VITAL and HEALTH STATISTICS

DATA FROM THE NATIONAL HEALTH SURVEY

Age at Menopause

United States - 1960 - 1962

Age at menopause as reported in data from the U.S. Health Examination Survey of adults, 1960-62, with consideration of operative and natural menopause.

Washington, D.C.   October 1966

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

John W. Gardner
Secretary

Public Health Service
William H. Stewart
Surgeon General

NATIONAL CENTER FOR HEALTH STATISTICS

FORREST E. LINDER, PH. D., *Director*

THEODORE D. WOOLSEY, *Deputy Director*

OSWALD K. SAGEN, PH. D., *Assistant Director*

WALT R. SIMMONS, M.A., *Statistical Advisor*

ALICE M. WATERHOUSE, M.D., *Medical Advisor*

JAMES E. KELLY, D.D.S., *Dental Advisor*

LOUIS R. STOLCIS, M.A., *Executive Officer*

DIVISION OF HEALTH EXAMINATION STATISTICS

ARTHUR J. McDOWELL, *Chief*

TAVIA GORDON, *Assistant Chief*

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.

FOREWORD

The Health Examination Survey was designed as a highly stratified multistage probability sampling of the civilian, noninstitutional population of the conterminous United States, ages 18-79 years, and was conducted over the years 1960-62. Detailed descriptions of the sampling plan and procedures have been presented in previous NCHS publications.[1,2] The Survey draws strength from the fact that it is a probability sample of the total target population, and from the fact that the measurement processes which were employed were highly standardized and closely controlled.

The basic function of the Survey is to provide estimates for the U.S. civilian, noninstitutional population of distributions of physical and physiological characteristics, prevalences, and relationships among demographic, socioeconomic, and health-related conditions. Such estimates, structurally unbiased, along with sampling variances appropriate to the design, are being presented in a succession of reports appearing in this publication series. Inferences drawn concerning populations of a broader or narrower scope than the United States must rest on knowledge or evidence outside the Survey itself.

In 1963, the National Center for Health Statistics, recognizing the value of wider exploitation of the data being accumulated by the Health Examination Survey (HES) inaugurated a program which called on competent scientists outside the Center for assistance. Several reports have already appeared in which outside scientists collaborated with the HES staff in the analysis of findings from the first cycle of examinations. This report represents a further step. It is the first in which the HES staff did not participate in the analysis.

On the basis of preliminary discussions between the Division of Health Examination Statistics and Dr. Brian MacMahon of the School of Public Health, Harvard University, the scope and general area of the report were agreed on. The tabulation requests initiated with Dr. MacMahon, and the decisions concerning analytical techniques were made by him and his associate in the School of Public Health, Dr. Jane Worcester. Tabulations and other information were supplied by Brian Devine of the Division of Health Examination Statistics. Liaison for the Center was the responsibility of Tavia Gordon.

In the report some observations are presented as estimates for the U.S. population, but the detailed analysis is performed by treating the sample as a series of individual observations without weighting to yield U.S. estimates.

Tavia Gordon
Division of
Health Examination Statistics

IN THIS REPORT findings are presented on the menopausal status of women participating in Cycle I of the Health Examination Survey. Cycle I consisted of a nationwide probability sample of persons 18-79 years of age selected from the U.S. civilian, noninstitutional population. Some observations are presented as estimates for the U.S. female population; others are presented for the unweighted sample of individual observations.

Frequency of operative menopause and age at natural menopause are examined in relation to race, marital status, parity, family income, geographic region, height, and skinfold measurement.

Between 25 and 30 percent of women 50-64 years of age reported that their menopause had occurred as the result of an operation. The proportion of women in individual years of age reporting that they had had a natural menopause gave a good fit to a logistic curve with 50-percent end point at 49.7 years.

Negro women reported operative menopause more frequently than white, and single women less frequently than married. There is a suggestion that women with small skinfold measurements have natural menopauses slightly earlier than average. There were no other substantial associations with the demographic and physiologic variables examined.

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-----------------   *

CONTENTS

AGE AT MENOPAUSE

Brian MacMahon, M.D., and Jane Worcester, Dr. P. H., *Departments of Epidemiology and Biostatistics, School of Public Health, Harvard University*

INTRODUCTION

One of the procedures in the first cycle of the Health Examination Survey was the completion of a self-administered medical questionnaire. The final item on this questionnaire sought information on menarchial, reproductive, and menopausal history. In this report the results of an analysis of the replies to the questions on menopause are presented. These allow estimates of age at menopause and of frequency of operative menopause in the female population of the United States.

Characteristics of the sample and of the response have been described previously.[1, 2] The sample, selected to represent the civilian, non-institutional population of the United States between 18 and 79 years of age, contained 4,211 females of whom 3,581 (85.0 percent) completed the questionnaire.

MATERIAL

The relevant section of the questionnaire was as follows: Question 74. WOMEN ONLY

    a. Age when periods started _____
    b. Have periods stopped? (not counting pregnancy [Yes] [No])

    IF YES

    c. Age when periods stopped _____
    d. Was this due to an operation? [Yes] [No]

    IF NO

    e. Have they begun to stop? [Yes] [No]
    f. Date of last period _____

The answers to items *b* and *d* provided most of the data for this analysis. Respondents were classified into one of the following categories:

1. *Still menstruating-2,211 women.*—This group consisted of 2,206 women who answered "no" to question *b*, plus 5 women who did not answer *b* but seemed most probably to belong to this category. Of these five, one was pregnant at the time of response, three were seen by their answers to other parts of question 74 to still be menstruating, and one was aged 40 years. Included in this group were 193 women who were still menstruating but reported that their periods had begun to stop.

2. *Menopausal as the result of an operation-473 women.*—This group consisted of 471 women who answered "yes" to both *b* and *d,* and 2 women who did not answer *b* but answered "yes" to *d.*

3. *Naturally menopausal-897 women.*—This group consisted of women who were postmenopausal and who did not answer "yes" to *d.* Some 895 answered "yes" to question *b* and 2 did not answer *b* but were seen from other answers to be post-menopausal. And 872 answered "no" to *d,* and 25 did not answer *d.*

There is no way of estimating the validity of answers to these questions, but the questions were simple, the questionnaires were completed in a medical environment in privacy, and the motivation of the respondents, as judged by response rate, was high. Perhaps the most difficult thought process was required of pregnant women an-

swering item *b*, since they were asked to respond as though they were still menstruating when, in fact, they were not. It is encouraging that 187 out of 188 pregnant women answered correctly. The distribution of answers was generally consistent with clinical experience, with the exception of nine women under age 35 who reported having had a natural menopause and one 79-year-old woman who reported that she was still menstruating. These instances may be attributable to respondent error, to the existence of pathological processes, or both. They are too few to affect the descriptive statistics to be reported.

An opportunity for checking for internal consistency in the questionnaire exists for women reporting operative menopause. Item 5 of the initial receptionist's interview (quite distant from the menopause question) requested information on operative procedures and specifically on a history of removal of the uterus. The original questionnaires were examined for 52 women reporting operative menopause—all those who were under 35 years of age at the time of response and a systematic sample of those over 35 years of age. Verification of operative menopause was found in question 5 for 25 of the 26 women under 35 years of age, and for 24 of the 26 women over that age. Two of the unverified cases had no relevant operations recorded in question 5; the third listed only a cesarean section.

Question 5 was also checked for the nine women under 35 years of age who reported natural menopause. None had relevant operations listed.

The distributions of the three groups of women by age at the time of response are shown in table 1. Table 2 gives estimates of the total U.S. female population derived by extending the sample with appropriate weights. As described elsewhere,[1] sampling fractions varied between population subgroups and relative weights varying between 1 and 10 are carried by individual members of the sample. However, the statistical values to be presented here are virtually identical whether computed from the sample itself or from the population estimates, and unless otherwise specified, computations are based directly on the sample.

Some use is also made of the answers to question 74c—reported age at which menopause occurred—at least for patients reporting operative menopause. Marked terminal digit clustering
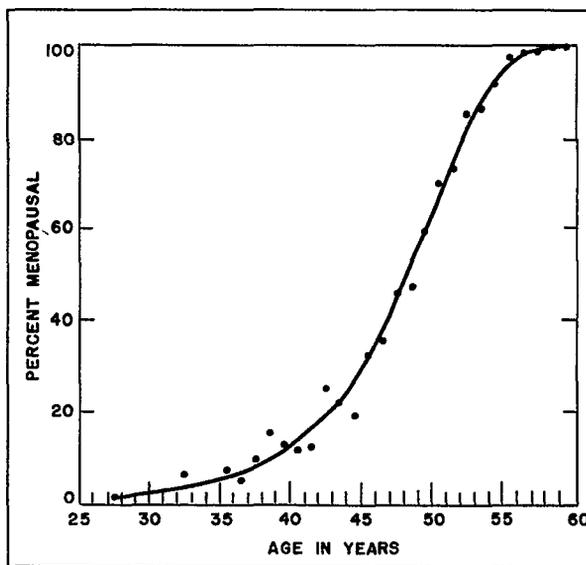

Figure I. Percent of women reporting having had a menopause, by age at time of response.

suggests that this item was not accurately recalled for patients whose menopause was natural (table 3). Terminal digit clustering was not evident for patients whose menopause was operative.

Similarly, some use is made of item 74e— Have your periods begun to stop?—although there was apparently some lack of understanding of this question, at least among the pregnant women—15 out of 188 pregnant women reported that their periods had begun to stop. The validity of the response to this item among the nonpregnant women is not known. The distribution of 178 nonpregnant women who stated that their periods had begun to stop is shown in table 1.

AGE AT MENOPAUSE

Table 1 indicates the percentage of women at each age who indicated that their periods had stopped, whether or not as the result of an operation. The change from one age group to another reflects predominantly the increase in the proportion of menopausal women with increasing age. However, the progression is not consistently upward since the observations were taken on independent samples at each age, and not from a

2

longitudinal study of a single cohort. No simple statistical function allows accurate summarization of the shape of this curve. In particular, an attempt to fit logistic curves to the trend resulted in curves with highly significant deviations from fit. Figure 1 shows a hand-smoothed curve drawn from the percentages in table 1. As judged by this curve, approximately 10 percent of the U.S. female population is menopausal by age 38, 20 percent by age 43, 50 percent by age 49, 90 percent by age 54, and 100 percent by age 58.

It is perhaps not surprising that this curve does not fit any simple statistical function, since it is a compound of the age trend for natural menopause (which might be expected to show some natural symmetry) with that for frequency of operative menopause by age (for which there is no reason to expect symmetry). These two components will now be considered separately.

OPERATIVE MENOPAUSE

Frequency

The percentage of women who had had an operative menopause increased with age to between 26 and 28 percent of all women in the 50-64-year age groups (table 4). For women over 65 years the percentage was considerably lower (17 percent) and for those 70 years and over it was only 13 percent (table 1). This decline with age after age 65 may be the result of diminishing recall, or it may be a cohort phenomenon. Thus, if operations that result in menopause have been increasing in frequency over time the older the woman at the time of this Survey the lower would be the frequency of such operations in the time period during which she passed through the pre-menopausal age groups. Perhaps both recall and cohort changes are involved.

Whatever the explanation of the trend in women 65 years of age and older, it is evident that operations are frequent contributors to the menopause of women who are now menopausal, and have in the past 15 years, entered the menopausal ages. Between 25 and 30 percent of U.S. women reaching the end of the menopausal age period have had their menopause as the result of an operation.

Demographic Characteristics

Operative menopause was reported more frequently by Negro than by white respondents (table 4). The higher rate is evident in all age groups with the exception of women aged 18-29 years. Overall, 16.0 percent of Negro women had had operative menopauses, by comparison with 13.0 percent of white women. If the rate for Negro women is adjusted to the age distribution of the white population, it is increased to 17.4 percent—approximately one-third again as high as that of white women.

Associations with marital status, parity, family income, and geographic region among the white population are examined in table 5. Single white women reported only 60 percent of the number of operative menopauses expected on the basis of age-specific rates for the all white women. This deficiency is on the border of statistical significance in spite of the relatively few single women in the sample. No significant associations are evident for the other variables which were examined. The demographic terms are defined in Appendix II.

Age Incidence

An estimate of age at which operative menopause occurred can be derived from the respondent's replies to question 74c. The computation is shown in table A. The data are restricted to women less than 65 years of age because of the decline in reported prevalence of operative menopause in older women. The method assumes that there are no important cohort changes among women between 18 and 64 years of age. The number of cases of operative menopause in a given age group is the total number of women who reported an operative menopause in that age interval, regardless of their age at the time of response (except that all were between 18 and 64 years). The population at risk in that age group is assumed to be all the women in the sample less than 65 years of age who have passed through that age interval, plus half of those who were in the age interval at the time of the Survey.

Incidence of operative menopause exceeds 5 percent (1 percent per annum) in each 5-year-age period between 35 and 49, reaching a peak in the

Table A. Incidence of operative menopause, by age as derived from respondents' statements as to when menopause occurred: Health Examination Survey, 1960-62

Age when menopause occurred	Among all women				Among women still menstruating		
	Population at risk (a)[1]	Operative menopause			Population at risk (b)[1]	Operative menopause	
		Number	Percent	Cumulative percent[2]		Number	Percent
Under 25 years----------	2,944	16	0.5	0.5	2,944	16	0.5
25-29 years-------------	2,485	39	1.6	2.1	2,473	39	1.6
30-34 years-------------	2,112	77	3.6	5.6	2,006	77	3.8
35-39 years-------------	1,721	87	5.1	10.4	1,566	87	5.6
40-44 years-------------	1,330	88	6.6	16.3	1,157	88	7.6
45-49 years-------------	950	69	7.3	22.4	665	69	10.4
50-54 years-------------	597	19	3.2	24.9	179	19	10.6
55-59 years-------------	320	1	0.3	25.1	13	1	7.7
60-64 years-------------	99	-	0.0	25.1	-	-	-

[1]Populations at risk are as follows:
    (a) the number of respondents in all age groups higher than the particular age group considered, plus half the respondents in that age group at the time of response.
    (b) the number in (a) reduced by the proportion estimated from figure 1 to have had a menopause by the beginning of the age interval.

[2]In accumulating, the incidence for a particular age group is applied to the proportion who had not had an operative menopause prior to the beginning of the age interval.

NOTE: The table is based on sample members under 65 years of age. Age at operation was not stated by 14 of the 410 women reporting operative menopause.

45-49-year age group. Table A also shows estimates of incidence of operative menopause using as a denominator only those women who were still menstruating at the beginning of the age interval. Between the ages of 45 and 54, among menstruating women, operative menopause occurred at the rate of 2 percent per annum.

NATURAL MENOPAUSE

To estimate age at natural menopause, women reporting operative menopause were excluded. In table 1, the number of women at each age who reported that they had had a natural menopause is expressed as a percentage of the number who had not had an operative menopause by that age. For further analysis, the nine women who were less than 35 years of age and reported having had a natural menopause were excluded as being either in error or abnormal, and attention was restricted to the age range 35-59 years. It might be well to reemphasize that here concern centers upon the ages of the women at the time of response, not on the age at which the menopause was reported to have occurred.

A logistic curve was found to give excellent fit to the trend line for the percentages in individual years of age. The line, illustrated in figure 2, gives a 50-percent point of 49.76 years, and
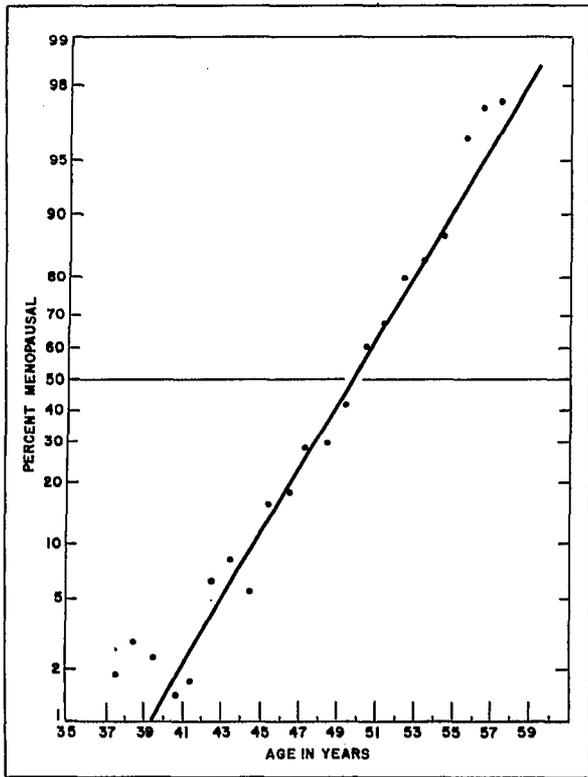
Figure 2. Percent of women reporting having had a natural menopause, by age at time of response. (Women who reported having had an operative menopause are excluded from the denominators.)

(The ordinal scale is logistic. The straight line is the line with 50 percent-point 49.76 years and slope 0.433. The points are the actual observations.)

Table B. Observed and computed percentages of women having had natural menopause before specified ages, among women not having had operative menopause: Health Examination Survey, 1960-62

Age[1]	Percentage menopausal	
	Observed[2]	Computed[3]
40 years--------	1.4	1.8
45 years--------	15.2	13.6
46 years--------	18.3	19.5
47 years--------	28.1	27.3
48 years--------	29.5	36.6
49 years--------	41.3	47.1
50 years--------	59.3	57.9
51 years--------	67.9	68.0
52 years--------	78.9	76.6
53 years--------	81.6	83.5
54 years--------	87.5	88.6
55 years--------	96.2	92.3
58 years--------	100.0	97.8

[1]Age at last birthday. Add 0.5 years to derive actual ages.
[2]From table 1, natural menopause as percent of those not having had operation.
[3]Computed from a fitted logistic curve with 50-percent point 49.76 years and slope 0.433.

slope 0.433. X^2 for goodness of fit gives $X^2 = 14.7$, n = 22, p > 0.8. Computed percentages menopausal at specific ages, as derived from this curve, are shown in table B.

Virtually identical values, as judged by standard errors computed from the sample, for the 50-percent point (49.73 years) and slope (0.455) are derived by fitting a curve to the population estimates rather than to the sample.

A second estimate of the 50-percent point for age at natural menopause can be derived from the trend with age in the proportions of women who were still menstruating but who indicated that their periods had begun to stop (table 1). These proportions for individual ages were again found to give good fit to a logistic curve. In this situation the value obtained is an estimate of the 50-percent point for women currently undergoing the menopausal process, in contrast to the earlier estimate which was the age by which 50 percent of the women recognized that their menopause had occurred. This second estimate should, of course, be a little lower than the first.

Using individual ages 35-59 years, a curve with 50-percent point 49.60 and slope 0.277 was derived. There were six women aged 35 and three aged 36 years who stated that their periods had begun to stop. If these are considered as likely to have been in error or the result of pathology, and the data are restricted to ages 38-59, a curve with center 49.37 and slope 0.306 is obtained. The

agreement with the estimate based on the percentages menopausal is close.

Demographic Characteristics

It was noted that, for the total sample, use of 5-year-age groups gave virtually the same logistic curve as that derived by using individual years of age. Thus, using the five 5-year-age groups between 35 and 59, a curve with 50-percent point 49.92 years and slope 0.416 was derived. X^2 for goodness of fit gave $X^2=7.10, n=3, p>0.05$. Therefore in comparing subgroups within the sample, in many of which numbers are quite small, curves were fitted using percentages menopausal in 5-year-age groups.

Results for subcategories by race, marital status, family income, and region are shown in table 6. In all categories there is good fit to the logistic curve. There is only one formally significant difference between subcategories—the slope of the curves for Negro women was less than that for white women. The 50-percent menopausal age for Negro women was 0.7 years lower than that for white women, but the difference between the means is not significant.

It is noteworthy that, among the white groups, women with family incomes of less than $2,000, and rural residents, also had low menopausal ages, rather similar to that of the Negro group. Again, however, neither of these central values differs significantly from that of the total white group.

Personal Characteristics

Table 7 gives similar data for white women characterized by parity, height, skinfold thickness, and age at menarche. Two categories—women having five or more children, and women 64.3 inches or more in height—show significant deviations from fit, and the constants for these two categories cannot be reliably interpreted. Nevertheless, there is no indication of association of age at menopause with either height or parity up to four children. Neither is there any indication of a relationship between age at menarche and age at menopause.

In the groups categorized by skinfold there is a suggestion that lean women may have slightly earlier natural menopauses. The trend is consistent between the three categories, and the 50-percent menopausal age for the leannest category differs significantly from those of the other two categories.

DISCUSSION

Age at natural menopause has been a popular subject of statistical medical inquiry for at least a century. Nevertheless, because of differences in methods of eliciting data and of analysis, there are few observations with which the present results can be satisfactorily compared. Indeed, in all but a few studies, the methodologic problems are such that it is doubtful whether the reported results should be considered reliable indicators of the state of affairs in the related population.

Nearly all previous studies of this problem have been based on hospital patients. The effect of this on estimates of menopausal age are problematic. The fact that most of the demographic and physiologic variables examined in this study appear not to be associated with age of natural menopause suggests that bias introduced as the result of the social and cultural characteristics of particular hospital populations may not be important. However, the possibility of association between actual or incipient disease and age of menopause cannot be ignored, and indeed has been suggested for diseases as varied as carcinoma of the body of the uterus[3-5] and of the breast,[6] fibroids,[6] diabetes,[4, 5] cardiovascular disease,[7] and prolapse.[6, 7] The problem is not solved by exclusion of categories of disease for which such associations are suspected intuitively or on the basis of previous studies. Whether or not there are differences between premenopausal and postmenopausal women in responses to specific symptoms that might lead to hospitalization is also a relevant question on which no data exist.

Only one major study has been based on healthy women. This is the study undertaken by the Council of the British Medical Women's Federation and reported in 1933.[8] The method of selection of respondents in this study is not described, but it is asserted that they represented normal women in a variety of social statuses, geographic regions, and conditions of life. Many were in public assistance institutions.

The problem of sample selection is, of course, commonly encountered in the review of studies of

human "normality," and is by no means peculiar to studies of age at menopause. More specific to the present subject are problems resulting from the methods by which data on age at menopause have been elicited from the subjects of previous investigations. With a single exception, the method has been to ask postmenopausal women the age at which their menopauses occurred, and to use the mean of these ages as the estimate of mean age at menopause. That postmenopausal women cannot accurately remember the age at which their menopause occurred is indicated quite clearly by the clustering of responses at ages ending in 5 and 0. This is seen in the present data (table 3), but it is also evident in every previous study in which the data have been reported in individual years. In the study by the Medical Women's Federation already referred to[8] the numbers of women reporting menopauses at specified ages were:

Age	Number
39, 40, 41	14, 92, 35
44, 45, 46	28, 96, 67
49, 50, 51	79, 167, 42

There is a further problem in this general method of inquiry. This is that women with early menopauses have a higher probability of being included than do women with late menopauses. Thus, among women aged, say, 50 years, those who are postmenopausal will be included, but those who are still menstruating will be excluded since their date of menopause is not known. The effect of this is to produce an underestimate of the actual mean age of menopause, particularly if the respondent group contains any large proportion of women in the 45-54 age period. The effect is exaggerated, when, as in some studies, women have been required to be a certain number of years postmenopausal in order to be included.

To reduce the problem of recall of the specific age at which menopause occurred, some investigators have included only women who are within a certain period (e.g., 5 years) of their menopause. This also results in an underestimate of the age at menopause, since the female population declines substantially between 40 and 60 years of age, and the number "at risk" of being ascertained while within a short interval of the

Table C. Mean age at which natural menopause occurred, as reported by women postmenopausal at the time of Survey: Health Examination Survey, 1960-62

Age at survey	Number of women	Mean age at menopause
Total-----	815	47.3
35-44 years-----	16	36.3
45-49 years-----	72	43.7
50-54 years-----	162	47.1
55-59 years-----	171	48.3
60-64 years-----	136	48.3
65-69 years-----	119	47.9
70-74 years-----	93	48.0
75-79 years-----	46	48.2

NOTE: Excludes 74 women who did not state the age at which menopause occurred, and 9 women under 35 years of age at the time of the Survey.

menopause declines as age at menopause increases.

The overall effect of these methodologic problems on the comparison of values of mean age at natural menopause from different studies is difficult to estimate. However, in addition to the theoretical reasons for supposing that most of the errors would lead to underestimation, there are other grounds for believing that most previous estimates of mean menopausal age are too low.

First, in one other study a method of analysis similar to that employed in this report has been used. This is the recent study of Frommer[9] based on the records of 443 patients between 40 and 55 years of age at the Royal Free Hospital, London. By probit analysis of the proportions of women who were postmenopausal at successive individual years of age a median age at menopause of 50.1 years was derived. This figure is 2 to 3 years higher than previous estimates for British women based on the usual anamnestic method.[3, 4, 8]

Second, it can be shown in the U.S. sample that use of the anamnestic material leads to understatement of the actual mean age at menopause. Table C shows mean ages at natural menopause

as reported by women who were postmenopausal at the time of response. For the total sample a mean of 47.3 years is derived; even if the data are restricted to women over 55 years at the time of response a value almost 2 years lower than the 50-percent point obtained from the logistic curve is obtained. Perhaps women reported their estimate of their age at last birthday, rather than their actual age, so that 0.5 years should be added to the mean reported ages to make them comparable to the 50-percent point on the logistic curve. This, however, accounts for only a small part of the difference.

Were it proper to assume that studies based on anamnestic material consistently underestimate menopausal age, it might be possible to make comparisons of results of different investigations after allowing for such factors. However, one cannot assume that the error introduced by terminal digit rounding is the same in all populations and, in addition, the effect of the other types of errors is highly dependent on the age distribution of the group surveyed—a statistic that rarely appears in the published reports.

Perhaps in these circumstances, the surprising thing about estimates of mean menopausal age reported in the last 50 years is their consistency. From populations as diverse as those listed below, estimates within a range of less than 3 years have been reported:

Place and year	Mean menopausal age in years
Israel (1963)[13]	49.5
Finland (1961)[12]	49.8
Basel, Switzerland (1961)[12]	49.8
South Africa—Zulu (1960)[11]	49.2
South Africa—white (1960)[5]	48.7
Denmark (1942)[10]	48.0
Great Britain (1933)[8]	47.5
Pittsburgh, Pa. (1918)[7]	47.1

This is a range well within that which could be explained by the methodologic problems outlined above.

Attention should be drawn to a methodologic difference between the present analysis and that of Frommer.[9] To meet his definition of postmenopausal, Frommer required an interval of at least 9 months free of menstruation. This interval was subtracted from the respondent's current age and the lower age used in the computations. Thus, the median age at menopause in Frommer's data is the median age at which the last menstrual period occurred, whereas in the U.S. sample it is the age at which 50 percent of the women recognized that their periods had ceased—an event which is necessarily a few months later than their last period. Taking this interval as 9 months, as Frommer did, the 50-percent point in the U.S. sample would be 49.0 years, a year earlier than that of Frommer's series.

There have been relatively few analyses of the effects of demographic and physiologic variables on age at natural menopause. Sanes[7] found an increase in age at menopause with increasing number of children, and in two studies[5, 10] it has been reported that nulliparae tended to have earlier menopause than parous women. The last observation is not inconsistent with the present findings (table 7), but in the present data the effect is small and statistically not significant, uniparous women share the low mean of the nulliparae, and there is no consistent trend with increasing numbers of children borne. Lack of effect of fertility was also reported in the British Medical Women's Federation study.[8] There is general agreement on the absence of any difference in menopausal age between married and single women, [5,8] which also argues against there being any important influence of parity. No difference between urban and rural residents or in relation to economic status was reported for Danish women.[10] Recent studies[5, 8] have not borne out earlier suggestions[7] that age at menarche and age at menopause are associated.

Studies of frequency of operative menopause have again been restricted to hospital populations, usually in the course of assembling control groups for epidemiologic studies of diseases, such as cancer of the breast, the incidence of which is suspected of being influenced by castration. The values reported in three such studies of U.S. hospital populations are not inconsistent with the estimates derived from the HES sample.[14-16] The observation of Lilienfeld[14] that artificial menopause occurs more frequently in married than in single women is confirmed in the present analysis.

That between 25 and 30 percent of U.S. women experience menopause as the result of an operation is a striking statistic. Hysterectomy is certainly the most common form of procedure involved, and the frequency observed in this sample is sufficiently high to have a substantial effect on the population incidence of diseases of the uterus and other organs commonly removed, quite apart from any hormonally determined or other indirect influences on diseases such as cancer of the breast. If, as seems likely, the incidence of operative menopause is increasing, this factor must be considered in the interpretation of trends in incidence of uterine malignancies and other diseases.

REFERENCES

[1]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.

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

[3]Way, S.: The aetiology of carcinoma of the body of the uterus. *J.Obst.&Gynaec.Brit.Emp.* 61:46, Feb. 1954.

[4]Awon, M. P.: Association between climateric haemorrhage, carcinoma of the body of the uterus and diabetes mellitus. *J.Obst.&Gynaec.Brit.Emp.* 64:50, Feb. 1957.

[5]Benjamin, F.: The age of the menarche and of the menopause in white South African women and certain factors influencing these times. *South African M. J.* 34:316, Apr. 1960.

[6]Hauser, von G. A.. Müller, T., Valaer, M., Erb, H., Obiri, J. A., Remen, U. and Vanäänen, P.: Der Zusammenhang zwischen gynäkologischen Krankheiten und dem Menopausealter. *Gynaecologia* 151:270, Oct. 1961.

[7]Sanes, K. I. The age of menopause. A statistical study. *Trans.Sect.Obstet.Gynec.Abd.Surg.Amer.Med.Ass.* 1918:358, June 1918.

[8]Council of the Medical Women's Federation: An investigation of the menopause in one thousand women. *Lancet* 1:106, Jan. 1933.

[9]Frommer, D. J.: Changing age of the menopause. *Brit. M.J.* 2:349, Aug. 1964.

[10]Clausager-Madsen, L. and Ytting, H.: Undersøgelser over menarchens og menopausens indtraeden i byog landbefolkningen. *Nord.med.* 16:3,677, Dec. 1942.

[11]Abramson, J. H., Gampel, B., Slome, C. and Scotch, N.: Age at menopause of urban Zulu women. *Science* 132:356, Aug. 1960.

[12]Hauser, von G. A., Obiri, J. A., Valaer, M., Erb, H., Müller, T., Remen, U. and Vanäänen, P.: Der Einfluss des Menarchealters auf das Menopausealter. *Gynaecologia* 152:279, Oct. 1961.

[13]Hauser, von G. A., Remen, U., Valaer, M., Erb, H., Müller, T. and Obiri, J.: Menarche und Menopause in Israel. *Gynaecologia* 155:39, Jan. 1963.

[14]Lilienfeld, A. M.: Relationship of cancer of the female breast to artificial menopause and marital status. *Cancer* 9:927, Sept.-Oct. 1956.

[15]MacMahon, B. and Feinleib, M. Breast cancer in relation to nursing and menopausal history. *J.Nat.Cancer Inst.* 24:733, Mar. 1960.

[16]Hirayama, T. and Wynder, E. L.: A study of the epidemiology of cancer of the breast. II. The influence of hysterectomy. *Cancer* 15(1):28-38, Jan.-Feb. 1962.

———— o o o ————

DETAILED TABLES

Table 1. Distribution of women, by age at time of response and menopausal status: Health Examination Survey, 1960-62

Age at time of response	Number of women					Percentage of women having had:			Natural as percent of those having had operation	Percent periods begun to stop
	Total	Post menopausal		Still menstruating		Operative meno-pause	Nat-ural meno-pause	Any meno-pause		
		Oper-ative meno-pause	Nat-ural meno-pause	Total	Periods begun to stop					
	(a)	(b)	(c)	(d)	(e)[1]	$\frac{(b)}{(a)}$	$\frac{(c)}{(a)}$	$\frac{(b)+(c)}{(a)}$	$\frac{(c)}{(a)-(b)}$	$\frac{(e)}{(d)}$
Total-----	3,581	473	897	2,211	178	13.2	25.0	38.3	28.9	8.1
18-24 years-----	534	1	2	531	-	0.2	0.4	0.6	0.4	-
25-29 years-----	383	4	3	376	3	1.0	0.8	1.8	0.8	0.8
30-34 years-----	363	21	4	338	6	5.8	1.1	6.9	1.2	1.8
35 years--------	89	7	-	82	6	7.9	-	7.9	0.0	7.3
36 years--------	87	5	-	82	3	5.7	-	5.7	0.0	3.7
37 years--------	61	5	1	55	-	8.2	1.6	9.8	1.8	-
38 years--------	83	11	2	70	2	13.3	2.4	15.7	2.8	2.9
39 years--------	99	11	2	86	4	11.1	2.0	13.1	2.3	4.7
40 years--------	78	8	1	69	6	10.3	1.3	11.7	1.4	8.7
41 years--------	66	7	1	58	5	10.6	1.5	12.1	1.7	8.6
42 years--------	80	16	4	60	7	20.0	5.0	25.0	6.3	11.7
43 years--------	74	11	5	58	8	14.9	6.8	21.6	7.9	13.8
44 years--------	67	10	3	54	11	14.9	4.5	19.4	5.3	20.4
45 years--------	99	20	12	67	11	20.2	12.1	32.3	15.2	16.4
46 years--------	76	16	11	49	13	21.1	14.5	35.5	18.3	26.5
47 years--------	75	18	16	41	15	24.0	21.3	45.3	28.1	36.6
48 years--------	80	19	18	43	19	23.8	22.5	46.3	29.5	44.2
49 years--------	66	20	19	27	16	30.3	28.8	59.1	41.3	59.3
50 years--------	72	18	32	22	13	25.0	44.4	69.4	59.3	59.1
51 years--------	66	10	38	18	11	15.2	57.6	72.7	67.9	61.1
52 years--------	54	16	30	8	5	29.6	55.6	85.2	78.9	62.5
53 years--------	67	18	40	9	9	26.9	59.7	86.6	81.6	100.0
54 years--------	50	18	28	4	3	36.0	56.0	92.0	87.5	75.0
55 years--------	45	19	25	1	-	42.2	55.6	97.8	96.2	-
56 years--------	50	13	36	1	1	26.0	72.0	98.0	97.3	100.0
57 years--------	54	13	40	1	1	24.1	74.1	98.1	97.6	100.0
58 years--------	46	13	33	-	-	28.3	71.7	100.0	100.0	-
59 years--------	50	7	43	-	-	14.0	86.0	100.0	100.0	-
60-64 years-----	198	55	143	-	-	27.8	72.2	100.0	100.0	-
65-69 years-----	173	38	135	-	-	22.0	78.0	100.0	100.0	-
70-74 years-----	126	17	109	-	-	13.5	86.5	100.0	100.0	-
75-79 years-----	70	8	61	1	-	11.4	87.1	98.6	98.4	-

[1]Fifteen pregnant women who reported that their periods had begun to stop are excluded from this column.

Table 2. Number of women, by age at time of response and menopausal status: United States, 1960-62

Age at time of response	Menopausal status			
	Total	Operative menopause	Natural menopause	Still menstruating
	Number of women in thousands			
Total, 18-79 years---------------------------------	58,343	8,006	16,198	34,139
18-24 years--	8,430	17	46	8,366
25-29 years--	5,755	68	62	5,624
30-34 years--	5,536	354	54	5,128
35 years---	1,441	93	-	1,349
36 years---	1,367	70	-	1,296
37 years---	1,014	94	10	909
38 years---	1,267	153	28	1,086
39 years---	1,495	172	35	1,288
40 years---	1,225	141	18	1,065
41 years---	1,014	84	11	919
42 years---	1,207	258	46	902
43 years---	1,181	179	82	920
44 years---	1,115	153	43	918
45 years---	1,439	244	164	1,031
46 years---	1,129	224	125	779
47 years---	1,077	280	222	575
48 years---	1,172	262	281	629
49 years---	1,033	330	302	400
50 years---	1,107	256	508	342
51 years---	989	137	609	242
52 years---	833	236	485	112
53 years---	1,013	300	587	127
54 years---	751	277	417	56
55 years---	746	311	427	8
56 years---	951	240	698	13
57 years---	1,036	216	782	38
58 years---	883	257	626	-
59 years---	879	128	751	-
60-64 years--	3,626	1,002	2,624	-
65-69 years--	3,557	832	2,724	-
70-74 years--	2,635	415	2,221	-
75-79 years--	1,443	221	1,207	14

NOTE: Unlike the other tables in this report, this table gives estimates for the U.S. population, not counts of examined women.

Table 3. Number of women reporting that their periods had stopped, by type of menopause and reported age when periods stopped: Health Examination Survey, 1960-62

Terminal digit of age	Natural menopause				Operative menopause			
	20-29 years	30-39 years	40-49 years	50-59 years	20-29 years	30-39 years	40-49 years	50-59 years
Total---------------------------	9	49	430	327	57	180	184	28
0-------------------------------------	1	2	30	126	2	14	25	10
1-------------------------------------	2	2	12	41	1	12	17	7
2-------------------------------------	1	4	33	68	2	18	25	2
3-------------------------------------	-	4	35	30	6	22	21	6
4-------------------------------------	1	2	27	21	4	19	15	2
5-------------------------------------	-	4	88	27	3	25	18	-
6-------------------------------------	1	5	32	6	6	20	14	1
7-------------------------------------	2	5	54	3	6	12	12	-
8-------------------------------------	1	13	66	2	12	26	18	-
9-------------------------------------	-	8	53	3	15	12	19	-

NOTE: Age at menopause was not stated by 74 women who reported natural menopause and 21 who reported operative menopause. Operative menopause at ages 14, 15, and 18 years, respectively, was reported by three women. Natural menopause at 18 years was reported by three women and at 60 years by five.

Table 4. Prevalence of having had operative menopause, by age at time of response and race: Health Examination Survey, 1960-62

Age at time of response	Number in sample			Percent having had operative menopause		
	Total	White	Negro	Total	White	Negro
Total------------------------------	3,581	3,050	469	13.2	13.0	16.0
18-29 years------------------------------	917	757	132	0.5	0.7	0.0
30-34 years------------------------------	363	304	52	5.8	5.6	7.7
35-39 years------------------------------	419	348	65	9.3	8.6	12.3
40-44 years------------------------------	365	322	36	14.2	13.0	25.0
45-49 years------------------------------	396	342	51	23.5	22.8	29.4
50-54 years------------------------------	309	259	47	25.9	25.1	29.8
55-59 years------------------------------	245	221	23	26.5	26.2	30.4
60-64 years------------------------------	198	171	24	27.8	26.3	41.7
65 years and over-----------------------	369	326	39	17.1	16.9	20.5

Table 5. Cases of operative menopause observed and expected, by race, marital status, parity, family income, and geographic region: Health Examination Survey, 1960-62

| Demographic variable | Number of women | Operative menopause | | $\frac{\text{Observed}}{\text{Expected}}$ X 100 |
		Expected[1]	Observed	
Race				
Negro---	469	58.5	75	128
White---	3,050	409.1	395	97
Marital status				
Never married----------------------------------	312	20.8	12	58
Ever married------------------------------------	2,738	374.2	383	102
Parity (number of children ever born)				
0---	358	51.1	57	112
1---	475	62.0	60	97
2---	679	87.5	97	111
3-4---	816	107.4	120	112
5 and over--------------------------------------	410	66.2	49	74
Family income				
Under $4,000------------------------------------	977	138.7	149	107
$4,000-$6,999-----------------------------------	934	104.6	94	90
$7,000 and over---------------------------------	850	108.4	108	100
Unknown---	289	43.4	44	101
Geographic region				
Northeast---------------------------------------	1,038	130.7	126	96
South---	968	120.7	129	107
West--	1,044	143.6	140	97

[1]Expected numbers are computed by applying age-specific rates for the whole sample (or for all white women, in the case of the lower four blocks) to the age distribution of the specific category, in the age groups shown in table 4.

NOTE: With the exception of the first breakdown, the data are restricted to white women. The data on parity are restricted to women ever married.

Table 6. Constants of logistic curves fitted to the percentages of women reporting having had a natural menopause, by race, marital status, family income, geographic region, and population-size group: Health Examination Survey, 1960-62

Demographic variable	Number of women	50-percent point	Slope	x^{2} [1]
Race				
Negro	169	49.31	0.280	4.13
White	1,219	50.02	0.451	4.92
Marital status				
Never married	61	49.91	0.428	0.81
Ever married	1,158	50.03	0.452	5.04
Family income				
Under $2,000	101	49.30	0.462	0.88
$2,000-$3,999	219	49.49	0.376	7.72
$4,000-$6,999	376	50.60	0.524	1.78
$7,000-$9,999	210	50.35	0.389	1.84
$10,000 and over	194	50.11	0.480	1.03
Unknown	119	49.54	0.522	1.72
Geographic region				
Northeast	431	50.09	0.456	3.26
South	357	50.05	0.484	3.93
West	431	49.97	0.422	0.44
Population-size group				
Giant metropolitan areas	291	50.00	0.480	6.68
Other very large metropolitan areas	195	49.97	0.406	4.13
Other standard metropolitan statistical areas	278	50.03	0.622	2.22
Other urban areas	220	50.84	0.333	1.81
Rural areas	235	49.43	0.470	3.70

[1]x^{2} is the x^{2} for goodness of fit to the computed curve. In all cases, n = 3. p = 0.05 for x^{2} = 7.8.

NOTES: The curves are fitted to the percentages of women in each of the 5-year-age groups between 35 and 59 who reported that they had had a natural menopause. Women who reported having had an operative menopause are excluded from the denominators.

With the exception of the first breakdown, the data are restricted to white women.

Table 7. Constants of logistic curves fitted to the percentages of white women reporting having had a natural menopause, by parity, height, skinfold thickness, and age at menarche: Health Examination Survey, 1960-62

Variable	Number of women	50-percent point	Slope	x^2 [1]
Parity (number of children ever born)				
0	127	49.54	0.473	1.28
1	169	49.54	0.473	2.11
2	296	50.84	0.435	4.86
3	239	50.71	0.463	2.93
4	128	50.39	0.474	0.75
5 and over	199	48.96	0.416	8.75
Height				
Less than 62.1 inches	400	50.26	0.443	1.65
62.1-64.2 inches	444	49.88	0.519	0.22
64.3 inches and over	375	49.94	0.406	8.57
Skinfold				
Under 3.1 cms	315	48.95	0.520	4.52
3.1-4.5 cms	430	50.01	0.455	4.12
4.6 cms. and over	474	50.55	0.450	2.55
Age at menarche				
Under 12 years	137	51.20	0.434	0.43
12 years	276	49.92	0.524	7.24
13 years	354	50.02	0.450	2.92
14 years	252	49.94	0.482	2.53
15 years and over	188	49.74	0.406	3.87

[1] x^2 is the x^2 for goodness of fit to the computed curve. In all cases, n = 3. p = 0.05 for x^2 = 7.8.

NOTE: The curves are fitted to the percentages of women in each of the 5-year-age groups between 35 and 59 who reported that they had had a natural menopause. Women who reported having had an operative menopause are excluded from the denominators. The subcategories of parity relate only to women ever married.

APPENDIX I

DESCRIPTION OF AGE AT NATURAL MENOPAUSE

Comparisons between subgroups of the sample with respect to age at natural menopause have been made in terms of the constants of the logistic curve. For each year of age between 35 and 59 the percentage menopausal was obtained by dividing the number of women who had had natural menopause by those who had not had an operative menopause by that age. Logistic curves were fitted to these percentages by maximum likelihood. The curves were fitted in the form

$$P_i = \frac{e^{b(x_i - a)}}{1 + e^{b(x_i - a)}}$$

where P_i is the prevalence at age x_i. The constant, b, is a slope constant and the constant, a, is the age at which P is .5. By analogy with bioassay it is called the 50-percent point or the 50-percent age. The constants, b and a, are descriptive and should not be interpreted in terms of the theory underlying the logistic.

If n_i is the denominator at age x_i and c_i the number responding, then the likelihood is (constant) $\Pi P_i^{c_i}(1-P_i)^{n_i - c_i}$. The logarithm of the likelihood is

$$L = \sum c_i \log P_i + \sum (n_i - c_i) \log (1-P_i) + \log (\text{constant})$$

$$\frac{\delta L}{\delta a} = -\sum c_i b + \sum b n_i P_i = 0$$

$$\frac{\delta L}{\delta b} = \sum (x_i - a)(c_i - n_i P_i) = 0$$

These equations are not linear and must be solved by iteration. Trial values, a_0 and b_0, are chosen and Δ_a and Δ_b are obtained from the equations

$$\left. \frac{\delta L}{\delta a} \right|_0 + \left. \frac{\delta^2 L}{\delta a^2} \right|_0 \Delta a + \left. \frac{\delta^2 L}{\delta a \delta b} \right|_0 \Delta b = 0$$

$$\left. \frac{\delta L}{\delta b} \right|_0 + \left. \frac{\delta^2 L}{\delta a \delta b} \right|_0 \Delta a + \left. \frac{\delta^2 L}{\delta b^2} \right|_0 \Delta b = 0$$

in which the derivatives are evaluated for a_0 and b_0. The next set of trial values is $a_1 = a_0 + \Delta_a$, $b_1 = b_0 + \Delta_b$. The derivatives are re-evaluated and the procedure is repeated until Δ_a and Δ_b become sufficiently close to 0.

The second derivatives of L are as follows:

$$\frac{\delta^2 L}{\delta a^2} = -\sum b^2 n_i P_i (1-P_i)$$

$$\frac{\delta^2 L}{\delta b^2} = -\sum n_i (x_i - a)^2 P_i (1-P_i)$$

and $$\frac{\delta^2 L}{\delta a \delta b} = -\sum c_i + \sum n_i P_i + \sum b n_i (x_i - a) P_i (1-P_i)$$

The variances of a and b are obtained in the usual way from the inverse of the matrix of second derivatives which are evaluated in terms of the expected values of P_i obtained at the last iteration. Table I gives variances for a number of estimates presented in the text and detailed tables.

Chi square is computed from $\sum \dfrac{(c_i - n_i P_i)^2}{n_i P_i (1-P_i)}$.

The degrees of freedom are the number of age groups less 2.

The procedure may be criticized on a number of grounds. It can be argued that the cumulated normal curve[9] would provide a better model than the logistic. However, experience has shown that the 50-percent points determined by these two models are virtually indistinguishable and, in the present case, the fits to the logistic as judged by x^2 are tolerable. It can also be argued that the use of any model of this type tacitly assumes that there has been no change in age at menopause over time. The same criticism can be made of most studies of this subject since they have, in general, used cross-sections of the female population.

The manner in which artificial and natural menopause have been separated in the analysis may also be criticized, since increases in the incidence of operative menopause from one age to another will produce an apparent increase in the prevalence of natural meno-

Table I. Standard errors of parameters of the logistic for specified variables: Health Examination Survey, 1960-62

Variable	Age at natural menopause	
	50-percent point	Slope
Race		
Negro	0.79	0.042
White	0.23	0.026
Marital status		
Never married	1.03	0.107
Ever married	0.23	0.027
Family income		
Under $2,000	0.71	0.089
$2,000-$3,999	0.54	0.049
$4,000-$6,999	0.38	0.060
$7,000-$9,999	0.67	0.056
$10,000 and over	0.61	0.077
Unknown	0.66	0.095
Geographic region		
Northeast	0.39	0.046
South	0.39	0.052
West	0.39	0.041
Population-size group		
Giant metropolitan areas	0.46	0.060
Other very large metropolitan areas	0.59	0.057
Other standard metropolitan statistical areas	0.41	0.082
Other urban areas	0.67	0.046
Rural areas	0.48	0.061
Parity		
0	0.64	0.082
1	0.52	0.072
2	0.52	0.053
3	0.57	0.067
4	0.74	0.092
5 or more	0.56	0.057
Height		
Under 62.1 inches	0.38	0.043
62.1-64.2 inches	0.34	0.052
64.3 inches or more	0.49	0.045
Skinfold		
Under 3.1 cms.	0.43	0.066
3.1-4.5 cms.	0.39	0.045
4.6 cms. or more	0.34	0.042
Age at menarche		
Under 12 years	0.70	0.080
12 years	0.44	0.069
13 years	0.42	0.049
14 years	0.48	0.061
15 years or more	0.59	0.057
Total		
Postmenopausal[1]	0.22	0.024
Periods begun to stop[1]	0.49	0.023
	(0.45)	(0.028)

[1]Parenthetical values derived from data for 38-59 years.

NOTE: These are variances for the estimates given in the text and in detailed tables 6 and 7. They do not refer to estimates for the population of the United States.

pause as it has been defined. To avoid this difficulty, it would have been necessary to use a model which treated natural and artificial menopause as competing risks. This would have involved using at each age the total sample as the denominator of the percentages of those having had operative and natural menopauses and then differencing these percentages in order to compute the risks which would be in effect from either factor if the other were not present. Life tables could then have been constructed from these two sets of risks from which conventional mean ages could have been computed. As has been pointed out, the progression in the percentages is not consistently upward and,

consequently, it would have been necessary to smooth them. Inspection of table 1 shows that the differences from one age to age between the percentages of artificial menopause are always small. Hence, the prevalence of natural menopause, as defined, will approximate the results which would have been reached by the life table methods.

For these reasons it should be emphasized that the 50-percent point of the logistic is used only as a device to compare one group with another and it should not be strictly interpreted as a mean age at natural menopause.

————o o o————

APPENDIX II

DEMOGRAPHIC TERMS

Age.—The age recorded for each person is the age at last birthday. Age is recorded in single years.

Race.—Race is recorded as "white," "Negro," or "other." "Other" includes American Indian, Chinese, Japanese, and so forth. Mexican persons are included with "white" unless definitely known to be Indian or of another nonwhite race.

Population size.—The five classes comprising this characteristic were derived from the design of the sample, which accomplished a stratification of the primary sampling units by population size in each of three broad geographic locations. Because the survey was started in 1960, the primary sampling units within each of the five population-size classes were necessarily based on populations and definitions of the 1950 census. The name of each selected primary sampling unit within each population-size class and geographic location, along with other selected sample data, is presented in an earlier report. [2]

The definitions for each of the five population-size classes are as follows:

Giant metropolitan areas.—This class includes primary sampling units defined in the census as standard metropolitan statistical areas (SMSA's) and having a population of 3,000,000 persons or more.

Other very large metropolitan areas.—Included in this class are standard metropolitan statistical areas with a population of 500,000 to 3,000,000 as defined by the 1950 census.

Other standard metropolitan statistical areas.— This class includes other SMSA's.

Other urban areas.—This includes primary sampling units which are highly urban in composition but are not defined as SMSA's.

Rural areas.—This includes primary sampling units which are primarily rural in composition according to census definitions.

Region.—For the purpose of classifying the population by geographic area, the United States was divided into three major regions. This division was especially

made for the design of the HES sample. The regions and the States included are as follows:

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

Income of family or unrelated individuals.—Each member of a family is classified according to the total income of the family of which he is a member. Within the household all persons related to each other by blood, marriage, or adoption constitute a family. Unrelated individuals are classified according to their own income.

The income recorded is the total of all income received by members of the family in the 12-month period preceding the week of interview. Income from all sources is included, e.g., wages, salaries, rents from properties, pensions, and help from relatives.

Marital status.—The categories of marital status are *married, widowed, divorced, separated,* and *never married.* Persons with common-law marriages are considered to be married. *Separated* refers to married persons who have a legal separation, those living apart with intentions of obtaining a divorce, and other persons permanently or temporarily estranged from their spouse because of marital discord.

———— o o o ————

OUTLINE OF REPORT SERIES FOR VITAL AND HEALTH STATISTICS

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.

Reports number 1-4

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.

Reports number 1-18

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.

Reports number 1-4

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.

Reports number 1-5

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.

Reports number 1-32

Series 11. Data From the Health Examination Survey.—Statistics based on the direct examination, testing, and measurement of national samples of the population, including the medically defined prevalence of specific diseases, and distributions of the population with respect to various physical, physiological, and psychological measurements.

Reports number 1-19

Series 12. Data From the Health Records Survey.—Statistics from records of hospital discharges and statistics relating to the health characteristics of persons in institutions, and on hospital, medical, nursing, and personal care received, based on national samples of establishments providing these services and samples of the residents or patients.

Reports number 1-5

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

Reports number 1-3

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

Reports number 1-9

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, medical experience in the last year of life, characteristics of pregnancy, etc.

Reports number 1-3

For a list of titles of reports published in these series, write to: National Center for Health Statistics
U.S. Public Health Service
Washington, D.C. 20201

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
Health Services and Mental Health Administration
5600 Fishers Lane
Rockville, Maryland 20852

OFFICIAL BUSINESS
Penalty for Private Use $300

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF HEW

HEW 396

U.S.MAIL

THIRD CLASS
BLK. RT.