLECTING AGENT FOR THE
U.S. PUBLIC HEALTH SERVICE

NATIONAL HEALTH SURVEY

Total combined family income during past 12 months

Group A . . . Under $500 (Including loss)

Group B . . . $ 500 - $ 999

Group C . . . $ 1,000 - $ 1,999

Group D . . . $ 2,000 - $ 2,999

Group E . . . $ 3,000 - $ 3,999

Group F . . . $ 4,000 - $ 4,999

Group G . . . $ 5,000 - $ 6,999

Group H . . . $ 7,000 - $ 9,999

Group I . . . $10,000 - $14,999

Group J . . . $15,000 and over

USCOMM-DC 15070 P-63

15. Is any language other than English spoken here in your home?

☐ Yes ☐ No

(If "Yes," ask):

What language(s)? Language(s) spoken _____

(Complete front page of questionnaire)

Comments

TABLE X - LIVING QUARTERS DETERMINATIONS AT LISTED ADDRESS

Line No.	Questionnaire No.	Are these (Specify location) quarters for more than one group of people? Yes (Fill one line for each group)	Are these (Specify location) quarters for more than one group of people? No	Location of unit (Examples: Basement, 2nd floor, etc.)	USE OF CHARACTERISTICS: Occupied — Do the occupants of these (Specify location) quarters live and eat with any other group of people? Yes	Occupied — No	All Quarters — Do these (Specify location) quarters have: Direct access from the outside or through a common hall? Yes	Direct access — No	A kitchen or cooking equipment for exclusive use? Yes	A kitchen or cooking equipment for exclusive use? No	CLASSIFICATION: Not a separate unit (Add occupants to this questionnaire)	Fill separate questionnaire and interview: HU	Fill separate questionnaire and interview: Other unit	IF HU IN B SEGMENT, ASK: In what year were these (Specify location) quarters created? (If 1959 or 1960, also specify "F" if first half or "L" if last half)	(If before July 1960) What was the name of the household head of these quarters on April 1, 1960?
(1)	(2)	(3a)	(3b)	(4)	(5a)	(5b)	(6a)	(6b)	(7a)	(7b)	(8)	(9a)	(9b)	(10)	(11)
1															
2															

FORM NHS-HES-2 (6-13-69)

USCOMM-DC 15689 P63

☆ U.S. GOVERNMENT PRINTING OFFICE : 1972 515-205/11

VITAL AND HEALTH STATISTICS PUBLICATION SERIES

Formerly Public Health Service Publication No. 1000

Series 1. Programs and collection procedures.—Reports which describe the general programs of the National Center for Health Statistics and its offices and divisions, data collection methods used, definitions, and other material necessary for understanding the data.

Series 2. Data evaluation and methods research.—Studies of new statistical methodology including: experimental tests of new survey methods, studies of vital statistics collection methods, new analytical techniques, objective evaluations of reliability of collected data, contributions to statistical theory.

Series 3. Analytical studies.—Reports presenting analytical or interpretive studies based on vital and health statistics, carrying the analysis further than the expository types of reports in the other series.

Series 4. Documents and committee reports.—Final reports of major committees concerned with vital and health statistics, and documents such as recommended model vital registration laws and revised birth and death certificates.

Series 10. Data from the Health Interview Survey.—Statistics on illness, accidental injuries, disability, use of hospital, medical, dental, and other services, and other health-related topics, based on data collected in a continuing national household interview survey.

Series 11. Data from the Health Examination Survey.—Data from direct examination, testing, and measurement of national samples of the civilian, noninstitutional population provide the basis for two types of reports: (1) estimates of the medically defined prevalence of specific diseases in the United States and the distributions of the population with respect to physical, physiological, and psychological characteristics; and (2) analysis of relationships among the various measurements without reference to an explicit finite universe of persons.

Series 12. Data from the Institutional Population Surveys.—Statistics relating to the health characteristics of persons in institutions, and their medical, nursing, and personal care received, based on national samples of establishments providing these services and samples of the residents or patients.

Series 13. Data from the Hospital Discharge Survey.—Statistics relating to discharged patients in short-stay hospitals, based on a sample of patient records in a national sample of hospitals.

Series 14. Data on health resources: manpower and facilities.—Statistics on the numbers, geographic distribution, and characteristics of health resources including physicians, dentists, nurses, other health occupations, hospitals, nursing homes, and outpatient facilities.

Series 20. Data on mortality.—Various statistics on mortality other than as included in regular annual or monthly reports—special analyses by cause of death, age, and other demographic variables, also geographic and time series analyses.

Series 21. Data on natality, marriage, and divorce.—Various statistics on natality, marriage, and divorce other than as included in regular annual or monthly reports—special analyses by demographic variables, also geographic and time series analyses, studies of fertility.

Series 22. Data from the National Natality and Mortality Surveys.—Statistics on characteristics of births and deaths not available from the vital records, based on sample surveys stemming from these records, including such topics as mortality by socioeconomic class, hospital experience in the last year of life, medical care during pregnancy, health insurance coverage, etc.

For a list of titles of reports published in these series, write to:

Office of Information
National Center for Health Statistics
Public Health Service, HSMHA
Rockville, Md. 20852