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<https://doi.org/10.18297/etd/1878>

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UNIVERSITY OF LOUISVILLE

THE EPIDEMIOLOGICAL PHASE OF
SYPHILIS CONTROL IN LOUISVILLE

A Dissertation

Submitted to the Faculty

Of the Graduate School of the University of Louisville

In Partial Fulfillment of the

Requirements for the Degree

Of Master of Science

Department of Bacteriology

By

Gracie Raymond Rowntree

Year

1940

NAME OF STUDENT: Gracie Raymond Rowntree

TITLE OF THESIS: The Epidemiological Phase of Syphilis
Control in Louisville

APPROVED BY READING COMMITTEE COMPOSED OF THE
FOLLOWING MEMBERS:

NAME OF DIRECTOR: _____

DATE: Dec. 30, 1940

**The Epidemiological Phase of
Syphilis Control in Louisville**

56634

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Introduction

The purpose of this study is to show that the epidemiological investigation of cases of early syphilis is a feasible and practical method for discovering new cases of syphilis.

To accomplish this purpose, an epidemiological study was made of all early cases of syphilis admitted to the Louisville City Hospital from July 1, 1937, to June 30, 1938.

In order to obtain a more complete picture of the problem of syphilis in Louisville, some data on the incidence of the disease, the results of blood testing of selected groups, and the increase in the number of treatments given in public clinics are included.

Because of the large number of syphilis cases lapsing from treatment, a study of the reasons for these lapses was undertaken. Information on the results of this study is also included.

Part I

Some Phases of the Syphilis Problem
in Louisville

Incidence of Syphilis in Louisville

Data concerning the prevalence and incidence of syphilis in the United States are based on statistical determinations from various sections of the country. Figures on prevalence (the number of cases constantly under treatment) are founded usually on one day surveys in representative areas (1). State and local health officers are requested to report the number of cases under treatment on a given day. No such survey has been made in Louisville. The only means of arriving at an approximate figure for prevalence in Louisville would be to apply data found in similar communities where surveys of treatment sources have been undertaken.

The incidence of syphilis (annual attack rate) is based on the number of cases who seek treatment for syphilis annually. While reporting is still incomplete, as some physicians continue to be lax in reporting cases coming to them for treatment, it is a much more reliable index today than it was several years ago. The campaign against syphilis has included education of the physician as well as the patient, and the increase in reported cases in Louisville, following the initiation of the syphilis control program, is shown in this study. Data with reference to the incidence of syphilis in Louisville are based on figures obtained from reported cases. The incidence for 1939 was 8.6 per 1000.

Reported Cases in Louisville - Cases of syphilis reported to the Louisville Health Department, year by year, in the ten year period from 1930 through 1939 are presented in Table 1 and Graph I. A considerable increase may be noted in the number of cases reported during this period. This does not mean that we have more syphilis now than we had ten years ago; it means that more syphilis is now coming to the attention of the Health Department. Reference to Graph I will show that reporting of syphilis cases in Louisville began to assume a decidedly upward trend in 1933 and that this trend was markedly accelerated by the intensive nation-wide campaign for syphilis control inaugurated early in 1936.

In 1937, the present intensive local syphilis control program was started in Louisville. This further stimulated the reporting of cases by private physicians and also increased the number of cases appearing for the first time in clinics. The flood of publicity which swept the country in 1936 and continued in Louisville in 1937 and 1938 brought to medical attention not only persons newly infected with syphilis but many who had had syphilis over a period of years. Mass blood testing, along with epidemiological methods in finding new cases, also played a part in making more cases known. The sudden public interest in the disease made physicians "syphilis conscious" and more diagnoses were made. This, in turn, led to better reporting.

Table 1

Cases of Syphilis Reported in Louisville:

1930 - 1939

Year	Cases
1939	2744
1938	3768
1937	2191
1936	1618
1935	847
1934	750
1933	809
1932	138
1931	55
1930	93

Graph I

In 1938, 3768 cases of syphilis were reported - an incidence of 12 per one thousand population. This large number of cases represented persons brought to the attention of the Health Department for the first time, either through presenting themselves to private physicians or to public clinics for treatment.

In 1939, there was a drop in the number of persons with syphilis presenting themselves for treatment for the first time. This may reflect an actual decrease in the number of persons with syphilis, in that persons dismissed as cured, and many of those still under treatment had ceased to be infectious. While it is not safe to make any definite deduction from figures for one year, it is the opinion of most investigators that the number of cases of syphilis is actually decreasing. It may be reasonably assumed, then, that the trend will be downward and that fewer cases may be expected in 1940.

The attack rate for syphilis differs widely with age. It is known also that the attack rate differs with color and geographical distribution. Roberts and Williams (2) found in Gibson County, Tennessee, a syphilis prevalence rate of 17 and 108 per thousand for the white and colored population, respectively. Reports show higher rates for Southern than for Northern States. This is, no doubt, due to the high percentage of syphilis among Negroes. It has also been found that there are regional differences in the Northern States. Incidence rates are higher in the Eastern than in the Western States.

In selected population groups the incidence of syphilis varies from two to two hundred persons per one thousand population (1).

Reported Cases by Stage - The cases of syphilis reported in Louisville for the years 1937, 1938 and 1939 were classified as early, late and congenital (Table 2). The early cases included those with primary and secondary lesions. Cases found positive for syphilis serologically but with no clinical symptoms, having histories of exposure within one year, were also placed in the early classification. The cases classified as late included all other cases except the congenital.

The number of early cases in relation to the total cases reported have decreased for the three years studied. In 1937, 36 per cent of the total cases reported were in the early stage; in 1938, 20 per cent; and in 1939, 14 per cent (Table 2). The decrease of early cases in 1939 probably resulted, partially, from the fact that many of the most infectious cases, 781 in 1937 and 772 in 1938, were placed under treatment, thus helping to reduce the sources of fresh infection in the population. This, in turn, reduced the number of persons with new infections seeking treatment. Some of the late cases were still in an infectious or potentially infectious stage, and treatment of these cases, rendering them non-infectious, was a contributing factor in the decline of new infections in the total population. Here we find another reason for the drop in early cases reported in 1939. In estimating the number of cases of early syphilis in a given population group, the data from Smith and Brumfield (3), is interesting. These investigators found that for every two individuals with early

Table 2
 Reported Cases of Syphilis by Stage:
 Louisville 1937, 1938, 1939

Stage	1937		1938		1939	
	No. Cases	% of Total	No. Cases	% of Total	No. Cases	% of Total
Early *	781	36	772	20	393	14
Late**	1273	58	2907	77	2290	84
Congenital	137	6	89	3	61	2
Total	2191	100	3768	100	2744	100

* Early syphilis represents the primary, secondary and other cases under one year.

** Late syphilis represents all other cases except congenital.

Graph II

syphilis who seek treatment there are three exposed contacts infected. Seven hundred eighty one early cases of syphilis applied for treatment in Louisville in 1937. According to this finding, approximately 1171 other individuals may have acquired syphilis in Louisville in that year.

The proportion of late cases of syphilis reported to the Health Department increased for each year noted. The percentage of late cases increased from 58 in 1937 to 77 in 1938 and 84 in 1939. (Table 2). The rise in the proportion of late cases may be attributed, in part, to the same factor which caused a rise in the total number of cases reported. Publicity attendant on the inauguration of the syphilis control program brought individuals to private physicians and clinics for blood tests, while routine blood testing of groups brought to light many unsuspected cases of long standing. Potentially infectious latent cases found through epidemiological investigation of early cases also increased the proportion of late cases reported.

In the three years studied there was a continuous decline in total cases of congenital syphilis. Congenital syphilis represented 6 per cent of the total cases reported in 1937; 3 per cent in 1938; and 2 per cent in 1939 (Table 2). The fact that prenatal patients are presenting themselves in the clinics earlier in pregnancy, thus aiding in earlier discovery of syphilis, and that a closer check is being maintained on continuous treatment for pregnant mothers may help to explain this finding.

Results of Serological Tests on Selected Groups in Louisville

In planning a syphilis control program in a community, one of the first needs is for information on the extent of the problem in that community. Several methods of approaching a true figure for the amount of syphilis in a given area have been employed. These methods include the one day survey of all cases under treatment and the number of cases reported annually. Another method is the serological examination for syphilis of selected groups in the population.

Vonderlehr and Usilton (4) showed in a study, based on the annual attack rate applied to 100,000 individuals born alive and followed throughout life, that one out of ten persons acquires syphilis at some time in his or her life. Rates found on routine serologic examination of persons in any random sample of the population are much lower than this figure of one in ten. Vonderlehr and Usilton give the following reasons for the difference: (a) many persons in a random sample may not yet have acquired syphilis but will acquire it later in life; (b) the blood test for syphilis may become negative, either spontaneously or as the result of treatment; (c) a large proportion of those who are infected die as a result of the disease. The combination of these factors, according to the investigators, leads to the probability that only one in 100 individuals in a random sample of the population will be found to have or to have had syphilis. As an illustration they point to the fact that in routine blood testing of applicants for marriage licenses only one per cent is found positive. In this group,

persons in the younger age groups predominate. The reason for the lower rate is that a large proportion have not yet attained the age at which syphilis is most frequently acquired.

In Louisville, beginning in 1937, group blood testing was done on a number of widely different population groups. The results are shown in Table 3.

Serological tests on 782 members of the Police and Fire Departments showed 8 per cent positive for syphilis. Employees of the Louisville City Hospital and the City Health Department were tested for syphilis. Five per cent of the hospital employees had positive tests and 4 per cent of the employees in the Health Department were positive. Results of serological tests on 1472 employees in six industrial plants in the city show 4 per cent positive. Figures on routine blood testing of industrial workers in other cities show similar results. In one industry near Chicago, 5 per cent of the workers were found to have positive tests (5). Tests totaling more than 66,000, with 3 per cent positive, were made in a group of industries in Chicago. Reports show that 4.7 per cent of a group of 10,000 railway workers had positive serological tests. In Milwaukee an industrial physician performing examinations for many small industries reported 4 per cent positive serological tests in 16,000 examinations (5).

Serological examinations were made on the pupils in three of the colored high schools in Louisville. Results showed 4 per cent of the 1113 tests were positive. This figure seems relatively low for the colored race, but the majority of these children were in junior high schools in the age group 11 to 15. In the general population, studies show 5 per cent positive for colored children in this age group (1).

Table 3
Results of Blood Tests* on Selected Groups
in Louisville: 1937 to 1940

Groups	Number Tested	Number Negative	Number Positive	Percent Positive
Police and Fire Departments	782	718	64	8
City Hospital Employees	416	395	21	5
Health Department	95	91	4	4
Industrial Plants	1472	1411	61	4
Colored High Schools	1113	1072	41	4
Domestic Servants	150	121	29	19
Prostitutes	322	116	206	64
Workhouse	1014	698	316	31
Routine Admissions to City Hospital	11628	10812	816	7
University of Louisville	1440	1439	1	0.07

* Standard Kahn Tests performed in The Bacteriological and Serological Laboratories at the Louisville City Hospital.

A domestic servants clinic was started in the Louisville City Hospital the latter part of 1939. Domestic employees are sent by employers for a complete examination. Blood tests are made as a part of this examination. To date results show 19 per cent positive. This high incidence is probably due to the large number of colored individuals in the group - a total of 114 out of 150 examined. This figure of 19 per cent positive is slightly higher than that found in examinations of domestics in Newark, New Jersey, where a syphilis rate of 17 per cent was found in 24,000 examinations of both white and colored (6).

In the spring of 1938, through the joint efforts of the Police Department and the Health Department, 322 prostitutes were brought to the City Hospital for examination. Two hundred and six, or 64 per cent, had positive serological tests. All these women were prostitutes living in open houses of prostitution.

A high incidence of syphilis was found among the inmates of the workhouse in Louisville. Of the 1014 prisoners tested, 31 per cent were positive. An article in the American Journal of the Medical Sciences (7) reports, among 119,000 individuals representing the average prison population for Federal and State prisons in the United States, from 16 to 17 per cent have positive blood tests. An Ohio penitentiary reports 18 per cent positive blood tests (7). An average of 29 per cent positive serological tests is reported among short-term prisoners in a penitentiary in Eastern Tennessee (7). This figure is perhaps more comparable to the figure of 31 per cent

positive found in Louisville, because the proportion of colored in the two groups is more nearly the same and the term of imprisonment is similar.

Routine Kahn tests on all persons admitted to the Louisville City Hospital in 1937 numbered 11,628. Of this number 7 per cent were positive (8). In Toronto General Hospital (9) the percentage of routine serological tests positive for syphilis was 1.5 in 1935. In another hospital in Toronto positive tests of patients admitted over a period of five years averaged 2 per cent. The higher percentage of positive tests in Louisville may probably be accounted for by the larger proportion of Negroes in the population.

Serological tests for syphilis were made on students in the University of Louisville over a two year period. Serological tests on this group were not taken routinely on every student. The examination was on a voluntary basis. Only one student in this group of 1440 had a positive reaction. This very low incidence of .07 per cent should not be taken as an indication of the incidence of syphilis in the college population because of the fact that the testing was done on a voluntary basis. Diehl found an incidence of 0.3 per cent positive in 5000 examinations of students in the University of Minnesota (10). In 78,388 tests given white students in representative colleges in the United States, Vonderlehr reports approximately 0.2 per cent positive (11).

Treatments in City Clinics

The number of syphilis treatments given in the Louisville public clinics have been tabulated by months for 1937, 1938 and 1939. (Table 4).

The monthly average of treatments for syphilis in Louisville public clinics during the fiscal year 1935-36 was a little more than two thousand. This monthly average had varied little in the previous ten years.

In February 1937, relatively few treatments were given at the City Hospital clinics because of the flood emergency (Graph III). The syphilis control program was organized as a part of the City Health Department in April, 1937. The upward trend in the number of treatments given in the public clinics began in June of the same year. In that month one new outlying treatment clinic was started in the eastern section of the city and in October a second in the central section was started for Negroes. The opening of these outlying clinics decreased, in a small measure, the number of patients in the City Hospital clinics for the remainder of 1937. By January 1938, however, there was an appreciable increase in the number of patients going to the outlying clinics and about this same period attendance at the City Hospital clinics also increased. This was probably due to publicity and follow-up work, as has been explained in the discussion on reported cases.

In March, 1939, the peak was reached in the treatment clinics;

Table 4

Number of Treatments for Syphilis in Louisville Public Clinics

By Month, 1937, 1938, 1939

		City Hosp.	East	Central	Work House	Portland	High. Park	Total
1937	Jan.	1364						1364
	Feb.	692						692
	Mar.	2086						2086
	Apr.	2845						2845
	May	2601						2601
	June	2811	55*					2866
	July	3012	65					3077
	Aug.	3002	78					3080
	Sept	3197	91					3288
	Oct.	3575	111	130*	57*			3873
	Nov.	3038	185	467	60			3750
	Dec.	3060	86	515	294			3955
1938	Jan.	4193	134	698	167			5192
	Feb.	4283	149	730	189			5351
	Mar.	4659	171	1029	169			6028
	Apr.	5544	167	912	234			6857
	May	5587	252	999	157			6995
	June	6318	244	1238	137			7937

Table 4 (Continued)

		City Hosp.	East	Central	Work House	Portland	High. Park	Total
1938	July	6178	170	1027	245			7620
	Aug.	6557	286	1320	237			8400
	Sept	6258	180	1062	217			7717
	Oct.	6685	297	1487	237			8706
	Nov.	6269	243	1302	138			7952
	Dec.	6835	222	1227	193			8477
1939	Jan.	7340	320	1424	129			9213
	Feb.	7082	256	1300	145			8783
	Mar.	8733	288	1543	133			10697
	Apr.	7536	317	1343	199			9394
	May	8253	404	1631	115			10403
	June	8412	294	1435	70			10211
	July	7346	373	1418	131			9268
	Aug.	6612	291	1269	126			8298
	Sept	7303	220	1384	132			9039
	Oct.	7055	325	1454	98	169*	50*	9151
	Nov.	7036	380	1669	82	217	93	9477
	Dec.	5804	284	1183	121	255	59	7706

* Clinic organized in this month.

Total number of treatments for Syphilis in Louisville Public Clinics by months, 1937, 38, 39.
(Showing number of treatments in City Hospital & Outlying Clinics.)

Graph III

since then the trend has been downward. This was as expected, since the period of treatment for syphilis is about one and one-half years, and many patients had been dismissed from the clinics as apparently cured. This downward trend coincides with the decline in the number of cases reported.

Study of Reasons for Cases Lapsing from Treatment

Follow-up of patients lapsing from treatment is a vital part of the program for the control of syphilis. The standard for minimal treatment for syphilis, according to the Cooperative Clinic Group, is 40 weeks, 20 weekly injections of an arsenical and 20 weekly injections of mercury or bismuth. Studies made in the University of Virginia Hospital clinic show that 58 per cent of patients with early infectious syphilis lapse before receiving this minimum standard of treatment (12).

Cost of successful follow-up service varies in different clinics. The cost of follow-up service at the University of Pennsylvania Syphilis Clinic is estimated at \$ 5.99 per patient (12). The workers in the New Jersey Division of Venereal Disease Control state that they have found from their experience in case holding that most patients with syphilis will assume partial responsibility for securing regular treatment if they are given (a) an understanding of the reasons for treatment, (b) adequate facilities for treatment arranged at convenient hours, (c) medical care at the hands of skilled and sympathetic personnel (13).

It was found that a large proportion of cases in the Louisville public clinics were lapsing from treatment. In an effort to determine causes for these lapses, a study was made early in 1938. Follow-up visits were made in the homes of delinquent patients. Reasons given by the patients for discontinuing treatment are shown in Table 5.

Table 5

Reasons Given by 244 Patients for Lapsing from Treatment

	No.	% of Total
1. Did not understand reason for continuing treatment	64	26
2. Had a job and could not come at time of clinic	30	12
3. Was ill with disease other than syphilis	26	11
4. Could not afford carfare	22	10
5. Could not afford clinic fees	19	9
6. Had to wait too long in clinic	15	6
7. Had reaction from treatment causing loss of work	14	6
8. Was temporarily out of the city	11	4
9. Had duties at home which prevented attendance	11	4
10. "Just didn't know why."	7	3
11. Was afraid of being "stuck with needle."	6	2
12. Said clinic workers were rude to him	5	2
13. Was in jail and only recently released	5	2
14. Was under treatment elsewhere	3	1
15. Had not sufficient clothes to wear	2	1
16. Was ashamed to have it known that he has syphilis	2	1
17. Said clinic was too far away	1	0
18. Was too tired to come to clinic	1	0
	244	100

Of the 244 patients questioned, 64, or 26 per cent, indicated lack of understanding as to necessity of continuing treatment. About half of the 64 patients failed to appreciate the importance of regular treatment; others thought they were cured, and a few said treatment seemed to have no effect. Some said they were not told to return. Thus more than 26 per cent of the patients gave evidence that when the diagnosis was made, they were not properly instructed as to the nature of the disease and the importance of long continued treatment. Here is a large factor in delinquency that might easily be remedied. Ten minutes given to education of the new patient as to the nature of his disease and the far-reaching consequences of neglect of adequate treatment would do much in keeping the patient coming to clinic.

Case holding methods depend for their success chiefly on the well instructed and well informed patient. In successful caseholding, it is necessary to grasp every opportunity to teach the patient in the clinic, in the office, and in the home. Stokes believes that the first interview with the patient with syphilis is of great importance in the successful handling of the patient (14). In addition to this first interview, it is advisable, from time to time, to have further interviews with the patient. Talks to the clinic group as a whole on the reasons why they should continue their treatment are an additional aid in instruction. Education involves the interpretation of the disease to the patient and aids him in making the needed

readjustments in his life. The patient must be made to feel that the personnel in the clinic have a regard for his welfare and a kindly, sympathetic understanding of the situation in which he finds himself.

The second most frequent reason given for not attending clinic was that the patient had a job which interfered with his attendance. This answer was advanced in 12 per cent of instances. Clinics should be held at various times during the day, and on various days, so that those who are employed may receive treatment at their convenience. This situation has been met, to a large extent, by having clinics at an early hour in the morning, at noon and in the evening.

Third in frequency was the statement that the individual was ill with a disease other than syphilis. This occurred in 11 per cent of instances and, probably, was only an excuse.

The next two reasons in order of frequency were economic. These causes for delinquency may be adjusted in clinics by furnishing carfare and by making the treatments available without charge to those who cannot afford to pay. Carfare can also be saved by establishing more outlying clinics.

Another important factor in delinquency was that the patient had to wait too long in the clinic. This, too, may be remedied by having a larger number of small clinics. These smaller clinics also have an advantage, in that more individual care can be given each patient.

Only 14 out of the 244 individuals, or 6 per cent, stated that reactions from treatment severe enough to cause them to miss work deterred them from coming to clinic. Better technic in administering treatment and better trained clinic workers undoubtedly are a factor in this regard.

The rest of the reasons apparently are merely excuses for missing treatment. Little can be done on the part of the clinic administration to prevent these.

In the syphilis clinic of the University of Pennsylvania Hospital a similar survey was made of the reasons given by patients for discontinuing their attendance (14). When these reasons were classified, it was found that financial difficulties, unsuitability of hours, shortcomings of clinic personnel, and painful reactions to treatment were the largest factors in non-attendance. Stokes believes that 85 per cent of the reasons for lapse could be prevented or adjusted to some extent.

In the Louisville study about 75 per cent of the reasons might be prevented or adjusted to some degree.

Part II

Epidemiological Study on 524 Cases of Early Syphilis

In an effort to obtain more detailed information on early cases, an epidemiological study of 524 cases of early syphilis was undertaken. These cases represented 30 per cent of the 1729 total syphilis cases admitted to the Louisville City Hospital clinic from July 1, 1937, through June 30, 1938. *

The 524 cases selected for this study were all classified as early syphilis. These early cases included persons with primary and secondary lesions and those with a history of syphilis of less than one year duration.

The 524 cases represented only those patients admitted to the Louisville City Hospital clinic during the fiscal year 1937-38 and did not include early cases reported by private physicians or outlying clinics.

The characteristics of this group of 524 cases were analyzed in regard to social status, case status and contacts. The social status analysis included age, sex, color, marital status, employment status, geographical distribution, method of admission and whether transient or permanent. Case status investigation embraced stage of disease and interval before treatment. Investigation of contacts was a case finding procedure, designed to determine the number of early cases having contacts, the contact exposures of early cases and the reports on such contacts.

* Hereafter when 1937-38 is recorded, it will refer to the fiscal year July 1, 1937, through June 30, 1938.

Social Status

Age - Classifying the 524 early cases of syphilis according to age (Table 6 and Graph IV), it was found that the highest proportion fell in the age group 20 to 24. This represented one-third of the total cases. Parran (1) reports, in a study on age incidence, based on 6669 cases of syphilis in all stages, that the largest proportion was found in the age group 21 to 25.

In the present study, the next highest proportion was in the age group 25 to 29 years. More than one-half of the cases (56 per cent) were in the age group 20 to 29 years. The mean age at which infection with syphilis occurs, as given by Vonderlehr and Usilton, is from 20 to 28 years (15).

There was a marked preponderance of females with early syphilis in the age group 15 to 19 (Table 7 and Graph V). More than twice as many females as males were in this age group. The percentage of females exceeded that of the males for both the white and colored races in age groups 15 to 19 and 20 to 24. Females slightly exceeded males in the age group 20 to 29. After 30 years of age the males outnumbered the females. This would indicate that females acquire syphilis at an earlier age than males. One explanation of this may be that females attain sexual maturity at an earlier age than males.

When the age at which infection occurs is considered by color alone (Table 6 and Graph IV), the proportion of cases does

Table 6

Early Cases of Syphilis by Age and Color: 1937-38

Age	White		Colored		Total	
	No.	% of Total	No.	% of Total	No.	% of Total
Under 15	0	0	3	1	3	1
15-19	27	11	45	15	72	14
20-24	74	32	104	35	178	34
25-29	48	21	68	23	116	22
30-34	33	15	28	9	61	12
35-39	18	8	24	8	42	8
40-44	8	4	10	3	18	3
45 & over	16	9	18	6	34	6
Total	224	100	300	100	524	100

AGE DISTRIBUTION OF 524 EARLY CASES OF SYPHILIS; BY RACE

LOUISVILLE 1937-1938

White

Negro

Percentages of Early Syphilis Cases

50

40

30

20

10

0

Under 15

15-19

20-24

25-29

30-34

35-39

40-44

45 and over

Age Groups
Graph IV

Table 7

Early Cases of Syphilis by Age, Sex, Color: 1937-38

Age Group	White				Colored				Total			
	Male		Female		Male		Female		Male		Female	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Under 15	0	0	0	0	0	0	3	2	0	0	3	1
15-19	11	9	16	17	12	8	33	22	23	9	49	20
20-24	40	32	34	35	49	34	55	36	89	33	89	36
25-29	28	22	20	20	32	22	36	23	60	22	56	22
30-34	22	18	11	11	13	9	15	10	35	13	26	10
35-39	8	6	10	10	19	13	5	3	27	10	15	6
40-44	4	3	4	4	8	5	2	1	12	4	6	2
45 & over	13	10	3	3	13	9	5	3	26	9	8	3
Total	126	100	98	100	146	100	154	100	272	100	252	100

AGE DISTRIBUTION OF 524 EARLY CASES OF SYPHILIS; BY SEX

LOUISVILLE 1937-1938

MALE

FEMALE

50

40

30

20

10

0

Under 15

15-19

20-24

25-29

30-34

35-39

40-44

45 and over

Age Groups

Graph V

not vary greatly in any age group. One difference noted is that there is a larger proportion of cases among the colored population under 20 years of age than among white. This preponderance of colored patients over white patients in this age period may be attributed to the greater percentage of colored females than white females under the age of 20 (Table 7 and Graph V). It would appear that colored females acquire syphilis at an earlier age than white females. This is indicated by the studies of 6669 cases of syphilis in all stages, as reported by Parran (1), wherein it was found that 41 per cent of the total colored females fell into the age group 16 to 20 years as against 30 per cent of the total white females in the same age group. It is acknowledged that the colored female, probably because of poor intellectual environment and housing conditions, has sexual experiences earlier than the white female. This is a possible explanation for the findings.

Sex - There was no significant difference in the number of male and female cases of early syphilis in the group studied (Table 9). The proportion of white male cases was not significantly different from the proportion of negro male cases. Of the total male cases, 46 per cent were white and 54 per cent were colored (Table 8). However, when females are considered by color, the number of colored females was significantly greater than the number of white females. One hundred fifty-four, or 61 per cent, of the 252 female cases, were colored and 98, or 39 per cent, white.

The higher frequency of colored females in the group is probably due to several factors. One is the greater incidence of syphilis in the colored race; another is the lower economic status of the colored race, making it more necessary for them to seek care in public clinics. Two other factors which apply only to females are; first, colored domestic servants are sent to the clinic for serological tests, and second, more colored females than white are examined in gynecological clinics, thus increasing the chance of finding the infection.

Table 8

Early Cases of Syphilis, by Sex and Color: 1937-38

	Males		Females		Total	
	No.	%	No.	%	No.	%
White	126	46	98	39	224	43
Colored	146	54	154	61	300	57
Total	272	100	252	100	524	100

Table 9

Early Cases of Syphilis, by Sex: 1937-38

	No.	%
Male	272	52
Female	252	48
Total	524	100

Color - Of the 524 cases of early syphilis coming to the City Hospital clinic, 300, or 57 per cent, of the total were colored (Table 8). Approximately one-sixth of the population of Louisville is colored, yet there were more Negroes than white persons in this group of early cases. Probably the reason for this is that there is more syphilis among the colored than among the white and fewer Negroes are able to go to private physicians for care.

That there is more syphilis in the colored race than in the white is borne out by the following data. The annual attack rate for syphilis in Kentucky in 1938-39 was found to be 1.4 per one thousand population for whites and 15.3 per thousand for colored (16). In Chicago, a rate of 2.7 per thousand for the whites and 30.2 for the Negro was reported in 1937 (17). Group blood testing surveys among young colored adults in Memphis and Shelby County, Tennessee, have revealed the presence of syphilis in 300 per one thousand population (18).

Marital status - The largest percentage of cases among both the white and the colored occurred in the single group (Table 10). This was to be expected since single individuals are probably more promiscuous than married persons.

A larger proportion of colored than white were found to be single, while a smaller proportion of colored gave their status as divorced. There is a tendency among Negroes to state that they are single, even though they have been married and are not living with the marital partners. Experience has shown that in the Negro, questions as to marital status are less likely to be accurately answered. The smaller percentage of colored in the divorced group may be due to the fact that fewer Negroes than white persons obtain divorces.

There was a much larger proportion of males than females in the single group. Fifty per cent of the total males stated that they were single, as compared to 34 per cent of the females (Table 11). This would seem to indicate that the unmarried male is exposed to syphilis oftener than the unmarried female. Nelson, in a study of 20,000 cases in Massachusetts, reported the syphilis rate per 100,000 to be highest for the single male (19). He stated also that after marriage the rates for both male and female are more nearly the same. A similar situation was disclosed by the present study.

Twice as many females as males were reported as separated. Lack of means of support and the necessity of resorting to prostitution may be factors here.

Table 10
Cases of Early Syphilis According to Marital Status,
by Color: 1937-38

	White		Colored		Total	
	No.	%	No.	%	No.	%
Single	81	36	141	47	222	43
Married	58	26	85	28	143	27
Widowed	14	6	11	4	25	5
Divorced	22	10	11	4	33	6
Separated	49	22	52	17	101	19
Total	224	100	300	100	524	100

Table 11
Cases of Early Syphilis According to Marital Status,
by Sex: 1937-38

	Male		Female		Total	
	No.	%	No.	%	No.	%
Single	137	50	85	34	222	43
Married	76	28	67	26	143	27
Widowed	11	4	14	6	25	5
Divorced	13	5	20	8	33	6
Separated	35	13	66	26	101	19
Total	272	100	252	100	524	100

Employment status - Three hundred and twenty-six cases, or 62 per cent, of the 524 cases of early syphilis were unemployed (Table 12). If a similar ratio of unemployed exists in the total group of individuals infected with syphilis, it indicates that the larger number of those infected cannot afford to pay for treatments. According to Vonderlehr (15), only 20 per cent of the population can pay the private physician's rates for adequate care of syphilis.

The proportion of employed colored females is greater than that of white females, probably because more colored women are employed as domestic servants. Even though more colored women than white are employed, the low wage scale of the colored domestic makes it more often necessary for her to go to the public clinic for treatment.

Table 12

Employment Status of 524 Early Cases of Syphilis;
by Color and Sex: 1937-38

	White				Colored				Total	
	Male		Female		Male		Female			
	No.	%	No.	%	No.	%	No.	%	No.	%
Employed	51	40	30	31	58	40	59	38	198	38
Unemployed	75	60	68	69	88	60	95	62	326	62
Total	126	100	98	100	146	100	154	100	524	100

Geographical distribution - A spot map showing the distribution in the city of the 524 early cases of syphilis is shown (Graph VI). This distribution corresponds to that of the total syphilis population in Louisville (20).

The areas of concentration of the 524 early cases are between Kentucky and Market and between Shelby and Twenty-First Streets. This part of the city is most densely populated. In part of this area are the rooming houses and many slum dwellings. A large number of persons in the lower economic group are living here. The majority of the Negro population lives in this section.

It must be remembered that the cases described are City Hospital clinic cases and these do not represent the entire number of early cases of syphilis. It is believed that the majority of early cases of syphilis in other sections of the city, notably the eastern section, go to private physicians for treatment.

Method of admission - Eighty-three per cent of the 524 patients came to the clinic voluntarily, either requesting a serological test or asking for medical care because of symptoms (Table 13). This large proportion of voluntary admissions may probably be attributed, in part, to the amount of publicity on syphilis released in Louisville during the period 1937-38. Ninety-one, or 17 per cent, were referred to the clinic by private physicians, or agencies, or were asked by follow-up workers to come in for examination as contacts of other cases.

Little difference is noted in the proportion of white and colored cases coming to the clinic voluntarily.

Table 13

Admissions of Patients to Clinic of Their Own Volition
or by Referral, by Color: 1937-38

	White		Colored		Total	
	No.	%	No.	%	No.	%
Voluntary	183	82	250	83	433	83
Referred	41	18	50	17	91	17
Total	244	100	300	100	524	100

Transients - Of the 524 early cases of syphilis admitted to the City Hospital Syphilis Clinic, 19 cases, or 4 per cent, were transients (Table 14). While 4 per cent is not a large proportion of the total cases, it indicates that the transient problem may be more serious than was at first thought. These 19 cases of early syphilis represent only the relatively few who were found. There may be many transients who are in an early infectious stage of syphilis and do not stay in one place sufficiently long to come to the attention of the health agencies.

The migrating individual with syphilis in the early, highly infectious stage probably exposes more persons to syphilis than the non-transient who remains in the same city.

Table 14

Transients among the 524 Early Cases Studied:

1937-38

	White		Colored		Total	
	Male	Female	Male	Female	No.	%
Transient	8	1	4	6	19	4
Not Transient	118	97	142	148	505	96
Total	126	98	146	154	524	100

Case Status

Stage - Early syphilis was further classified into (1) primary, (2) secondary, and (3) other early cases. Primary included patients coming in with primary lesions. Secondary included patients with secondary manifestations. Those placed under "other early" represented the remainder of the cases who gave histories of having been infected with syphilis within a year.

Of the 524 early cases of syphilis, two-thirds, or 67 per cent, had primary or secondary manifestations when seen for the first time in clinic (Table 15). These patients were in a highly infectious stage. The remaining 33 per cent showed no signs of syphilis at the time of admission, but had positive Kahn tests and histories of infection.

In the period from July 1, 1937, to June 30, 1938, 1729 cases of syphilis were admitted to the City Hospital Clinic. Of this number, 352, or 20 per cent, were in the primary and secondary stages. Thus only 20 per cent of the total number of cases admitted to the clinic in that period received treatment in the early stages of the infection. Comparison may be made between percentages found in Louisville, in Kentucky as a whole and in the City of Chicago (16).

Table 15

Classification of 524 Cases of Early Syphilis
by Stage, According to Sex: 1937-38

Stage	Male		Female		Total	
	No.	%	No.	%	No.	%
Primary	151	56	61	24	212	41
Secondary	50	18	90	36	140	26
Other early	71	26	101	40	172	33
Total	272	100	252	100	524	100

Table 16

Classification of 524 Cases of Early Syphilis
by Stage, According to Color: 1937-38

Stage	White		Colored		Total	
	No.	%	No.	%	No.	%
Primary	102	46	110	37	212	41
Secondary	65	29	75	25-	140	26
Other early	57	25	115	38	172	33
Total	224	100	300	100	524	100

As may be seen in Table 17, the percentage of total patients admitted with primary and secondary lesions is higher in Louisville than in Kentucky as a whole and in Chicago. This indicates that a larger percentage of patients in the early infectious stage is coming to the public clinic in Louisville for treatment than in Kentucky as a whole or in Chicago.

Table 17
Primary and Secondary Cases in Relation to
the Total Admissions

Clinics	Total Cases Admitted	Percentage Primary and Secondary
Louisville	1729	20
Kentucky	7057	18
Chicago	19000	15

More than 50 per cent of the early male cases were in the primary stage, while less than one-fourth of the early female cases were in this stage (Table 15). The reason for the predominance of males in the primary stage may be that the lesions are more readily noticed in the male.

A larger percentage of females than of males was found in the secondary group. The fact that women are more apt than men to notice skin eruptions may be a factor in this finding. Since a

greater proportion of males is discovered in the primary stage and placed under treatment, fewer go on to other stages of the disease. The converse applies to the females.

A larger proportion of white patients than of colored was found in the primary and secondary stages. Seventy-five per cent of the white, compared to 62 per cent of the colored, were found in these stages (Table 16). A partial explanation of this may lie in the fact that white persons seek medical care for illness more readily than colored.

Interval before treatment- In an effort to determine how soon the individual came under treatment after the appearance of the first signs or symptoms, an investigation was made. In only 16 per cent of the cases was diagnosis made within two weeks of the first signs and symptoms (Table 18). In 25 per cent two to four weeks elapsed between onset of symptoms and diagnosis. In other words, only 41 per cent of all the cases were placed under treatment less than one month after the first sign of the disease appeared. The 59 per cent who did not receive treatment until more than a month after the onset of symptoms represented a loss to society as well as to the individual. In proportion as the interval between onset of symptoms and admission to clinic is increased, so the period of infectiousness is increased with corresponding prolongation of danger to the public. The longer treatment is delayed, the less the patient's chances for cure. In 20 per cent, the time interval was not known.

The above findings emphasize the need for education of the public as to the significance of symptoms of syphilis. The aim of the educational program in syphilis control should be to make the signs and symptoms of syphilis as well known as the tuberculosis control program seeks to make those of tuberculosis. Had individuals with lesions suspected that they had syphilis, 80 per cent might have appeared for treatment under two weeks.

The proportion of white males coming for treatment under two weeks was about twice as great as that of white females. A partial

Table 18
Interval Between First Sign or Symptom and Diagnosis,
by Color and Sex: 1937-38

Time Interval	White				Colored				Total	
	Male		Female		Male		Female			
	No.	%	No.	%	No.	%	No.	%	No.	%
Under two weeks	25	20	11	11	20	14	30	19	86	16
Two to four weeks	33	26	33	34	32	22	34	22	132	25
Over four weeks	52	41	34	35	63	43	52	34	201	39
Not known	16	13	20	20	31	21	38	25	105	20
Total	126	100	98	100	146	100	154	100	524	100

explanation may be that the primary lesions are more evident in males than in females. For the colored group, however, a greater proportion of the females than the males came for diagnosis and treatment under two weeks. No explanation can be offered for this finding.

Investigation of Contacts as a Case-Finding Procedure

The tracing of sources and the follow-up of contacts of patients with syphilis is a direct epidemiological procedure which differs little from that used in the control of other communicable diseases. The procedure, however, in the case of sexual contacts involves a peculiar difficulty because of the unwillingness of the average individual to discuss sex matters. On the other hand, it is easier to determine the circumstances under which syphilis is acquired than in the case of other communicable diseases, because the person with syphilis, except the very promiscuous individual, usually knows when and from whom the infection was acquired. The number of contacts of each individual infected is, in most cases, limited; therefore, if the cooperation of the patient is obtained, the contacts can often be identified.

Number of early cases giving contacts - Inquiries were made of each of the 524 early cases of syphilis as to sexual contacts within sixty days of the appearance of first signs and symptoms (Table 19). Sixty-six per cent of the patients gave histories of contact only before the appearance of symptoms, whereas 23 per cent admitted having contacts both before and after the onset of symptoms. Because of the unwillingness of the patients to cooperate, no information on contacts could be obtained from 11 per cent. Clark and Sargent (21), in a similar study, found that 10 per cent of the patients refused to give information on contacts.

Table 19

Number of Cases with Early Syphilis Giving Contacts: 1937-38

Patients	Total	
	No.	%
Giving contacts within 60 days previous to date of first sign or symptoms	346	66
Giving contacts both previous to and subsequent to first sign or symptoms	119	23
Declining to give information on contacts	59	11
Total	524	100

If the statements of the patients are trustworthy, no other individuals were exposed to syphilis by the 66 per cent who gave histories of contacts only prior to the onset of symptoms. The 23 per cent who gave histories of contacts both before and after the visible manifestations of the disease did, however, play a definite part in the spread of syphilis. The fact that the latter comprised nearly one-fourth of the total early cases investigated emphasized the prime importance of bringing all infectious cases under immediate treatment.

Contact Exposures of Early Cases - The 524 early cases were questioned as to the number of different individuals with whom each had contact within sixty days prior to onset of symptoms. The majority of cases, 55 per cent of the total, reported having had one contact. Thirty-four per cent gave two or more contacts, while the remainder, 11 per cent, declined to give information on contacts (Table 20).

Table 20
Number of Early Cases Having Had One, Two,
Three or More Contacts: 1937-38

Patients	Total	
	No.	%
Giving one contact	287	55
Giving two contacts	94	18
Giving three or more contacts	84	16
Declining to give information on contacts	59	11
Total	524	100

Considered by sex, a greater proportion of females gave only one contact, while a much larger proportion of males gave three or more contacts (Table 21). This would indicate that males are more promiscuous than females. The highest proportion of cases reporting three or more contacts was in the colored male. The colored male apparently is the most promiscuous in his sexual relations.

Table 21

Number of Patients Having Had One, Two or Three or More Contacts
by Color and Sex: 1937-38

Patients	White				Colored				Total			
	Male		Female		Male		Female		Male		Female	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Giving No Contacts	13	11	16	17	18	12	12	8	31	12	28	11
Giving One Contact	65	52	57	58	66	45	99	64	131	48	156	62
Giving Two Contacts	22	17	15	15	25	17	32	21	47	17	47	19
Giving Three or More Contacts	26	20	10	10	37	26	11	7	63	23	21	8
Total	126	100	98	100	146	100	154	100	272	100	252	100

Report on Contacts Given by Early Cases of Syphilis - The number of contacts of the 524 early cases investigated are shown in Table 22.

Of the 759 contacts given, almost one-third, or 243, were located and brought in for examination. More than two-thirds of the 759 contacts could not be located because of insufficient identifying information. A larger proportion of females than males in both the white and colored races were not located. This is hard to explain, unless a number of the female contacts were prostitutes and thus would be more difficult to trace.

Thirteen per cent of the total number of contacts, according to information received, lived out of the city and, therefore, could not be located. On investigation it was found that 5 per cent of the original 524 early cases gave as the sources of their infection, persons living outside the city. A larger percentage of male than female contacts, especially the white male, were reported as living out of the city. Here the problem of migrating men in an infectious stage may be a factor.

The contact exposure rate was calculated and found to be 1.45 contacts per case (Table 23).

Table 23

Number of Exposed Contacts per Case

Original Case	Total No. Contacts	Number contacts per case
524	759	1.45

This is less than the figure obtained by Brumfield and Smith (22) and Smith (23), who in one study (22) found 1.77 contacts per case and in another (23), 2.03 contacts per case.

Table 22
Report on 759 Contacts of Early Cases of Syphilis,
by Color and Sex: 1937-38

Contacts	White				Colored				Total	
	Male		Female		Male		Female			
	No.	%	No.	%	No.	%	No.	%	No.	%
Located and examined	44	37	43	23	94	49	62	24	243	32
Not located	51	43	128	68	67	35	170	65	416	55
Living out of the city and not located	23	20	17	9	32	16	28	11	100	13
Total	118	100	188	100	193	100	260	100	759	100

Result of Examination of Contacts - As was shown previously, 524 persons with early syphilis gave 759 contacts, 243 of whom were located and examined for syphilis. More than three-fourths of the contacts examined were found to be infected (Table 24). The percentage of infected contacts was highest among the colored females, 90 per cent of all colored females examined being found positive.

The ratio of 77 per cent of contacts examined and found infected in Louisville is compared with the infection rate reported by other investigators. In New York City, 80 per cent of a group of 394 persons named as sources by early cases of syphilis were found on examination to be infected (24). Clark and Sargent (21), in an epidemiologic investigation of early cases of syphilis in Buffalo, New York, found 73 per cent of 275 contacts positive on examination. The ratio of contacts examined and found infected as reported in the latter study is very similar to the Louisville ratio. Brumfield and Smith (22) in Virginia reported that 75 per cent of exposed contacts examined were positive for syphilis.

Treatment Status of Contacts Found Positive - To determine the number of contacts with syphilis brought under treatment as a result of the epidemiological investigation, the following data were obtained. On examination, 188 contacts of the 524 early cases of syphilis were found positive (Table 24). Forty-three per cent of the 188 contacts who were found to have syphilis were identified as having been under treatment before the

Table 24.
Result of examination of 243 Contacts
by Color and Sex: 1937-38

Contacts	White				Colored				Total	
	Male		Female		Male		Female			
	No.	%	No.	%	No.	%	No.	%	No.	%
Positive for syphilis	34	77	32	74	66	70	56	90	188	77
Negative for syphilis	10	23	11	26	28	30	6	10	55	23
Total	44	100	43	100	94	100	62	100	243	100

epidemiological investigation was made (Table 25). About the same number of white males and females and of colored males were under treatment previous to investigation as after investigation. In contrast to this, only 30 per cent of the colored females were already under treatment, while 70 per cent were brought under treatment after examination.

All but 3 per cent of the 188 cases found positive received treatment. The six individuals who failed to take treatment could not be located after the examination was made.

More than half, or 102, of the contacts were placed under treatment after the investigation was made. The fact that 102 new cases of syphilis were discovered and placed under treatment as a result of the epidemiological investigation of 524 early cases of syphilis indicates the value of epidemiological investigation as a case finding procedure.

Table 25

Treatment Status of the 188 Contacts Found Positive,
by Color and Sex: 1937-38

Contacts	White				Colored				Total	
	Male		Female		Male		Female			
	No.	%	No.	%	No.	%	No.	%	No.	%
Under treatment previous to investigation	15	44	15	47	33	50	17	30	80	43
Under treatment after investigation	19	56	16	50	28	43	39	70	102	54
Found positive but failed to take treatment	0	0	1	3	5	7	0	0	6	3
Total	34	100	32	100	66	100	56	100	188	100

Summary of Part II

1. A series of 524 early infectious cases of syphilis admitted to the Louisville City Hospital Syphilis Clinic, from July 1, 1937, to June 30, 1938, included persons with primary and secondary lesions and those with histories of syphilis of less than one year duration.

2. More than one-half of the 524 early cases were in the age group 20-29 years. There was a marked preponderance of females in the age group 15-19 years. This would indicate that females acquire syphilis at an earlier age than males. It appears that colored females acquire syphilis at an even earlier age than white females.

3. While only one-sixth of the population of Louisville is colored, more than 50 per cent of the persons in the group studied were Negroes. This would indicate that the incidence of syphilis is higher in the colored, and that fewer Negroes are able to go to private physicians for care. Information as to marital status showed that the greatest proportion of the individuals with early syphilis were single.

4. Almost two-thirds of the 524 early cases were unemployed. The areas of concentration of the total number of early cases were found to be in that part of the city most densely populated and occupied by persons in the lower economic status. More than four-fifths of the cases studied came to the clinic voluntarily for examination. Nineteen of the 524 cases stated that they were transients.

.5. Two-thirds, or 352, of the 524 early cases studied had primary or secondary manifestations when seen for the first time in clinic. However, these 352 cases represented only 20 per cent of the total number of patients in all stages admitted to the Louisville City Hospital Clinic in the same period of time. More than twice as many male cases as female cases were admitted in the primary stage.

6. Only 41 per cent of the 524 early infectious cases were placed under treatment within one month of the onset of symptoms. The other 59 per cent did not receive treatment until more than a month after the first symptoms appeared. It is a recognized fact that as the interval between onset of symptoms and admission to the clinic is increased, the period of infectiousness, with its consequent danger to the public, is lengthened. Nearly one-fourth of the early cases investigated admitted sexual contacts after the onset of symptoms, while they were in the most infectious stage, thereby increasing the chances for spread of the disease. These findings indicate the need for education of the public as to the significance of symptoms of syphilis, so that the individual with such symptoms will seek medical care earlier and thus break the chain of infectiousness.

7. Of a total of 759 individuals named as contacts by the 524 early cases of syphilis, almost one-third, or 243, were located and examined. More than three-fourths, or 188, of the contacts examined proved to be infected with syphilis. On investigation, 80 of the contacts with syphilis were found to be already under treatment. Of the 108 remaining syphilis cases, 102 were placed under treatment. Thus 102 new cases of syphilis were discovered and brought under treatment as a result of epidemiological investigation.

Conclusions

The results obtained in this epidemiological study of early cases of syphilis have shown the practical value of the epidemiological approach in case finding. The primary purpose in finding persons with syphilis in the early stages of the disease is not only to bring the persons themselves under treatment and so to enhance the chance of cure but also to decrease the period of infectiousness and thus protect the public by preventing spread of the disease.

The complete syphilis control program is directed at case finding, treatment, case holding and education.

Case finding has increased in Louisville with the development of the syphilis control program, as shown by the increase in the number of cases reported. This rise in syphilis cases has been brought about by serological examination of selected groups, the epidemiological investigation of early cases, and the education of the public concerning the disease.

Treatment must be made available for the individual with syphilis and, in addition, he must be educated to take advantage of the treatment facilities provided. That this is possible has been demonstrated by the increased number of persons receiving treatment in the public clinics in Louisville during the past three years.

Case holding has been shown, in the study of reasons for lapsing from treatment, to be dependent, to a large extent, on education.

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