VITAL and HEALTH STATISTICS
DATA FROM THE NATIONAL HEALTH SURVEY

Findings on the

Serologic Test for

Syphilis in Adults

United States - 1960 - 1962

A discussion of the serologic tests for syphilis used, with data on the percent reactive to the Kolmer Reiter Protein test by age, sex, and race, and an analysis of differentials by place, income, education, occupation, and marital status.
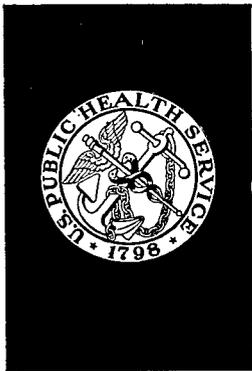
COOPERATION OF THE BUREAU OF THE CENSUS

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.

CONTENTS

IN THIS REPORT are presented findings on the serologic test for syphilis done during Cycle I of the Health Examination Survey. Cycle I consisted of examinations of a nationwide probability sample of persons 18-79 years of age, selected from the U.S. civilian, noninstitutional population.

Blood specimens were taken, and the Kolmer Reiter Protein and Venereal Disease Research Laboratory methods were used to determine serologic evidence of syphilis.

This report describes the serologic tests for syphilis, specifies the techniques used, presents the data collected, and compares the information obtained in this survey with that obtained in other surveys. The relationships of the Kolmer Reiter Protein test findings to the demographic variables of age, sex, race, family income, education, place, marital status, and occupation are examined.

The prevalence of positive STS findings was higher in men than in women both in the white and Negro populations. The rates for the Negro population were substantially greater than those for the white population in both sexes and in every age group. The prevalence of reactivity to the serologic test for syphilis also varied by region. The rates were highest in the West and lowest in the Northeast for all race-sex groups.

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   reliability or precision------------------   *

FINDINGS ON THE SEROLOGIC TEST
FOR SYPHILIS IN ADULTS

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INTRODUCTION

The National Health Survey uses three methods for obtaining information about the health of the U.S. population. The first is a household interview in which persons are asked to give information relating to their health or to the health of other household members. The second is the collection of data from available health records. The third is direct examination. The Health Examination Survey (HES) was organized to use the third procedure, drawing samples of the population of the United States, and by medical examination and with various tests and measurements undertaking to characterize the population under study.

The initial enterprise of the Health Examination Survey was the examination of a nationwide probability sample of 7,710 persons aged 18-79 years. Its purpose was to obtain information on the prevalence of cardiovascular disease, diabetes and certain other chronic diseases, on dental health, and on the distribution of a number of anthropometric and sensory characteristics. A blood specimen was taken for various tests, including three serologic tests for syphilis (STS). Altogether, 6,672 persons were examined during the course of the Survey, which was begun in October 1959 and completed in December 1962. Sample persons received a standard examination, lasting about 2 hours, performed by medical and other staff members of the Survey in specially designed mobile clinics.

This report deals with findings on the serologic tests for syphilis. It is one of a series of reports describing and evaluating the plan, conduct, and findings of the first cycle of the Health Examination Survey. The descriptions of the general plan[1] and of the sample population and response[2] have been published. These provide general background for all reports of findings. This report describes the serologic tests for syphilis, specifies the techniques used, presents the data collected, and compares the information obtained in this Survey with that obtained in other surveys. The relationships of test findings to the demographic variables of age, sex, race, family income, education, place, marital status, and occupation are discussed. Comparisons by race are restricted to the white and Negro populations, since the sample is too small to permit adequate representation of other nonwhite groups.

THE SEROLOGIC TESTS
FOR SYPHILIS

A venous blood specimen of 15 cc. was taken from each examinee. Three cc. were transferred to a blood glucose specimen tube. The remainder was centrifuged, and 2 to 3 cc. of the serum were transferred to an STS tube, the remaining serum being divided between tubes for serum cholesterol and serum bentonite flocculation determinations. The STS specimens were promptly refrigerated; twice a week the accumulated specimens were shipped unrefrigerated to the Venereal Disease Research Laboratory (VDRL) in Chamblee, Georgia, for determination of serologic evidence of syphilis by the Mazzini, the Kolmer Reiter Protein (KRP), and the VDRL methods. The technical

assistance and advice of the Venereal Disease Branch, Communicable Disease Center, Bureau of State Services, U.S. Public Health Service is gratefully acknowledged, the more so because of their recognized leadership in the area of serologic tests for syphilis.

The serologic tests were performed and reported in accordance with techniques described in the manual of Serologic tests for Syphilis—1964 (Appendix I). The Mazzini and VDRL tests use the more sensitive cardiolipin antigen, while the KRP test uses the more specific treponemal antigen. This multiple determination allows a comparison of the results of different tests on the same individual as well as of the overall results of the different tests. Only the results of the KRP and VDRL tests are presented in this report.

To use the data in this report, it is necessary to have some understanding of the essential features of the serologic test for syphilis and an awareness of the limitations in our understanding of the immunological mechanisms on which these tests are based. While an exhaustive review of this subject is out of the question here, a few remarks may be helpful.

Syphilis is caused by a treponeme-Treponema pallidum. The normal response to infection by this organism is an increase in the concentration of an antibody in the blood called reagin. The classical serologic tests for this infection, beginning with the Wassermann and including the VDRL, determine the presence or the concentration of this substance. If effective treatment is begun early enough, it will normally reduce the concentration of reagin below a level measurable by the tests in use. Even without treatment the concentration of antibody will tend to drop with the passage of time. It is impossible, however, to determine from the reagin concentration whether the syphilis is early or late, whether it was contracted recently or a long time ago, or whether it is active or cured.[3]

Like all biological phenomena, antibody development and decline is highly variable from person to person, both with respect to time and level. A few infected persons never develop reagin; some treated persons never lose reagin. Some persons develop reagin without having contracted syphilis, and there is a long roster of illnesses which have

been shown to cause transient rises in this antibody. Moreover, some persons maintain permanently elevated concentrations of reagin as a consequence to some of the collagen diseases or for other reasons. In other words, reagin is not a specific treponemal antibody.

Beginning in 1949 with the Treponema Pallidum Immobilization test, a new group of tests was developed which determined the presence or concentration of a specific treponemal antibody in the serum. Included among these tests is the KRP test, which uses as antigen a protein fraction of the Reiter treponeme. The treponemal antibody appears at about the same time after infection by this organism as does reagin, but the rise and fall of antibody level after infection does not necessarily follow the curve for reagin. Present evidence suggests that this specific antibody persists at a high level much longer than reagin and is less affected by treatment.

The KRP test has the usual limitations. There are occasions when the KRP test is positive in the absence of syphilis. Like all the serologic tests for syphilis it cannot distinguish between syphilis and other treponemal diseases (such as yaws). What is more, there are certain categories or stages of syphilis in which the KRP test is less sensitive or less likely to yield a positive reaction than are the reagin tests, such as the VDRL. Thus, the KRP is neither completely specific nor completely sensitive.

Also, it is not diagnostic *per se*. In individuals no serologic test for syphilis is in itself diagnostic of the disease. What is necessary in addition to the serologic test is (1) a careful physical examination with syphilis in mind, (2) a history specifically directed to both syphilis and other diseases which may produce positive serologic tests for syphilis, and (3) an investigation of case contacts. Furthermore, adjunct laboratory procedures are frequently indicated. The Health Examination Survey did not include any examination of the genitalia or the perianal region in its physical examination, nor did the medical history inquire about syphilis or related matters. There was also no case followup.

Despite the limitations of the HES examination and of the serologic test for syphilis as indicators of the disease, the findings reported here can be regarded as indicating not only the extent to which

persons in this population have been exposed to syphilis but also the socioeconomic differentials of this disease. While a positive serologic test for syphilis may not in itself be used for diagnosing the disease in an individual, it still points to the strong probability of the disease. Moreover, even in clinical practice the STS must often be the court of last resort in diagnosis because of the absence or ambiguity of other evidence. Finally, in the findings of the prevalence of this disease the cases incorrectly diagnosed as syphilis by the serologic test are balanced against the cases of syphilis missed. What the net balance will be varies with the test under consideration, the population being tested, and other factors.

DIFFERENCES IN TEST RESULTS

In this report a test result is considered positive whether the reaction is weak or strong. However, there were sharp differences among the tests with respect to the ratio of reactive to weakly reactive results (table A). A large majority of the positive KRP results were reactive; there were seven reactive tests to each weakly reactive test. In the VDRL test the situation was reversed, with a ratio of weakly reactive to reactive of 3 to 1. While weakly reactive VDRL tests are more common than reactive ones in both the white and Negro populations, the *ratio* of weakly reactive to reactive is less in the Negro population than in the white. For the VDRL tests, then, positive reactions were, on the average, stronger for the

Negro population than for the white; this reflects a higher average concentration of reagin in the Negro. This may indicate either a higher proportion of relatively new infections or a higher proportion of untreated cases. For the KRP test race differential is evident in the ratio of weakly reactive cases for women but not for men.

The prevalence rates of reactivity for adults by sex for each of the serologic tests for syphilis are given in table B. In the KRP test the rate for men is distinctly higher than that for women. In the VDRL test the rates are essentially the same for both sexes. However, if weakly reactive results are omitted, the rate for men is higher than the rate for women in the VDRL as well as the KRP test.

Both tests show substantially higher prevalence rates for the Negro population than the white. This is true whether the reactive tests or the weakly reactive tests are combined or considered separately. However, the preponderance of the rate for Negroes is distinctly less if the tests are combined than if only reactive VDRL tests are considered. The largest race differential is manifested by the KRP test.

It seems reasonable to attribute these test differentials to differences in specificity, with the KRP being more specific than the VDRL test—that is, less likely to show a positive reaction in the absence of syphilis. The explanation, however, may well be more complex.

In general, both tests show the same trends by age (fig. 1). The chief point of difference is that

Table A. Prevalence of reactive and weakly reactive serologic tests for syphilis in adults, by race, sex, and test used: United States, 1960-62

Race and sex	KRP		VDRL	
	Reactive	Weakly reactive	Reactive	Weakly reactive
	Number of positive reactions per 100 adults in specified group			
White men-------------------------------------	2.0	0.3	0.9	2.5
White women-----------------------------------	1.6	0.5	0.5	3.3
Negro men-------------------------------------	20.2	3.0	6.3	11.3
Negro women-----------------------------------	16.1	0.3	5.4	5.5

NOTE: Sample too small to permit adequate representation of other races.

Table B. Prevalence of reactive and weakly reactive serologic tests for syphilis in adults, by sex and test used: United States, 1960-62

Test	Both sexes	Men	Women
KRP	Number of positive reactions per 100 adults in specified group		
Total---	4.0	4.4	3.6
Reactive----	3.5	3.8	3.1
Weakly reactive-------	0.5	0.6	0.5
VDRL			
Total---	4.7	4.8	4.6
Reactive----	1.2	1.5	1.0
Weakly reactive-------	3.5	3.3	3.6

for men the prevalence of positive serology continues to rise through the entire age range with the VDRL test, whereas with the KRP test the rise continues to ages 45-54 years, after which there is a decline. The parallelism of these two tests is generally better if weakly reactive VDRL tests are omitted from the comparison, but even with this omission the test differences with respect to the age trend for men at older ages remain. The age trends for white and Negro persons are essentially the same, with positive reactions being substantially higher among the Negro at all ages (fig. 2). This is true even if weakly reactive VDRL tests are excluded, although the race differential for this test is then accentuated at all ages.

From the preceding discussion it is evident that the two tests present differing pictures of the prevalence of syphilis and of differentials by age, race, and sex; but these pictures are not necessarily inconsistent.

These test comparisons may be concluded by a consideration of the agreements and disagreements between the tests. In table C the level of agreement and disagreement by sex and race is exhibited. In most cases. the lower the percentage of positive findings, the higher the agreement between the two tests. This reflects the large

amount of agreement with respect to negative findings. However, the proportion of positive cases on which the two tests agree is greater the *higher* the prevalence. Thus, the VDRL and
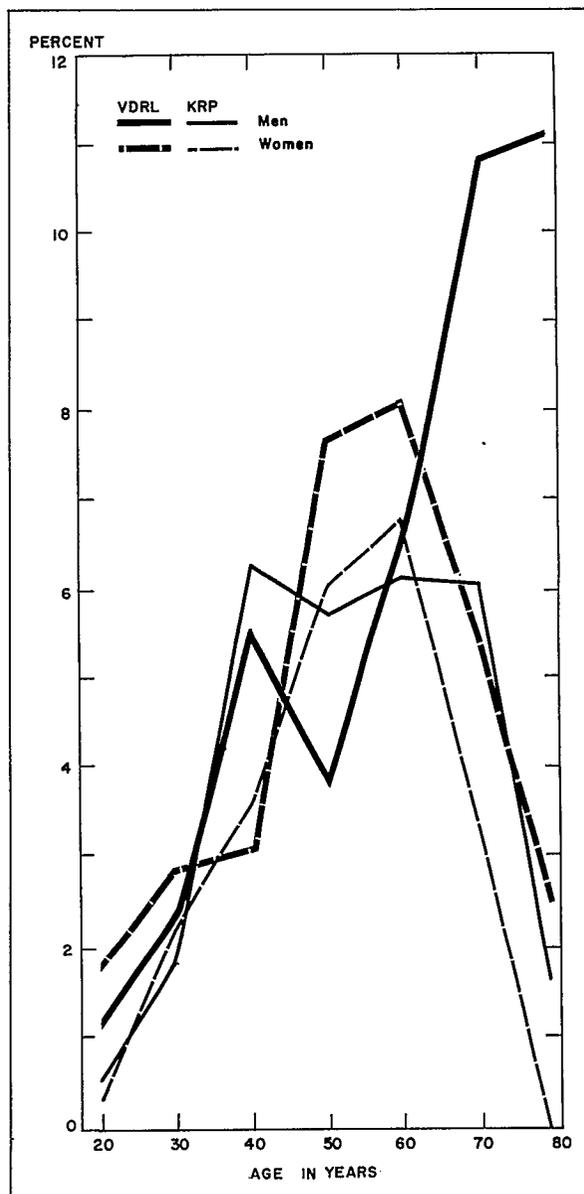
Figure 1. STS prevalence rate by age and sex, both tests.
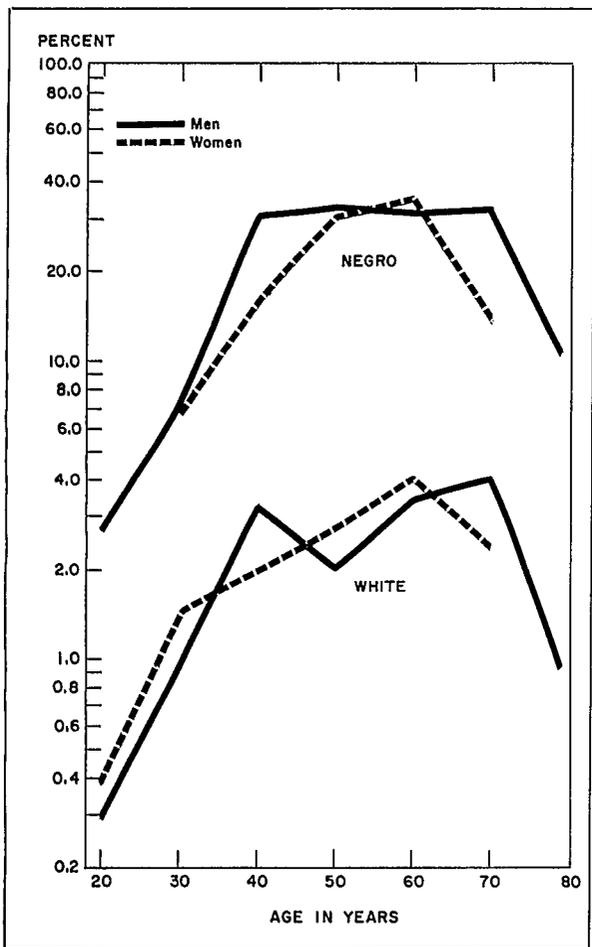
Figure 2. STS prevalence rate by age, race, and sex; KRP test.

the KRP are less likely to be in overall agreement in the Negro population than in the white but are more likely to be in agreement with respect to cases considered positive by either test.

FINDINGS ON THE KRP TEST

Throughout the remainder of this report the discussion will be restricted to the findings of the KRP test. Weakly reactive and reactive findings will be grouped together under the label "re-

active." It is believed that, in general, this test provides minimum estimates of the prevalence of syphilis. By syphilis is meant an infection with T. pallidum which has occurred sometime in the life history of the individual. This infection may have occurred many years before the test was administered or more recently. It may or may not have been cured; it may or may not have produced secondary effects evident on physical examination. The KRP is chosen in the belief that it is nearly as likely to be positive as the VDRL test if the person has had syphilis and less likely to be positive if a person has not had syphilis.

Age, Race, and Sex

To review briefly the findings with respect to the age, race, and sex on the KRP: it is estimated that more than four million adults are reactive to the KRP test, a rate of 4.0 per-cent (tables 2 and D).

The prevalence of positive findings is higher in men than in women, both in the white and the Negro populations. The rate for men rises to ages 35-44 and remains fairly constant through ages 65-74, dropping sharply at ages 75-79 years. The rate for women increases to ages 55-64 and then sharply decreases. The peak age-specific rates for men and women are about the same. Rates for the Negro population are substantially greater than those for the white population in both sexes and in every age group (table 1). The trend of prevalence with age is remarkably similar in the two races. The sex differentials in prevalence among the white population vary erratically from one age group to the next, being higher for women than men in some age groups, but, on the average, slightly higher for men. In the Negro population, where a larger sex differential is noted, the prevalence rate for men is higher than that for women in every age group except the age group 55-64.

Previous studies have arrived at largely comparable results.[4, 7-10] The percentage of reactive specimens increases with age, although the studies differ in the age at which the highest percentage is reached. Where data are available for both sexes, the percentage is higher for men than for women. Where data are available for both white and Negro persons, the race differential is similar to that found in the Health Examination Survey.

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Table C. Percent distribution of agreement between KRP and VDRL test results, by race and sex: United States, 1960-62

KRP result VDRL result	All races		White		Negro	
	Men	Women	Men	Women	Men	Women
	Percent distribution of all determinations in specified group					
All test results--------	100.0	100.0	100.0	100.0	100.0	100.0
Agreement---------------	95.1	94.1	96.4	94.9	83.9	87.2
Positive--Positive-- Negative--Negative--	2.3 92.8	1.3 92.8	1.1 95.3	0.5 94.4	13.0 70.9	7.5 79.7
Disagreement-----------	4.9	5.9	3.6	5.1	16.1	12.8
Negative--Positive-- Positive--Negative--	2.7 2.2	3.5 2.4	2.4 1.2	3.4 1.7	5.3 10.8	3.6 9.2

NOTE: Sample too small to permit adequate representation of other races.

Table D. Number and percent of adults reactive to the KRP test for syphilis, by race and sex: United States, 1960-62

Race	Both sexes	Men	Women
	Number of adults in thousands		
All races---	4,414	2,305	2,109
White------------ Negro------------	2,136 2,206	1,047 1,191	1,089 1,015
	Percent reactive in specified group		
All races---	4.0	4.4	3.6
White------------ Negro------------	2.2 19.3	2.3 22.9	2.1 16.3

NOTE: Sample too small to permit adequate representation of other races.

The interpretation of these differentials is a complicated matter. It may be assumed that the sex and race differentials mainly reflect differences in rates of infection. However, if women are more likely to obtain early or effective treatment than men, infection is less likely to leave a serologic trace, and the sex differential in rate of infection will be exaggerated by the serologic test. A similar exaggeration of the racial differential would result if white persons were more likely to obtain early or effective treatment than Negroes.

Age differentials reflect an even more complicated set of factors. As a person grows older, the chance that he will have been infected increases. Age differences, then, will reflect accumulated experience. However, they will also reflect differences in exposure and treatment, which has varied from one generation to another. A 45-year-old person included in this Survey will have been 25 years old sometime between

1940 and 1942 when the prevalence of syphilis and the quality of treatment differed greatly from that of 1960-62. Other factors, such as the loss of reactivity with time after infection and the increasing likelihood of other illness capable of producing false positive reactions, are also involved. It is impossible to measure the effect of these various factors with any precision, just as it is impossible to state with any precision what proportion of the positive serologic reactions represent cured infections and what proportion represent still active infections.

Other Demographic Variables

In the discussions that follow, the population is classified in a variety of ways—by family income, by education, etc.—and the prevalence of positive KRP findings in different groups is compared. In making these comparisons, allowance must be made for the fact that there are differences from one group to another in the distribution of people by age, race, and sex, and that prevalence of reactivity to serologic tests for syphilis varies by age, race, and sex. Because the sampling variability of age-race-sex-specific values for each group is usually very large, a summary comparison was thought preferable to the presentation of prevalence rates specific by age, race, and sex. For this reason the actual prevalence rate for each group is compared with an expected rate. The expected value is obtained by weighting age-race-sex-specific rates for the total United States by the age-race-sex distribution for that group under consideration. The obvious meaning can be attached to differences between actual and expected rates, with the understanding that small differences may arise by chance. A positive difference, for example, indicates that the prevalence rate for the group is higher than expected. Alternatively the data can be presented as a ratio of actual to expected rates. If the ratio is greater than 1.0, the actual rate is higher than expected; if the ratio is less than 1.0, the actual rate is less than expected. Where there is no statistically significant difference between the actual and expected values for a group, differences for individual age-race-sex groups usu-

ally exhibit only random fluctuations. The following discussion is generally restricted to the total population by sex, but race-specific data are included in the detailed tables.

Area

The findings in tables 3-6 can be briefly summarized. The prevalence rate is significantly higher in the West than in the remainder of the country (table 3, fig. 3). Otherwise, there are no discernible place differences, whether contrasts
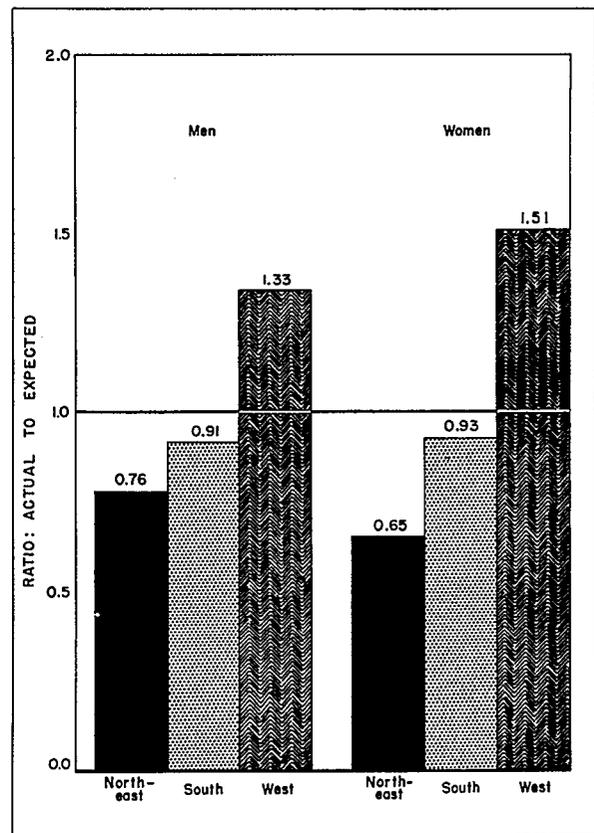
Figure 3. Ratio of actual to expected percent reactive to the KRP test for syphilis in adults, by region.

between population-size groups, urban-rural differences, or differences between standard metropolitan statistical areas and other urban places are considered. Such differences undoubtedly do exist, but they are too small to be determined from the HES data.

Vonderlehr and Usilton found lower rates for those Selective Service inductees from rural areas than for those from urban areas,[4] but they found no discernible pattern to rate differences for inductees by city size.[5]

Race and Region

The large differences in racial distribution by region and the large racial differences in rates make it desirable to consider the regional contrast separately for Negroes and for white persons. Table 6 presents the actual and expected prevalence rates by race and region. The expected rates are race-sex-adjusted expected rates.

Regional differences, as age and race differences, are both large and consistent. The prevalence rate for every race-sex group was highest in the West and lowest in the Northeast. Indeed, for all age groups the rates for white men and for white women were higher in the West than in the Northeast and the South.

HES findings by race and region are largely in agreement with those reported by Vonderlehr and Usilton[4][5] and Karpinos.[6] They found substantially lower rates for white and Negro Selective Service inductees in the Northeast but showed little or no differences between the rates for the South and the West. Region was recorded as the place where the inductee first registered for the draft and, consequently, does not reflect any later interregional migration before the induction examination.

Region, therefore, appears to be a variable in the prevalence of reactivity to the serologic test for syphilis.

Occupation of Employed

Comparisons of employed persons by occupation show the prevalence rate for men who were farmers and farm managers to be significantly lower than expected (table 7). Also, the prev-
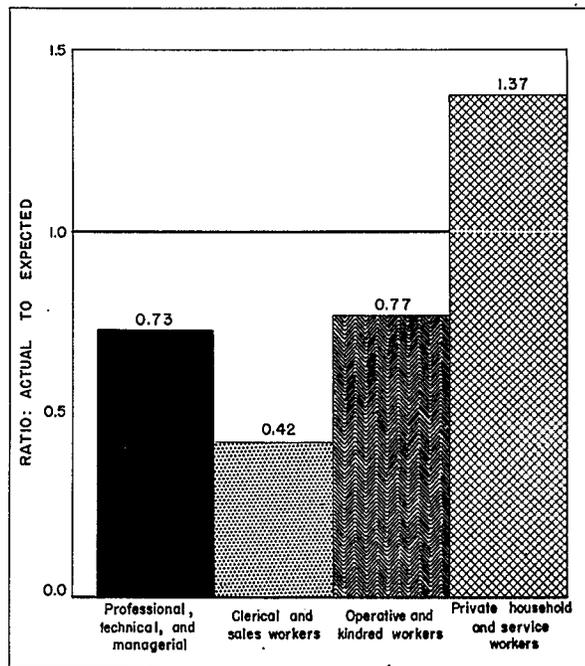
Figure 4. Ratio of actual to expected percent reactive to the KRP test for syphilis in women, by occupation of employed persons.

alence rate for women who were clerical and sales workers was significantly lower than expected, while the prevalence for women who were private household and service workers was significantly higher than expected (fig. 4). Whatever other occupational differences exist are either small or occur in categories which exhibit too large a variance to deem the difference statistically significant.

Bowdoin et al. in a study in Savannah, Georgia,[7] found in all race-sex-age groups relatively low prevalence rates for professional, clerical, sales, and kindred workers. Women domestic service workers were the only occupational group who showed a consistently high rate.

Education

There are no statistically significant differences between actual and expected prevalence rates by amount of schooling (table 8). This fact

does not preclude the existence of differences by education but merely shows any differences which exist either to be small or to have exhibited too large a variance to be considered statistically significant.

These findings differ from those of some other studies. Hill and Mugge[8] in a study of Negroes in Atlanta and Clark[9] in a study of white and Negro persons in Baltimore found that prevalence rates varied inversely with amount of schooling, but neither study adjusted for age. Similarly Bowdoin et al., in their Savannah study[7] found that prevalence rates moved inversely with education for each age-race-sex group.

Family Income

The actual and expected prevalence rates by family income and the differences between them are presented in table 9. The actual prevalence rates by family income are essentially the same as the expected rates. Whatever income differences exist are either small or occur in categories exhibiting too great a variance.

Marital Status

The findings in table 10 can be briefly summarized. The actual prevalence rates by marital status are essentially the same as the expected rates. Only for never-married women is there a statistically significant difference between the actual and expected rate, the actual rate being less than expected (fig. 5). It cannot be said that no other marital status differences exist, but those that do exist are either small or occur in those categories which exhibit too great a variance for the difference to be deemed statistically significant. Except in the age group 18-24 years, where never-married persons predominate, the large bulk of adults are married.
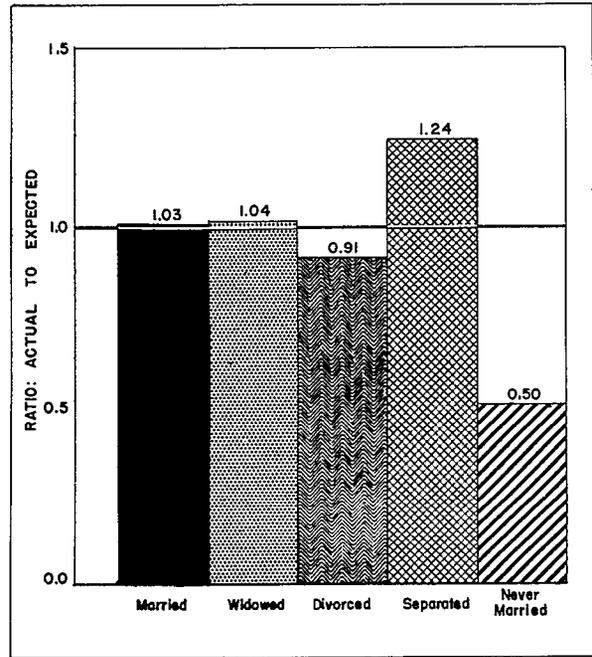
Figure 5. Ratio of actual to expected percent reactive to the KRP test for syphilis in women, by marital status.

Bowdoin et al.,[7] Hill and Mugge,[8] Clark,[9] and Usilton et al.[10] all discussed marital status differences in prevalence rates, but a different result was found in each study. Since both marital status and prevalence rates varied considerably by age and since none of these studies gave their results in age-adjusted form, their results cannot be validly compared with each other or HES rates.

SUMMARY

1. The prevalence of positive STS findings is higher in men than in women both in the white and the Negro populations.
2. Rates for the Negro population are substantially greater than those for the white population in both sexes and in every age group.
3. No significant population-size group or urban-rural difference in rates was found.
4. Regional differences are both large and consistent. The prevalence rates were highest in the West and lowest in the Northeast for all race-sex groups.
5. Various occupational differences were found. Men who were farmers and farm managers and women who were clerical and sales workers had prevalence rates significantly lower than expected, while women who were private household and service workers had rates significantly higher than expected.
6. No significant education or family income differentials were found in HES data.
7. The only marital status difference found was for never-married women, who had significantly lower-than-expected rates.

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DETAILED TABLES

Page

Table 1. Percent reactive to the KRP test for syphilis in adults, by age, race, and sex: United States, 1960-62

Age	Total		White		Negro	
	Men	Women	Men	Women	Men	Women
	Percent reactive in specified group					
Total-18-79 years-----------	4.4	3.6	2.3	2.1	22.9	16.3
18-24 years-----------------------	0.5	0.3	0.3	0.4	2.8	-
25-34 years-----------------------	1.8	2.2	1.0	1.5	7.3	7.0
35-44 years-----------------------	6.3	3.6	3.3	2.0	30.1	16.7
45-54 years-----------------------	5.7	6.1	2.1	2.8	33.4	31.5
55-64 years-----------------------	6.1	6.8	3.5	4.1	31.0	35.2
65-74 years-----------------------	6.1	3.2	4.0	2.4	32.6	13.1
75-79 years-----------------------	1.6	-	1.0	-	10.1	-

NOTE: Sample too small to permit adequate representation of other races.

Table 2. Number of adults reactive to the KRP test for syphilis, by age and sex: United States, 1960-62

Age	Both sexes	Men	Women
	Number of adults in thousands		
Total-18-79 years-------------------------	4,414	2,305	2,109
18-24 years-----------------------------------	68	39	29
25-34 years-----------------------------------	436	188	248
35-44 years-----------------------------------	1,162	718	444
45-54 years-----------------------------------	1,215	574	641
55-64 years-----------------------------------	1,012	462	550
65-74 years-----------------------------------	499	303	196
75-79 years-----------------------------------	23	23	-

Table 3. Actual and expected percent reactive to the KRP test for syphilis in adults, by race, region, and sex: United States, 1960-62

Race and region	Men			Women		
	Actual	Expected	Difference	Actual	Expected	Difference
All races	Percent reactive in specified group					
Northeast--------------	2.7	3.5	-0.8	2.1	3.2	-1.1
South-----------------	5.8	6.4	-0.6	4.5	4.9	-0.4
West------------------	5.0	3.8	1.2	4.5	2.9	1.6
White						
Northeast--------------	1.8	2.3	-0.5	1.1	2.1	-1.0
South-----------------	1.9	2.3	-0.4	1.5	2.1	-0.6
West------------------	3.0	2.2	0.8	3.7	2.2	1.5
Negro						
Northeast--------------	14.9	21.6	-6.7	14.0	16.3	-2.3
South-----------------	21.4	22.6	-1.2	17.0	16.6	0.4
West------------------	34.3	24.9	9.4	17.0	15.2	1.8

NOTE: Sample too small to permit adequate representation of other races. For many categories, estimates for the Negro population have a very high sampling variability. Comparisons for this group should be considered as indicative only.

Table 4. Actual and expected percent reactive to the KRP test for syphilis in adults, by race, population-size group, and sex: United States, 1960-62

Race and population-size group	Men			Women		
	Actual	Expected	Difference	Actual	Expected	Difference
All races	Percent reactive in specified group					
Giant metropolitan areas---------------	3.9	4.0	-0.1	3.5	3.7	-0.2
Other very large metropolitan areas----	2.8	3.7	-0.9	2.4	3.5	-1.1
Other standard metropolitan statistical areas----------------	4.7	3.6	1.1	3.1	3.1	-
Other urban areas------	3.7	4.9	-1.2	3.6	3.7	-0.1
Rural areas------------	6.3	5.6	0.7	5.5	4.1	1.4
White						
Giant metropolitan areas---------------	2.9	2.3	0.6	2.2	2.2	-
Other very large metropolitan areas----	2.4	2.3	0.1	1.5	2.1	-0.6
Other standard metropolitan statistical areas----------------	2.2	2.2	-	1.7	2.1	-0.4
Other urban areas------	1.9	2.2	-0.3	1.9	2.1	-0.2
Rural areas------------	1.6	2.3	-0.7	3.5	2.1	1.4
Negro						
Giant metropolitan areas---------------	12.7	20.8	-8.1	15.0	16.4	-1.4
Other very large metropolitan areas----	7.6	20.5	-12.9	11.2	16.7	-5.5
Other standard metropolitan statistical areas----------------	40.5	22.4	18.1	21.5	16.0	5.5
Other urban areas------	16.1	23.5	-7.4	15.3	15.3	-
Rural areas------------	33.0	25.2	7.8	18.2	17.0	1.2

NOTE: Sample too small to permit adequate representation of other races. For many categories, estimates for the Negro population have a very high sampling variability. Comparisons for this group should be considered as indicative only.

Table 5. Actual and expected percent reactive to the KRP test for syphilis in adults, by race, place description, and sex: United States, 1960-62

Race and place description	Men			Women		
	Actual	Expected	Difference	Actual	Expected	Difference
All races	Percent reactive in specified group					
SMSA-in central city---	5.8	5.2	0.6	4.4	4.5	-0.1
SMSA-outside central city----------	2.6	2.9	-0.3	2.2	2.6	-0.4
Urban, not SMSA--------	3.0	4.0	-1.0	3.5	3.5	-
Rural, farm------------	3.8	5.5	-1.7	6.1	4.6	1.5
Rural, nonfarm---------	6.8	5.7	1.1	4.1	3.7	0.4
White						
SMSA-in central city---	3.1	2.2	0.9	2.1	2.1	-
SMSA-outside central city----------	2.0	2.3	-0.3	1.7	2.1	-0.4
Urban, not SMSA--------	1.5	2.2	-0.7	2.0	2.1	-0.1
Rural, farm------------	1.3	2.6	-1.3	4.7	2.4	2.3
Rural, nonfarm---------	2.3	2.2	0.1	2.5	2.0	0.5
Negro						
SMSA-in central city---	20.6	21.6	-1.0	16.8	16.4	0.4
SMSA-outside central city----------	21.7	20.3	1.4	16.6	17.7	-1.1
Urban, not SMSA--------	17.8	22.8	-5.0	14.8	14.6	0.2
Rural, farm------------	18.1	23.5	-5.4	13.4	13.8	-0.4
Rural, nonfarm---------	32.4	26.2	6.2	17.6	18.2	-0.6

SMSA = Standard metropolitan statistical area.

NOTE: Sample too small to permit adequate representation of other races. For many categories, estimates for the Negro population have a very high sampling variability. Comparisons for this group should be considered as indicative only.

Table 6. Actual and expected percent reactive to the KRP test for syphilis in adults, by race, place, and sex: United States, 1960-62

Race and place	Men			Women		
	Actual	Expected	Difference	Actual	Expected	Difference
All races	Percent reactive in specified group					
Urban-------------------	4.3	4.2	0.1	3.7	3.6	0.1
Rural-------------------	4.5	4.6	-0.1	3.4	3.5	-0.1
White						
Urban-------------------	2.4	2.2	0.2	2.1	2.1	-
Rural-------------------	1.9	2.3	-0.4	2.2	2.1	0.1
Negro						
Urban-------------------	20.8	21.6	-0.8	16.7	16.0	0.7
Rural-------------------	26.9	25.1	1.8	15.2	16.7	-1.5

NOTE: Sample too small to permit adequate representation of other races. For many categories, estimates for the Negro population have a very high sampling variability. Comparisons for this group should be considered as indicative only.

Table 7. Actual and expected percent reactive to the KRP test for syphilis in adults, by race, occupation, and sex: United States, 1960-62

Race and occupation	Men			Women		
	Actual	Expected	Difference	Actual	Expected	Difference
All races	Percent reactive in specified group					
Professional, technical, and managerial--------	2.6	2.8	-0.2	2.3	3.1	-0.8
Farmers and farm managers--------------	2.4	5.2	-2.8	*	*	*
Clerical and sales workers---------------	3.2	2.5	0.7	1.0	2.3	-1.3
Craftsmen, foremen, and kindred workers-------	3.1	3.4	-0.3	*	*	*
Operatives and kindred workers---------------	4.4	4.4	-	2.4	3.2	-0.8
Private household and service workers-------	3.5	5.7	-2.2	11.0	8.0	3.0
Farm and other laborers (except mine)---------	13.6	10.4	3.2	*	*	*
White						
Professional, technical, and managerial--------	2.1	2.3	-0.2	2.1	2.4	-0.3
Farmers and farm managers--------------	1.5	2.8	-1.3	*	*	*
Clerical and sales workers---------------	3.1	2.2	0.9	1.0	2.0	-1.0
Craftsmen, foremen, and kindred workers-------	1.7	2.2	-0.5	*	*	*
Operatives and kindred workers---------------	2.1	1.9	0.2	1.4	2.3	-0.9
Private household and service workers-------	2.1	2.2	-0.1	4.8	2.2	2.6
Farm and other laborers (except mine)---------	1.4	1.8	-0.4	*	*	*
Negro						
Professional, technical, and managerial--------	23.5	27.2	-3.7	5.3	13.3	-8.0
Farmers and farm managers---------------	11.7	29.0	-17.3	*	*	*
Clerical and sales workers---------------	6.8	9.3	-2.5	-	12.7	-12.7
Craftsmen, foremen, and kindred workers-------	23.3	22.6	0.7	*	*	*
Operatives and kindred workers---------------	19.8	20.8	-1.0	12.5	11.8	0.7
Private household and service workers-------	10.7	22.6	-11.9	23.4	19.5	3.9
Farm and other laborers (except mine)---------	36.2	25.7	10.5	*	*	*

NOTE: Sample too small to permit adequate representation of other races. For many categories, estimates for the Negro population have a very high sampling variability. Comparisons for this group should be considered as indicative only.

Table 8. Actual and expected percent reactive to the KRP test for syphilis in adults, by race, education, and sex: United States, 1960-62

Race and education	Men			Women		
	Actual	Expected	Difference	Actual	Expected	Difference
All races	Percent reactive in specified group					
Under 5 years--------	7.8	10.3	-2.5	7.8	7.2	0.6
5-8 years--------------	6.0	5.7	0.3	6.1	5.0	1.1
9-12 years-------------	3.8	3.4	0.4	2.3	2.8	-0.5
13+ years--------------	1.7	2.5	-0.8	2.5	2.7	-0.2
White						
Under 5 years--------	3.7	2.8	0.9	1.8	2.4	-0.6
5-8 years--------------	2.4	2.7	-0.3	2.5	2.5	-
9-12 years-------------	2.3	2.0	0.3	1.9	2.0	-0.1
13+ years--------------	1.4	2.1	-0.7	2.3	2.0	0.3
Negro						
Under 5 years--------	19.0	28.1	-9.1	26.6	21.9	4.7
5-8 years--------------	29.4	25.3	4.1	26.8	19.9	6.9
9-12 years-------------	18.8	18.0	0.8	6.2	11.3	-5.1
13+ years--------------	15.7	19.4	-3.7	6.4	14.4	-8.0

NOTE: Sample too small to permit adequate representation of other races. For many categories, estimates for the Negro population have a very high sampling variability. Comparisons for this group should be considered as indicative only.

Table 9. Actual and expected percent reactive to the KRP test for syphilis in adults, by race, family income, and sex: United States, 1960-62

Race and family income	Men			Women		
	Actual	Expected	Difference	Actual	Expected	Difference
All races	Percent reactive in specified group					
Under $2,000----------	6.2	7.4	-1.2	7.1	6.3	0.8
$2,000-$3,999----------	7.6	6.2	1.4	3.6	3.9	-0.3
$4,000-$6,999----------	3.7	3.4	0.3	3.0	2.8	0.2
$7,000-$9,999----------	3.2	2.8	0.4	2.1	2.6	-0.5
$10,000+--------------	1.5	2.9	-1.4	2.7	2.2	0.5
Unknown---------------	4.7	4.8	-0.1	2.9	3.9	-1.0
White						
Under $2,000----------	2.5	2.5	-	1.7	2.1	-0.4
$2,000-$3,999----------	1.5	2.2	-0.7	2.3	2.2	0.1
$4,000-$6,999----------	2.5	2.1	0.4	2.1	2.0	0.1
$7,000-$9,999----------	2.6	2.2	0.4	2.2	2.1	0.1
$10,000+--------------	1.3	2.5	-1.2	2.8	2.2	0.6
Unknown---------------	3.1	2.3	0.8	1.3	2.3	-1.0
Negro						
Under $2,000----------	18.4	24.0	-5.6	22.1	18.3	3.8
$2,000-$3,999----------	34.2	23.4	10.8	12.3	15.0	-2.7
$4,000-$6,999----------	20.1	21.5	-1.4	15.5	14.8	0.7
$7,000-$9,999----------	17.3	20.2	-2.9	-	13.4	-13.4
$10,000+--------------	-	21.1	-21.1	-	3.0	-3.0
Unknown---------------	14.8	22.9	-8.1	16.1	17.2	-1.1

NOTE: Sample too small to permit adequate representation of other races. For many categories, estimates for the Negro population have a very high sampling variability. Comparisons for this group should be considered as indicative only.

Table 10. Actual and expected percent reactive to the KRP test for syphilis in adults, by race, marital status, and sex: United States, 1960-62

Race and marital status	Men			Women		
	Actual	Expected	Difference	Actual	Expected	Difference
All races	Percent reactive in specified group					
Married----------------	3.9	4.3	-0.4	3.5	3.4	0.1
Widowed----------------	6.5	6.3	0.2	5.1	5.0	0.1
Divorced---------------	11.5	8.2	3.3	5.1	5.6	-0.5
Separated--------------	14.7	16.9	-2.2	8.5	6.8	1.7
Never married----------	3.7	2.3	1.4	1.0	1.9	-0.9
White						
Married----------------	2.3	2.4	-0.1	2.4	2.1	0.3
Widowed----------------	3.1	3.2	-0.1	2.2	2.6	-0.4
Divorced---------------	4.4	2.6	1.8	1.9	2.5	-0.6
Separated--------------	*	*	*	*	*	*
Never married----------	1.5	1.2	0.3	0.1	1.3	-1.2
Negro						
Married----------------	22.1	24.7	-2.6	15.7	16.6	-0.9
Widowed----------------	27.0	25.9	1.1	25.6	22.7	2.9
Divorced---------------	39.9	30.3	9.6	17.5	20.5	-3.0
Separated--------------	*	*	*	*	*	*
Never married----------	·17.5	9.4	8.1	7.0	6.6	0.4

NOTE: Sample too small to permit adequate representation of other races. For many categories, estimates for the Negro population have a very high sampling variability. Comparisons for this group should be considered as indicative only.

APPENDIX I

SEROLOGIC TESTS FOR SYPHILIS

The serologic tests for syphilis used in this Survey are briefly described in this appendix. Detailed specifications of these tests are provided in *Serologic Tests for Syphilis, 1964,* a manual prepared at the Venereal Disease Research Laboratory, U.S. Public Health Service (PHS Pub. No. 411). Specific page references are included in this summary.

Kolmer Reiter Protein Test

The test used Reiter protein antigen (p. 45) and employed a Kolmer one-fifth volume qualitative test with serum (pp. 49-52). Test results were reported as nonreactive, weakly reactive, reactive, or anticomplementary. Reactive tests were reported as 1+, 2+, 3+, or 4+.

VDRL Tests

The test was a VDRL slide qualitative test with serum (p. 95). If the qualitative test yielded reactive or weakly reactive results, a VDRL slide quantitative test with serum was undertaken (pp. 96-98), and the greatest dilution at which a reaction was noted was determined. Reactive results were reported in the same manner as for the KRP test.

Quality Control

Quality control procedures used were the standard procedures described in the manual.

Some internal evidence of quality control may be obtained from an examination of the number of reactive specimens at each of the 42 places at which the survey was conducted. It is possible that individual places, by chance, might have more or fewer reactive specimens than average, but a series of such stands would suggest some change in laboratory standards. No such evidence is indicated by the data in table I.

Anticomplementary Specimens

Some 188 or 3 percent of the KRP tests were anticomplementary (AC). Computationally these test results were treated in all tables except A and B as if they were negative. The estimated rate for all adults on this basis was 3.97 percent. In tables A and B these specimens were treated as undetermined, and rates were computed only for determined specimens. The rate for

all adults on this basis was 4.00. The difference between these two estimates is lost in rounding to one decimal, but for groups with high prevalence the difference does remain visible.

It is by no means clear what the correct approach should be. Since VDRL tests were performed on all anticomplementary specimens and since VDRL test results are highly correlated with KRP test results, it would have been reasonable to have used the VDRL test information to estimate the unknown KRP test results. Unfortunately the available data raise serious doubts that this would be a safe procedure. The following VDRL test results were obtained on the specimens having anticomplementary KRP tests.

	Total	Weakly reactive	Reactive	Normal
Total-	188	11	5	172
White men-	58	1	-	57
White women----	112	10	3	99
Nonwhite men------	10	-	1	9
Nonwhite women----	8	-	1	7

Women were more likely to have anticomplementary test reactions than men. Women having anticomplementary test reactions were more likely to have reactive VDRL tests than women not having anticomplementary reactions. While this may reflect a higher rate of syphilitic infection in the group, it may also reflect a common artifact producing both anticomplementation on the KRP test and a positive reaction on the VDRL test. This possibility is emphasized by the fact that the number of anticomplementary reactions among pregnant women was four times the average for that age-sex group.

The computational treatment of the anticomplementary results, however, almost certainly leads to an understatement of the true percentage reactive to the KRP test in the population.

Other Artifacts

The possibility that a reactive STS may be caused by factors other than syphilis is of some concern when evaluating the data presented in this report. There is, unfortunately, little internal evidence on this subject, and no external evidence allowing an imputation to the

Table I. Number of examined adults and number of adults reactive to the KRP test for syphilis, by stand number and color: Health Examination Survey, 1960-62

Stand number	Total sample population		Sample persons reactive to KRP	
	White	Nonwhite	White	Nonwhite
1--------------------------------	128	17	1	1
2--------------------------------	120	32	7	4
3--------------------------------	150	19	1	5
4--------------------------------	155	6	2	-
5--------------------------------	159	8	13	2
6--------------------------------	161	2	8	-
7--------------------------------	148	16	2	1
8--------------------------------	156	17	3	2
9--------------------------------	167	3	3	-
10-------------------------------	166	15	6	-
11-------------------------------	146	9	7	5
12-------------------------------	141	-	6	-
13-------------------------------	153	2	2	-
14-------------------------------	112	47	2	8
15-------------------------------	130	21	1	3
16-------------------------------	142	8	2	1
17-------------------------------	142	1	1	1
18-------------------------------	141	5	-	3
19-------------------------------	154	-	4	-
20-22-----------------------------	390	56	9	7
23-------------------------------	121	32	1	3
24-------------------------------	128	24	3	10
25-------------------------------	100	55	1	7
26-------------------------------	122	52	3	12
27-------------------------------	103	71	-	12
28-------------------------------	69	98	1	14
29-------------------------------	145	10	3	1
30-------------------------------	158	11	-	3
31-------------------------------	134	30	2	7
32-------------------------------	164	4	7	-
33-------------------------------	161	8	3	2
34-------------------------------	159	1	2	-
35-------------------------------	155	7	-	1
36-------------------------------	158	4	3	-
37-------------------------------	124	37	1	8
38-------------------------------	132	23	3	2
39-------------------------------	68	92	3	5
40-------------------------------	155	8	1	-
41-------------------------------	108	43	2	10
42-------------------------------	94	59	1	10

general population surveyed by the Health Examination Survey.

Two possible factors were considered. The first was pregnancy. The actual number of reactive tests among pregnant women and the number expected in women of the same age and race was

	Actual	Expected
KRP------------	2	2.0
VDRL-----------	4	3.4

Another factor considered was the presence of collagen disease. Among persons with a positive serum bentonite flocculation test for the rheumatoid factor the number of reactive tests was

	Actual	Expected
KRP------------	12	12.3
VDRL-----------	10	15.0

Thus, in neither group were there more reactive tests, either KRP or VDRL, than expected.

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APPENDIX II

STATISTICAL NOTES

The Survey Design

The Health Examination Survey is designed as a highly stratified multistage sampling of the civilian, non-institutional population, aged 18-79 years, of the conterminous United States. The first stage of the plan is a sample of the 42 primary sampling units (PSU's) from 1,900 geographic units into which the United States has been divided. A PSU is a county, two or three contiguous counties, or a standard metropolitan statistical area. Later stages result in the random selection of clusters of about four persons from a small neighborhood within the PSU. The total sample included 7,710 persons in the 42 PSU's in 29 different States. The detailed structure of the design and the conduct of the Survey have been described in previous reports.[1][2]

Reliability in Probability Surveys

The methodological strength of the Survey derives especially from its use of scientific probability sampling techniques and of highly standardized and closely controlled measurement processes. This does not imply that statistics from the Survey are exact or without error. Data presented are imperfect for three important reasons: (1) results are subject to sampling error, (2) the actual conduct of a survey never agrees perfectly with the design, and (3) the measurement process itself is inexact even when standardized and controlled. The faithfulness with which the study design was carried out has been analyzed in a previous report.[2]

Of the total of 7,710 sample persons 86 percent or 6,672 were examined. Analysis indicates that the examined persons are a highly representative sample of the adult civilian, noninstitutional population of the United States. Imputation for the nonrespondents was accomplished by attributing to nonexamined persons the characteristics of comparable examined persons. The specific procedure used [2] consisted of inflating the sampling weight for each examined person to compensate for non-

examined sample persons at the same stand and of the same age-sex group.

The presumption that positive serology was as common in nonexamined persons as examined is by no means demonstrated. It is quite possible that a person knowing or suspecting that he had syphilis would be less likely to appear for examination than other sample persons. This can hardly constitute a predominant reason for nonresponse, however; and what is more to the point, the prevalence of positive serology would have to be very high indeed for the prevalence in the total sample to be greatly in excess of the prevalence found in the examined group. For the true prevalence to be one percentage point greater than that found in the examined group, one in ten white persons not examined and one in three Negroes would have had to have positive serology—a rather unlikely situation.

Missing Data on Examined Persons

In addition to persons not examined, there were some persons whose examinations were incomplete in one particular or another. Age and sex were known for every examined person, but for 173 people either a blood specimen was not available or no STS determination was made. The extent of missing information is indicated in table II. The number of determinations by race and sex is shown in table III. The problem of anticomplementary KRP results is discussed in Appendix I.

In computing rates for any group, persons for whom no STS determinations were available were considered to have the same age-sex-race specific rates as persons on whom determinations were made. Since most of the missing data loss resulted from accidental breakage of STS specimen tubes or from insufficient blood being drawn, it can be assumed that these were random exclusions and, therefore, their rates should not differ significantly from the determined rates. Because of the small number of nondetermined specimens the effect on the overall rates would be slight even if they differed substantially.

Table II. Number of examined persons and number for whom no KRP or VDRL determination was made, by sex and age: Health Examination Survey, 1960-62

Sex and age	Total examined	No KRP or VDRL determination
Total	6,672	173
Men		
18-79 years	3,091	58
18-24 years	411	7
25-34 years	675	14
35-44 years	703	11
45-54 years	547	14
55-64 years	418	8
65-74 years	265	4
75-79 years	72	-
Women		
18-79 years	3,581	115
18-24 years	534	22
25-34 years	746	17
35-44 years	784	22
45-54 years	705	18
55-64 years	443	21
65-74 years	299	12
75-79 years	70	3

Table III. Number of persons with KRP or VDRL determinations and number reactive, by color and sex: Health Examination Survey, 1960-62

Color and sex	Number of STS determinations		
	Total	KRP reactive	VDRL reactive
All persons	6,499	270	300
White men	2,621	56	82
White women	2,959	64	103
Nonwhite men	412	75	63
Nonwhite women	507	75	52

Sampling and Measurement Error

In this report and its appendices several references have been made to efforts to evaluate both bias and variability of the measurement techniques. The probability design of the Survey makes possible the calculation of sampling errors. Traditionally the role of the sampling error has been the determination of how imprecise the survey results may be because they come from a sample rather than from measurement of all elements in the universe.

The task of presenting sampling errors for a study of the type of the Health Examination Survey is complicated by at least three factors: (1) Measurement error and "pure" sampling error are confounded in the data; it is not easy to find a procedure which will either completely include both or treat one or the other separately. (2) The survey design and estimation procedure are complex and accordingly require computationally involved techniques for calculation of variances. (3) Thousands of statistics come from the survey, many for subclasses of the population for which there are small numbers of sample cases. Estimates of sampling error are obtained from the sample data and are themselves subject to sampling error, which may be large when the number of cases in a cell is small or even occasionally when the number of cases is substantial.

In the present report estimates of approximate sampling variability for selected statistics are presented in tables IV-VII. These estimates have been prepared by a replication technique which yields overall variability through observation of variability among random subsamples of the total sample. The method reflects both "pure" sampling variance and a part of measurement variance.

In accordance with usual practice the interval estimate for any statistic may be considered to be the range within one standard error of the tabulated statistic with 68 percent confidence or the range within two standard errors of the tabulated statistic with 95 percent confidence.

Expected Values

In tables 3-10 the actual rates of serologic test reactivity for the various demographic variables are compared with the expected. The computation of expected rates was done as follows:

Suppose that in an area (say the Northeast) the Health Examination Survey estimates that there are N_i persons in the ith age-sex-race group ($i = 1, 2, \ldots, 42$; sum of $N_i = N$).

Suppose the Health Examination Survey estimates that the rate of serologic test reactivity for the United States in the ith age-sex-race group is X_i.

Then the expected rate of serologic test reactivity for the area is

$$\frac{1}{N} \sum_i N_i \ X_i$$

Comparison of an actual value for, say, a region with the expected value for that region is undertaken on the assumption that a meaningful statement can be made which holds, in some average way, for all persons in the region. This may or may not be true. The specified region may have higher values for young persons and lower values for old persons than are found in other regions. In that case an average comparison will obliterate one or both of these differentials. A similar remark may be made with respect to values computed for all races together, since relationships found in one race may not be found in another. Some instances will be noted in the detailed tables where the white and Negro differentials are not the same. In arriving at the general conclusions expressed in the text, an effort was made to consider all the specific data, including data not included in this report; but it must be recognized that balancing such evidence is a qualitative rather than quantitative exercise.

The standard error of the difference between an actual and expected value may be approximated by the standard error of the actual value (table VII). That this is a reasonable approximation is indicated by the following data for percent reactive to the KRP test by income for white men and women.

Income	Race-sex	Approxi-mation	Standard error of difference Replication estimates With varying weights	With fixed weights
Under $2,000	White men	1.1	1.1	1.2
	White women	0.6	0.9	0.3
$2,000-$3,999	White men	0.7	0.9	0.5
	White women	0.6	0.5	0.3
$4,000-$6,999	White men	0.5	0.6	0.3
	White women	0.6	0.5	0.3
$7,000-$9,999	White men	0.7	0.8	0.4
	White women	0.7	0.5	0.5
$10,000+	White men	0.7	1.0	0.5
	White women	1.0	1.1	0.9
Unknown	White men	1.4	1.4	1.9
	White women	0.8	1.3	0.7

Part of the variance of the difference between actual and expected values arises from the use of estimates of the population in computing expected values. If the population values were known or if the estimates were treated as constants, the variance of the difference would be less as can be judged from the column for "fixed weights."

The degree of correspondence between the approximations and directly computed variances for differences between actual and expected values will vary somewhat with the variable under consideration. While direct computation is very time-consuming, a few other instances have been examined.

Table IV. Standard errors in percent reactive to the KRP test for syphilis in adults, by age, race, and sex: United States, 1960-62

Age	Total		White		Negro	
	Men	Women	Men	Women	Men	Women
	Percent					
Total-18-79 years-----------	0.3	0.3	0.2	0.2	2.7	1.5
18-24 years-----------------------	0.3	0.2	0.2	0.3	0.6	-
25-34 years-----------------------	0.5	0.7	0.5	0.4	2.9	2.8
35-44 years-----------------------	1.3	0.7	0.7	0.4	4.5	2.5
45-54 years-----------------------	1.1	1.2	0.4	0.6	5.0	4.7
55-64 years-----------------------	1.2	1.4	0.7	0.8	4.7	5.3
65-74 years-----------------------	1.5	0.8	1.0	0.6	6.5	3.9
75-79 years-----------------------	*	-	*	-	*	-

Table V. Standard errors in number of adults reactive to the KRP test for syphilis, by age and sex: United States, 1960-62

Age	Both sexes	Men	Women
	Number in thousands		
Total-18-79 years-------------------------------------	309	184	169
18-24 years---	27	20	17
25-34 years---	109	56	74
35-44 years---	174	144	89
45-54 years---	182	115	128
55-64 years---	152	92	110
65-74 years---	100	76	59
75-79 years---	*	*	-

Table VI. Standard errors in number of adults reactive to the KRP test for syphilis, by race and sex: United States, 1960-62

Race	Both sexes	Men	Women
	Number in thousands		
All races--	309	184	169
White--	171	94	120
Negro--	353	202	162
Other nonwhite---	*	*	*

Table VII. Standard errors in percent reactive to the KRP test for syphilis in adults, by specified characteristics, race, and sex: United States, 1960-62

Characteristic	White		Negro	
	Men	Women	Men	Women
Region	Percent			
Northeast--	0.3	0.4	6.7	3.5
South--	0.6	0.5	4.3	1.7
West---	0.4	0.6	5.1	2.6
Population-size group				
Giant metropolitan areas------------------------------------	0.7	0.5	5.7	3.0
Other very large metropolitan areas-------------------------	0.6	0.6	7.6	3.4
Other standard metropolitan statistical areas--------------	0.9	0.9	8.1	8.6
Other urban areas---	0.7	0.6	4.8	3.1
Rural areas---	0.6	1.1	11.5	3.6
Place description				
SMSA-in central city---------------------------------------	0.6	0.7	5.2	2.5
SMSA-outside central city-----------------------------------	0.5	0.5	8.7	10.0
Urban, not SMSA--	0.8	0.7	6.2	5.9
Rural, farm---	0.9	1.4	4.5	4.7
Rural, nonfarm--	0.5	0.6	14.6	3.5
Occupation of employed				
Professional, technical, and managerial--------------------	0.4	1.0	14.1	4.8
Farmers and farm managers----------------------------------	1.2	-	2.3	*
Clerical and sales workers---------------------------------	1.1	0.3	6.5	-
Craftsmen, foremen, and kindred workers-------------------	0.5	9.1	8.2	-
Operatives and kindred workers-----------------------------	0.5	0.8	4.0	6.9
Private household service workers--------------------------	0.7	1.7	8.0	3.5
Farm and other laborers (except mine)---------------------	0.9	2.9	10.9	7.9
Education				
Under 5 years--	2.0	1.3	6.7	9.3
5-8 years--	0.5	0.8	5.9	4.0
9-12 years---	0.5	0.4	8.5	0.9
13+ years--	0.4	0.8	12.5	4.5
Family income				
Under $2,000---	1.1	0.6	4.6	4.4
$2,000-$3,999--	0.7	0.6	12.0	3.7
$4,000-$6,999--	0.5	0.6	7.0	3.9
$7,000-$9,999--	0.7	0.7	12.1	-
$10,000+---	0.7	1.0	-	-
Unknown--	1.4	0.9	7.4	6.5
Marital status				
Married--	0.2	0.4	4.4	2.4
Widowed--	3.1	0.7	10.8	7.7
Divorced---	3.3	1.2	20.0	7.0
Separated--	-	2.5	12.9	8.2
Never married--	0.7	0.2	10.5	3.5

Specific characteristic	Race	Men		Women	
		Approximation	Replication estimate with varying weights	Approximation	Replication estimate with varying weights
Marital status					
Married-------------------	White	0.2	0.2	0.4	0.2
Widowed-------------------	White	3.1	3.0	0.7	0.7
Divorced------------------	White	3.3	3.2	1.2	1.2
Separated-----------------	White	-	0.6	2.5	2.6
Never married-------------	White	0.7	0.8	0.2	0.3
Marital status					
Married-------------------	Negro	4.4	3.8	2.4	1.3
Widowed-------------------	Negro	10.0	11.1	7.7	5.0
Divorced------------------	Negro	20.0	11.7	7.0	6.7
Separated-----------------	Negro	12.9	11.2	8.2	7.8
Never married-------------	Negro	10.5	7.3	3.5	2.7
Population-size group					
Giant metropolitan area---	White	0.7	0.7	0.5	0.5
Other very large metropolitan area-------------	White	0.6	0.7	0.6	0.6
Other SMSA----------------	White	0.9	0.9	0.9	0.8
Other urban area---------	White	0.7	0.7	0.6	0.6
Rural--------------------	White	0.6	0.6	1.1	1.1
Income					
Under $2,000--------------	White	1.1	1.1	0.6	0.9
$2,000-$3,999-------------	White	0.7	0.9	0.6	0.5
$4,000-$6,999-------------	White	0.5	0.6	0.6	0.5
$7,000-$9,999-------------	White	0.7	0.8	0.7	0.5
$10,000+------------------	White	0.7	1.0	1.0	1.1
Unknown-------------------	White	1.4	1.4	0.9	1.3

Small Numbers

In some tables magnitudes are shown for cells for which sample size is so small that the sampling error may be several times as great as the statistic itself.

Obviously in such instances the statistic has no meaning in itself except to indicate that the true quantity is small. Such numbers, if shown, have been included to convey an impression of the overall story of the table.

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APPENDIX III

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 other nonwhite race.

Population density.—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 density in each of three broad geographic locations. Because the Survey was started in 1960, the primary sampling units within each of the five population density classes were necessarily based on populations and definitions of the 1950 census. The name of each selected primary sampling unit within each population density class and geographic location, along with other selected sample data, are presented in an earlier report.[2]

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

Giant metropolitan areas.— This class includes nine primary sampling units defined in the 1950 census as a standard metropolitan statistical area (SMSA) and having a population of 3,000,000 persons or more.

Other very large metropolitan areas.—Included in this class are six 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 nine other SMSA's selected as primary sampling units. With one exception—Providence, R.I.—all had less than 500,000 population.

Other urban.—This includes eight primary sampling units which were highly urban in composition but were not defined in 1950 as standard metropolitan areas.

Rural.—This includes 10 primary sampling units which were primarily rural in composition according to 1950 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:

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.

Location of residence terms.—This term refers to urban or rural place of residence of the sample persons. For the first six primary sampling units at which examinations were conducted, the definition of urban and rural was the same as that used in the 1950 census. These locations were Philadelphia, Pa., Valdosta, Ga., Akron, Ohio, Muskegon, Mich., Chicago, Ill., and Butler, Mo. For the remainder of the sampling units the 1960 census definitions were used.

The change from 1950 to 1960 definitions is of small consequence in the Survey, since only six locations were affected, and the major difference is the designation in 1960 of urban towns in New England and of urban townships in New Jersey and Pennsylvania.

According to the 1960 definition, the urban population comprises all persons living in (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 contain no incorporated municipalities as subdivisions and have either 25,000 inhabitants or more or a population of 2,500-25,000 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 have no incorporated municipalities within their boundaries and have a density of 1,500 persons or more per square mile; and (e) unincorporated places of 2,500 inhabitants or more not included in any urban fringe. The remaining population is classified as rural.

Size of place.—In this Survey the urban population is classified as living "in the central city" or "outside the central city" of an SMSA. The remaining urban population is classified as "not in SMSA."

The definitions and titles of standard metropolitan statistical areas 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 involves two considerations: first, a city or cities of specified population to constitute the central city and to identify the county in which it is located as the central county; and, second, economic and social relationships with contiguous counties which are metropolitan in character so that the periphery of the specific metropolitan area may be determined.

Persons "in the central city" of an SMSA are therefore defined as those whose residency is in the city appearing in the stand and metropolitan statistical area title. Persons residing in an SMSA but not in the city appearing in the SMSA title are considered to reside "outside the central city."

The remaining population is allocated into rural-farm and rural-nonfarm groups. The farm population includes all persons living in rural territory on places of 10 or more acres from which sales of farm products amounted to $50 or more during the previous 12 months or on places of less than 10 acres from which sales of farm products 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.

Employment status.—This term applies to the employment status of persons during the 2-week period prior to the week of interview. It is not intended that this term define the labor force or provide estimates of the employed or unemployed population at the time of the survey.

Persons who reported that they either worked at or had a job or business at any time during the 2-week period prior to the week of interview were considered employed. This includes paid work as an employee of someone else, self-employment in business, farming, or professional practice, and unpaid work in a family business or farm. Persons on layoff from a job and those who were absent from their job or business because of temporary illness, vacation, strike, or bad weather are considered as employed if they expected to work as soon as the particular event causing their absence no longer ex-

isted. Free-lance workers are considered as currently employed if they had a definite arrangement with one or more employers to work for pay according to a weekly or monthly schedule either full time or part time. Excluded are such persons who have no definite employment schedule but work only when their services are needed. Also excluded are (1) persons receiving revenue from an enterprise in whose operation they do not participate, (2) persons doing housework or charity work for which they receive no pay, and (3) seasonal workers during the portion of the year they were not working. (It should be noted that these data were not collected for Philadelphia.)

Occupation.—A person's occupation may be defined as his principal job or business. For the purposes of this Survey the principal job or business of a respondent is defined in one of the following ways. If the person worked during the 2-week-reference period of the interview or had a job or business, the question concerning his occupation (or what kind of work he was doing) applies to his job during that period. If the respondent held more than one job, the question is directed to the one at which he spent the most time. It refers to the one he considers most important when equal time is spent at each job. A person who has not begun work at a new job, is looking for work, or is on layoff from work is questioned about his last full-time civilian job. A full-time job is defined as one at which the person spent 35 or more hours per week and which lasted 2 consecutive weeks or more. A person who has a job to which he has not yet reported and has never had a previous job or business is classified as a "new worker."

The occupational groups are shown below with the appropriate census code categories.

Occupational title	*Census code*
Professional, technical, other kindred workers, and managerial	R,000-195, 250-285
Farmers and farm managers	N, 222
Clerical and sales workers	S, Y, Z, 301-395
Craftsmen, foremen, and kindred workers	Q, 401-545
Operatives and kindred workers	T, W, 601-721
Private household and service workers	P, 801-803, 810-890
Farm and other laborers (except mine)	U, V, X, 901, 905, 960-973
Unknown (including new workers)	995 and all other codes

(U.S. Bureau of Census, 1960 Census of Population, Classified Index of Occupation and Industries, U.S. Government Printing Office, Washington, D.C., 1960). This information was not collected for Philadelphia and Valdosta.

Education.—Each person is classified by education in terms of the highest grade of school completed. Only grades completed in regular schools, where persons are given a formal education, are included. A "regular" school is one which advances a person toward an elementary or high school diploma or a college, university,

or professional school degree. Thus, education in vocational, trade, or business schools outside the regular school system is not counted in determining the highest grade of school completed.

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, help from relatives, and so forth.

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.

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