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PUBLIC HEALTH NURSING IN A BI-COUNTY HEALTH DEPARTMENT [1]

Brunswick-Greensville Health Administration Studies No. 4 [2]

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INTRODUCTION

In the first article published on the Brunswick-Greensville (Va.) study,[3] Mountin raised four fundamental questions which need to be answered by the health administrators in every community. These questions are:

1. What are the health problems of the people in the community?
2. What is the quality and the quantity of the service rendered by the health department?
3. What relationship exists between the services rendered and the needs of the people?
4. What specific effect does the health department procedure have on the individual health problems?

In the present article, a description is presented of the Brunswick-Greensville (Va) Health Department nursing service covering a continuous period of 12 months, together with a summary of its extent and distribution. Types of service and factors which governed their selection are considered here in a general way, but will be dealt with in more detail in later articles, when consideration will also be given to quality and the effect of specific nursing procedures.

A complete description of the Brunswick-Greensville area may be obtained from the first article in this series. However, a brief résumé

[1] From the Office of Studies of Public Health Methods, in cooperation with the Division of Domestic Quarantine.

[2] The collection of most of the material was supervised by Helen C. Brennan, special nurse, U. S. Public Health Service. Acknowledgment is due Marian G. Randall, of the Milbank Memorial Fund, who assisted in setting up the study. The writer expresses appreciation to Marian G. Randall, to Lillian A. Hudson, Teachers' College, Columbia University, and to Katherine Tucker, general director, National Organization for Public Health Nursing, for their advice and criticism on the analysis of the material.

[3] Mountin, Joseph W.: Effectiveness and economy of county health department practice. Pub. Health Rep., vol. 49, no. 42, Oct. 19, 1934.

will be given here. The total population of the area in 1930 was approximately 34,000, about 20,000 in Brunswick County and about 14,000 in Greensville County. There were 4 incorporated villages within the 2 counties, and, if these villages were excluded, the population per square mile would be approximately 34. Fifty-eight percent of the population was colored. Agriculture was the chief industry, and the main crops were cotton, tobacco, wheat, peanuts, and corn. The taxable resources of the area were low, the assessed valuation being but $15,000,000, while the per capita income [4] in 1933 was $147 in Brunswick County and $134 in Greensville County. Vital statistics for the intercensal [5] period (1921–30) previous to the study reveal conditions which are very similar to those in neighboring counties in Virginia and North Carolina. The gross mortality rate for the period 1921–30 was 11.2 per thousand; the infant mortality rate was 71.4; the stillbirth rate, 46.5; the maternal mortality rate, 6.0; and the rate for tuberculosis, 106.0. Intestinal infections presented problems of importance, since the typhoid fever death rate was 11.0 and the death rate from diarrhea and enteritis in children under 2 years of age was 41.0 per 100,000 population. The above rates were high among the colored as compared with the white population.

Eighteen physicians and five dentists, engaged in active practice, resided within the area but there were no hospitals of any type in either county. About 75 percent of the births were attended by midwives. None of the midwives had had any special training in midwifery. The welfare work in each county was handled by a county poormaster and by various volunteer church groups. Trained social workers were not employed.

The bi-county health department was under the direction of a whole-time medical officer who served both counties but maintained headquarters in Brunswick County. One nurse was assigned to each county. The sanitation officer, who lived in Greensville County, served the entire area. A part-time clerk was stationed at the main office in Brunswick County. The State health department furnished a consultation service to local health department personnel, and, at the time that this study was made, visits by the State advisory nurse were made to each county about once every quarter. The State health department advised the nurses to spend one-fourth of their time on tuberculosis work, one-third on the maternal and infant hygiene program (including midwife supervision), and the remainder on the other health problems. Virginia (under the West law) required the teachers to make the annual physical inspections of school children; and while the teachers were privileged to seek help

[4] Sales management, April 1933.

[5] Total birth and total death rates per 1,000 population; stillbirth, infant mortality, and maternal mortality rates per 1,000 live births; other death rates per 100,000 population.

from the nurses, routine physical inspection on the part of the nurses was discouraged by the State health department. Very little bedside nursing was done by the public health nurses, even as a demonstration.

METHOD OF STUDY

While the nurses in the health department had been keeping records which were regarded locally as sufficient for administrative purposes, it was found that the information desired in connection with the study could not be obtained from the forms then in use. Consequently, specially designed record forms were prepared which would meet the added requirements of the study. Detailed case records were completed for those persons seen by the nurse either in the home or the office and for whom a continuing service was planned. On those individuals, information was obtained which conformed in a general way to the following classification:

1. Identification of the individual, as to family, age, color, type of case, economic status, and location of the family home.
2. Source of information about the individual. Did patient send for the nurse? Was the case reported by a physician, a midwife, or a neighbor? Did the nurse discover the case while visiting the home for another purpose?
3. Reason for first visit. Was the reason for visiting the patient his most important health problem? What were the nurse's objectives?
4. Place of service. Was the service rendered in the patient's home, at the health department office, or in the school?
5. Type of service. What was the character and extent of the service rendered?
6. Effect or result of service. Was the nurse's objective realized? Was the patient's need satisfied?

A list of the individuals who were visited in regard to other patients or who were seen in behalf of the health program was made out each day. When the study was begun, it was reported that comparatively little health work was done by the nurses in the schools beyond group inspections; consequently, individual case records were not provided for the school contacts. The records of the school work gave the number of schools visited, the purpose of each visit, and the total contacts made each time the school was visited. The number of persons according to age group and color was obtained for those examined in connection with the "preschool round-up" and the number of those who were immunized. For the public health classes, the number of class sessions and the attendance per session were recorded.

EXTENT AND DISTRIBUTION OF NURSING SERVICE

According to the available records, the number of nursing services at various places during the study year is shown in table 1.

TABLE 1.—*Distribution of individual services according to type of service*

Type of service	Brunswick County	Greensville County	Total.
Immunization clinics	2,455	2,163	4,618
School visits	1,032	1,773	2,805
Home visits	1,044	481	1,525
Health office conferences	276	221	497
Clinics (tuberculosis, orthopedic, etc.)	324	165	489
Nursing classes	83	70	153

There was a total of 10,087 services at the various places during the year. From data available it was not always possible to identify individuals who were served in the schools, at the immunization clinics, and who attended the home nursing classes. It is quite possible that some of those contacted in the schools were also immunized, as the greater part of the immunization work was done among the school-age group. On the other hand, only 208 children of the school-age group received home visits; therefore, there were very few individuals, if any, who received service both at school and at home.

From the available data, it is possible to give only an estimate of the total number of individuals who received some type of nursing service during the year. Allowing for all probable duplications, it is safe to estimate that 7,500 of the 10,087 services recorded represent different individuals. Since the population of the area was approximately 34,000, this would indicate that the nurses gave one or more types of service to approximately 22 percent of the total population of the area.

IMMUNIZATION SERVICE

A special diphtheria prevention campaign, sponsored by the State health department, was conducted during a part of the study year. For a period of about 6 weeks' practically the entire time of the nurses was devoted to this work. The nurses made the preliminary arrangement for the clinic by visits to the schools and other centers and assisted the health officer at the clinics. All clinics were conducted under the direction of the health officer or a local practicing physician, although not infrequently the nurses did part of the actual immunization work alone. One hundred and fifteen diphtheria immunization clinics were conducted in the two counties and 2,279 children were given the complete dosage of toxin-antitoxin or toxoid during the study year.

TABLE 2.—*Immunization clinics with which the nurses assisted during the study year and the number of individuals who were immunized at the clinics*

Type of clinic	Brunswick			Greensville			Total immunized		Grand total	
	Number of clinics	Number immunized		Number of clinics	Number immunized		White	Colored	Number of clinics	Number immunized
		White	Colored		White	Colored				
Diphtheria	78	647	280	37	83	1,269	730	1,549	115	2,279
Typhoid fever	11	395	166	11	220	179	615	345	22	960
Smallpox	100	186	781	53	42	370	228	1,151	153	1,379
Total	189	1,228	1,227	101	345	1,818	1,573	3,045	290	4,618

Typhoid fever immunization clinics were held at various times during the spring and summer and 960 complete immunizations were given. Smallpox vaccination was given to 1,379 persons during the year; 83 percent of them were colored school children who were vaccinated as a requirement for school attendance. Table 2 summarizes the work which the nurses did in connection with the immunization program.

SCHOOL HEALTH SERVICE

A large majority of the 2,805 contacts made in the schools represent individual pupils, since only a few schools were visited more than once during the year. However, the Emporia school in Greensville County was visited 63 times during the year. This school was the largest in the county and it is quite probable that some of the individuals were seen on several different occasions.

Teachers, under the West Law, were required to make the preliminary inspection of the pupils in Virginia. However, the majority of the nursing contacts in the schools were for the purpose of assisting the teachers in the inspection of pupils for physical defects. Approximately 65 percent of the individuals seen in the schools received this service. Inspections for symptoms of communicable disease were the purpose of about 33 percent of the school contacts. The remaining school contacts were parents or teachers who were interviewed in behalf of individual pupils or who were consulted regarding clinic schedules.

The inspections in one of the larger schools were made jointly with the health officer, but most of the school contacts were made by the nurses alone.

CLINICAL SERVICE

Seven tuberculosis clinics (4 in Brunswick County and 3 in Greensville County) were conducted by a clinician from the State health department. The local health department nurses made the necessary preliminary visits in connection with the arrangements for these clinics and assisted the examining physician during the clinic. Two hundred and forty-four individuals attended one or more of the tuberculosis clinics during the year.

The orthopedic clinics were sponsored by local service clubs, and usually one clinic was held in each county each month. The health department nurses assisted the orthopedic surgeon during the clinics and gave follow-up care when indicated. Twenty-three orthopedic clinics were held during the year, and 200 patients were registered. The total number of visits to the orthopedic clinics was 540, giving an average of 2.7 visits per individual.

One tonsillectomy clinic, arranged by the county health department, was held in Brunswick County, and 28 children were operated on. This clinic was financed in part by charging those who were able to pay a minimum fee. The operations were performed by a nose and throat specialist from outside the county. Most of the preliminary work in connection with this clinic was done by the Brunswick County nurse, but both nurses assisted during the clinic.

In accordance with the general policy advocated by the State health department, practicing physicians made the physical examinations in connection with the "preschool summer round-up." The services of the public health nurses were available to any physician who desired help in this work. The usual plan was for each physician to set aside a day and to invite all of the preschool children from among his clientele to attend. The public health nurse then arranged to be at his office to assist with the examinations. The Brunswick County nurse assisted with six preschool clinics of this type, and 27 preschool children were examined. The Greensville County nurse had no such preschool clinics during the study year, owing to the fact that, at that time, the plan had not been endorsed by the medical profession of the county.

GROUP TEACHING

Two home hygiene classes for girls of high school age were organized during the study year. The Brunswick County nurse conducted a class for white girls and the Greensville County nurse had one for colored girls. About 55 girls were enrolled in these classes.

Each nurse was expected to hold regular classes of instructions for the colored midwives. The Brunswick County nurse had 12 meetings with her group during the year, but the Greensville County group met but twice. The attendance at the midwife classes was usually about 25, but not all those attending were midwives. Any colored woman interested in maternity work was welcome to attend.

During the year the nurses organized 7 mothers' study clubs under the direction of local leaders. About 48 women were enrolled. The plan of study and the educational material were supplied by the State health department. The course of study emphasized prenatal, infant, and child care. After organizing the classes, the nurses gave demonstrations from time to time and assisted the club leaders in

other ways. As a rule the nurses attended about three sessions of each club.

Meeting with women's clubs, parent-teacher associations, the Red Cross, and other groups was another activity of the nurses. The nurses addressed groups of this type 29 times during the year. In addition to these meetings, each nurse attended two professional conferences.

HOME VISITING

Separate case records were opened for 1,114 of the 1,525 individuals who were contacted in the homes. From the daily reports it was observed that most of those for whom no case records were made were visited on behalf of other patients or in the interest of the health program, and no specific service was rendered to those individuals by the nurses.

While the 1,114 individuals for whom case records were opened represent only about 15 percent of the total number of individuals who were contacted by the nurses, those individuals were the recipients of a large part of the nursing time and service. This may be expected, since home visiting, though time consuming, should be an important part of the nurse's work if the selection of cases for home visitation is based upon real need for service. It is through these home contacts that the nurse discovers true family problems and interprets the medical and sanitary procedures to the family.

FACTORS WHICH APPEARED TO INFLUENCE THE SELECTION OF INDIVIDUALS FOR HOME VISITATION IN BRUNSWICK-GREENSVILLE COUNTIES

1. *Economic status* appeared to be one factor which influenced the selection of families for home visiting. This might be expected, since most studies of public health nursing services have indicated that the need for nursing service of the type rendered by health departments and other community health agencies varies inversely with the economic well-being of the family.

The 1,114 individuals who were included in the home visiting service represented 546 families. Of the 516 for whom economic status was recorded, 365, or approximately 77 percent, were classified as "poor" or "very poor." Those families who were unable to provide themselves with food, clothing, and shelter were classified as "very poor", while those who were able to provide themselves with these three essentials, but not with medical or dental care, and had none of the usual comforts, were classified as "poor". In the family study,[6] which included a representative sample of the population in those counties, approximately 50 percent of the families were classified as poor or very poor.

[6] Unpublished data obtained through a survey of a repreesntative group of 1,009 families.

2. *The size of family*, and particularly the presence of young children in the home, also appeared to have been a selective factor. The average size of family for this area, according to the United States census, was approximately five. Among the families visited by the nurses it was found that 61 percent of them had 5 or more per household and that in 19 percent of the households there were 9 or more individuals. From the family study,[7] it was found that there were children in approximately 74 percent of the homes. The nursing records show that there were children in more than 80 percent of the homes visited by the nurses. There were infants or preschool children in 68 percent of the homes visited by the nurses, while in the family study,[7] there were infants or preschool children in only 46 percent of the homes. The congregating of large numbers in one household, especially if there are many children within the group, usually increases the number of health problems. Apparently the size of the family, and particularly the presence of young children in the home, was a factor which influenced the selection of families for visitation.

3. *The age of the individual* was a definite selective factor in determining which persons in the household were to be given nursing service. While only 3.2 percent of the total population received home nursing visits during the year, when those who received service were separated into age groups it was found that approximately 11 percent of all of the infants in the county were visited during the year, as compared with 4 percent of the preschool age group, 2 percent of the school children, and 3 percent of the adults. Of these age periods, the infant group presents the largest number of problems and perhaps benefits most from public health nursing service; consequently, it would appear proper to give relatively more nursing service to this group. Table 3 gives the percentage of the total population receiving home visits from the nurses, according to age groups.

TABLE 3.—*Percentage of total population receiving home visits from the nurses according to age groups*

Age group	Brunswick				Greensville				Total				Grand total	
	White		Colored		White		Colored		White		Colored			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Infants [1]	48	12.9	68	11.9	13	7.0	43	10.4	61	10.9	111	11.3	172	11.1
Preschool children	72	6.9	73	4.4	27	4.5	14	1.2	99	6.0	87	3.1	186	4.2
School children	55	2.4	80	2.2	26	2.1	47	2.0	81	2.3	127	2.1	208	2.2
Adults	147	2.7	159	2.7	68	2.0	174	3.9	215	2.4	333	3.2	548	2.9
Total	322	3.5	380	3.2	134	2.5	278	3.3	456	3.1	658	3.3	1,114	3.2

[1] Percentage of infants receiving home visits by the nurse is based on an estimated infant population—number of children under 1 year of age at beginning of study year plus the live births occurring during remainder of the study year.

[7] See footnote 6.

4. *Type of case* was another factor which apparently influenced the selection of families for visiting. Data on the allocation of time to the various services were not available; but it appears that the recommendations of the State health department were followed in a general way, since 25 percent of the individuals visited were listed as tuberculosis cases, contacts, or suspects, and 20 percent of the individuals were maternity cases. The infant and preschool health supervision group made up approximately 23 percent of the cases. Thus, from the standpoint of the number of cases visited, the maternal and infant

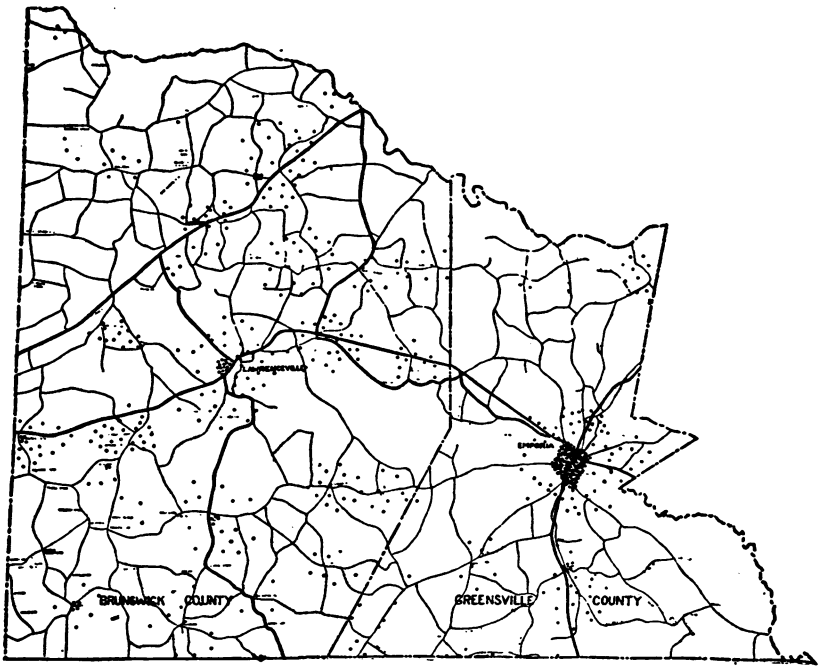

FIGURE 1.—Location of the 546 families visited by the public health nurses during a study period of 12 months.

hygiene and tuberculosis problems were undoubtedly selected for special consideration.

5. *The location of the family home* is often a selective factor. Those homes on the highways or near the nurse's headquarters sometimes received more visits from the nurse than those located in remote areas, because of the ease with which they may be reached. To some extent this was true in Greensville County. Forty-nine percent of the homes visited by the Greensville County nurse were located in the county seat, where she resided, although only about 15 percent of the total population of the county lived within the county seat. The distribution of homes visited by the Brunswick County nurse appeared to be quite evenly distributed. Only 5 percent of the homes she visited were located in the county seat, which contained about 10 per-

cent of the population. Eighty-five percent of the homes visited in Brunswick County were located in the open country. Figure 1 shows the location of the homes visited by the nurses during the study year.

SOURCE OF INFORMATION WHICH LED TO HOME VISITS

Of the 546 families who were visited by the nurses, about 42 percent of the first visits to the family were made at the request of some member of the family. In some instances the parents or the patients themselves came or wrote to the health department requesting advice or service. In other instances some member of the family attended a clinic or a class conducted by a member of the health department staff, learned about the available services, and informed the nurses about their needs. Midwives referred about 19 percent of the families to the health department, and neighbors were the source of information in about 18 percent of the families. Physicians requested the nurses to make the first visit to 10 percent of the families.

In considering the source of first information about individual cases, it was shown that approximately 37 percent of the cases were found when visiting some other member of the family. It is usually assumed that when a nurse visits a home she makes a family health visit. In the majority of homes there is likely to be more than one member of the family in need of health supervision of some type. If the nurse recognizes her opportunities and is alert to discover health needs, it may be assumed that, in families where there are several members, more than one will receive advice or service when the nurse visits the home. Observation of nurses in the field proves that most nurses do more work than their records indicate. Frequently a record will be made out for the most important case and no mention will be made of the services rendered to other members of the family. The nurses in Brunswick and Greensville Counties were urged to record all of the services rendered upon every visit, but from table 4 it is quite evident that they either served but one individual on 57 percent of their visits or failed to make a record for the other persons served.

TABLE 4.—*Distribution of nursing visits to the homes according to the number of individuals seen on each visit*

Number of individuals seen per visit to the home	White		Colored		Total	
	Number of visits to home	Percent of visits	Number of visits to home	Percent of visits	Number of visits to home	Percent of visits
1	185	51.0	365	60.1	550	56.7
2	99	27.3	149	24.6	248	25.5
3	39	10.7	49	8.1	88	9.1
4	18	5.0	13	2.1	31	3.2
5	6	1.6	13	2.1	19	2.0
6 or more	16	4.4	18	3.0	34	3.5
Total	363	100.0	607	100.0	970	100.0

REASON FOR FIRST VISITS TO HOMES

The reason for the first visits to 40 percent of the homes was maternity care or instruction. The control of tuberculosis was the reason for the first visit to approximately 16 percent of the homes. Advice and care of patients suffering from chronic illnesses such as pellagra, rheumatism, or heart conditions accounted for about 20 percent of the first visits to the homes. While very little actual nursing care was given to these patients, arrangements for medical care were frequently made by the nurses and special instructions on diet and hygiene were given. The control of communicable disease accounted for but 6 percent of the first visits to the homes, although approximately 11 percent of the total number of individuals visited were listed as communicable-disease cases or contacts. General[8] health supervision, which is usually considered a major function by most health departments, was the reason for the first visit to but 6 percent of the homes.

NUMBER OF VISITS PER HOME AND PER CASE

In all, 1,148 visits were made to the homes of the 546 families who received nursing visits, an average of 2.1 visits per home. Approximately 46 percent of the homes were visited but once, but a few homes were visited from 14 to 19 times during the year.

While an average of 2 visits was made to each home, the number of visits per individual case was less—1.3. Approximately 57 percent of the individuals seen received but one visit during the year. It might be assumed that the same factors which appeared to influence the selection of families and individuals for visiting would also influence the number of return visits. Those families in the "very poor" economic group did receive a slightly higher average number of visits per case, but location of the family home did not appear to affect the number of return visits.

There was a slight difference in the average number of visits to various types of cases. The communicable-disease cases, with an average of 2.2 visits per case, came first. General health-supervision cases,[8] with an average of 1.4 visits per case, had the lowest number. The tuberculosis and maternity cases were visited on an average of 1.8 times each. Fifty-nine percent of the maternity cases received but one visit and that was during the antepartum period.

With but two nurses to render all types of public health nursing service to a population of 34,000, the service to the individual must necessarily be limited. When the size of the staff is inadequate to meet all of the community needs, two alternative objectives are

[8] Includes services to infants, preschool and school children, and adults, except communicable disease and tuberculosis control and maternal hygiene.

presented: Shall the nurses aim to reach the largest possible percentage of the population who need health service or shall an intensive service be rendered to the few who present acute problems which can be influenced most readily by the nursing program? There is danger in "stretching" and "thinning" the service until the results are of doubtful value. However, a tax-supported department has certain general responsibilities which must be discharged irrespective of other considerations. These responsibilities are more or less fixed and therefore consume relatively more time when the staff is small. The percentage of the total population visited by the Brunswick-Greensville nurses nevertheless compared quite favorably with the percentage reached by the nurses in Cattaraugus County, N. Y.,[9] and in Rutherford County, Tenn.[10] However, the intensity of the service was necessarily much less, since the population per nurse in both of those counties was approximately 6,000, or about one-third as great as it was in the Brunswick-Greensville area.

Other features of the nursing service in the Brunswick-Greensville area will be presented in four additional articles. These articles will deal with the contributions of the nurse to maternal hygiene, tuberculosis control, prevention and control of acute communicable diseases, and general health supervision.[11] The discussion of each branch of the nurse's work will be developed along similar lines and will include type and extent of program, source of first information about cases, economic status of beneficiaries, apparent effect of the nursing procedures, and the relationship between types of service rendered by the nurses and the need for nursing service.

STUDIES OF SEWAGE PURIFICATION

I. APPARATUS FOR THE DETERMINATION OF DISSOLVED OXYGEN IN SLUDGE-SEWAGE MIXTURES *

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Research activities at the Stream Pollution Investigations Station of the United States Public Health Service in Cincinnati, Ohio, have recently been centered on the elucidation of one of the weakest links in the activated sludge process, namely, the troublesome condition, occasional or otherwise, of poor settlement generally designated as the

[9] Randall, Marian G.: Public-health nursing service in rural families. Milbank Memorial Fund Quarterly, vol. IX, no. 4, October 1931, p. 192.

[10] Mustard, Harry S.: Cross section of rural health progress. Commonwealth Fund, New York City, 1930, p. 221.

[11] See footnote 8.

*Originally printed in the Sewage Works Journal, vol. VI, no. 3, May, 1934, pp. 413–422, and reprinted here to bring together all articles of the series.

"bulking" of the sludge.[1] Using a small experimental unit, the approach to this problem has been from the chemical, biological, and physical, or engineering, viewpoints. In either case it has appeared highly advisable to obtain accurate information regarding the dissolved oxygen content of the sludge-sewage mixtures. The development of the apparatus to be described in this paper was accordingly undertaken after the procedures then available had been shown to fail utterly in meeting the severe condition imposed by the presence of sludge.

The governing consideration in the determination of dissolved oxygen in such a highly putrescible material as activated sludge is the uncommonly high oxygen demand of the material itself. Using the apparatus described by Theriault and McNamee (*1*), it can readily be shown that the oxygen demand of sludge-sewage mixtures drawn from aeration tanks may exceed 1 milligram per liter per minute, and this figure may be multiplied by 5 or 10 when sludge drawn from clarification tanks is examined. At ordinary temperatures the dissolved oxygen content of activated sludge will not exceed 9 milligrams per liter; usually it will be much lower. It is clear that time-consuming manipulations should be avoided in the examination of sludge-sewage mixtures for dissolved oxygen.

An artifice which is commonly used consists in eliminating most of the sludge by allowing it to settle. Tests for dissolved oxygen may then be made on the relatively clear supernatant liquor. Some of the sources of error in this procedure, particularly in the collection and handling of the sample, may be avoided by the use of the apparatus described by Küchler (*2*). The procedure of allowing the sludge to settle is, nevertheless, impracticable with "bulking" or poorly settling sludge. Even with "good" sludge the dissolved oxygen content of the supernatant liquor should be appreciably reduced during the initial period of turbulence which precedes settling or by convection currents after settling begins. The interpretation of results is further complicated by surface aeration during settling and by the absorption of atmospheric oxygen in the transfer of the supernatant liquor unless special apparatus is used.

The use of mercuric chloride is recommended by Konstantinowa (*3*) as an inhibitant of biochemical processes during tests for dissolved oxygen in the presence of activated sludge. Mercuric chloride is of doubtful efficiency as a sterilizing agent in activated sludge. Moreover, as shown by direct tests, the "immediate", or purely chemical, oxygen demand is not appreciably affected by this reagent. It can also be shown that such a strong oxidizing agent as potassium permanganate will not prevent the loss of dissolved oxygen from freshly prepared dilutions of stale sewage (*cf.* Theriault (*4*)).

[1] These investigations are being conducted under the direction of Sanitary Engineer J. K. Hoskins. Further reports on various aspects of the work will be published from time to time.

As modified by Theriault and McNamee (*5*), the Winkler technique has been successfully applied to the determination of dissolved oxygen in the presence of relatively stable forms of organic matter, such as glucose, even in amounts up to 5,000 p. p. m. (0.5 percent). Reasonably accurate results were also obtained with freshly aerated peptone solutions, up to 600 p. p. m., and with partly oxidized sludge from artificial channels. Huge errors, however, were observed in experiments with unstabilized peptone solutions, and later the method was found to fail altogether in the presence of activated sludge.

From the foregoing survey of the subject it has not appeared that any purely chemical procedure could be used in the important marginal case where the dissolved oxygen content of a sludge-sewage mixture is 1 p. p. m. or thereabouts. The desideratum is evidently a method whereby dissolved oxygen can be separated from activated sludge in a few seconds, instead of in a few minutes. Such a method should provide a record of the momentary situation in the unstable equilibrium maintained by the constant air supply against the unsatisfied oxygen demand of the sludge. Physical methods for the extraction of gases from liquids were accordingly examined.

EXTRACTION OF GASES FROM LIQUIDS

There is a wide choice in the selection of methods for the extraction of gases from liquids. For the purpose at hand, with time as the controlling factor, a method based on the injection of the sample into a highly evacuated space has appeared to be the most practical. The scrubbing out of the dissolved gases with an indifferent gas, such as nitrogen or carbon dioxide, was shown to be effective enough for use with nonputrescible liquids but too time-consuming in dealing with activated sludge. Other methods have appeared to be impractical for field use.

Vacuum extraction with heat was used by Adeney (*6*), in experiments with sewage, and a modification of Adeney's apparatus has recently been proposed by Damany (*7*) for use with boiler waters. This method of extraction is also incorporated in the Van Slyke apparatus (*8*) for the determination of gases in blood.

A disadvantage of the vacuum extraction procedure is that complete removal of the dissolved gases cannot be accomplished without the application of heat or of other auxiliary methods. It will presently be shown, however, that suitable corrections for the failure to achieve 100 percent recovery of the gas can readily be applied in cases where a delay in the analysis is inadvisable, as in work with activated sludge.

ABSORPTION AND ESTIMATION OF OXYGEN

It appeared possible in early experiments that a satisfactory indication regarding the dissolved oxygen content of a sludge-sewage mix-

ture might be based on a simple measurement of the total volume of the gas obtained by vacuum extraction after removing carbon dioxide and applying a correction for the known solubility of nitrogen. Under the conditions of the activated sludge process, the samples should be fully saturated with nitrogen. In practice, reasonably accurate results were obtained with a minimum of manipulations. The computations, however, were tedious and the apparatus was probably too fragile for field work. Similar objections may be raised against the use of most forms of micro-gas-analysis apparatus.

With a view to the avoidance of corrections for variations in temperature and barometric pressure, use was made of a method described by Theriault and Butterfield (*9*). The gaseous oxygen is first absorbed by vigorous agitation in the presence of a suspension of manganous hydroxide. The analysis then follows along lines of the well-known Winkler procedure for dissolved oxygen in the absence of any interfering substances. The results are obtained directly in milligrams without troublesome computations.

THE APPARATUS

In the design of apparatus embodying the principles of vacuum extraction followed by a manganimetric determination of oxygen, it has appeared possible to limit the volume of the sample to 100 ml. Strict accuracy is accordingly sacrificed in favor of portability and convenience in operation. The maximum amount of oxygen available for a test will be 1.0 ml when samples in equilibrium with air at 0° C. are examined. In equilibrium at any temperature, the volume of dissolved nitrogen is approximately twice that of the dissolved oxygen. In work with aerated samples, over 1 ml of gas should be obtained by complete extraction, even though dissolved oxygen is practically absent.

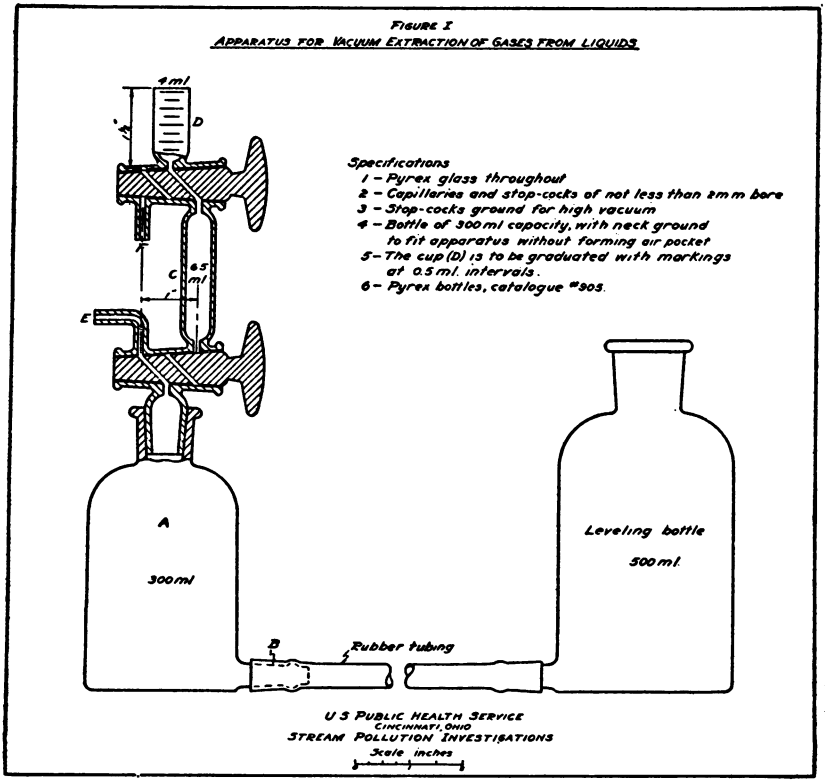
Omitting intermediate steps in its development, the apparatus finally adopted is shown in fig. 1. The evacuation vessel (*A*) consists of a 300-ml aspirator bottle with an outlet (*B*) near the bottom connected by 4 feet of rubber tubing to a second aspirator bottle of 500 ml capacity which serves as a leveling bottle. The gas analysis apparatus consists essentially of a 6.5-ml chamber (*C*) closed at both ends by parallel-bore stopcocks. The upper part of this apparatus is surmounted by a small graduated cup (*D*) and the lower part is ground to fit the evacuation vessel (*A*). Pyrex glass is used throughout. Rubber tubing of the nitrometer variety, size 3/16 by 1/8 inch, has proved very satisfactory.

SAMPLING

For the purpose of minimizing the error due to the loss of dissolved oxygen during sampling, it should generally be advisable to bring the

apparatus to the side of a plant rather than to transport the sample to a laboratory. When air bubbles are absent, as in clarification or settling tanks, a direct connection with glass and rubber tubing should be made between the evacuation vessel and the mixture under examination. This simplification should also be considered in the examination of samples drawn from the lower portions of mechanically aerated tanks.

When air bubbles are present, as in aeration tanks equipped with diffuser tubes or plates, provision must be made for the dissipation of



entrained air prior to the removal of the dissolved gases. No allowance need be made for the re-aeration of the sample during collection, the presumption being that an equivalent result should be obtained by sampling a few feet further towards the outlet of the tank. Under these conditions, a wide-mouthed bottle of 125 ml capacity with an outlet tube near the bottom has appeared to be the most practical type of sampling vessel. The outlet tube is closed with rubber tubing and a pinchcock, and the bottle is suitably mounted on a rod. After dipping at the desired location and depth, the rubber tubing is flushed and a connection is quickly made to the sludge inlet tube (*E*) of the

evacuation apparatus. With proper allowance for the disappearance of air bubbles, this operation should be completed in 15 seconds.

THE MANIPULATIONS

Prior to a test, the stopcocks and ground glass connection are carefully lubricated. Approximately 400 ml of mercury should be present in the aspirator bottles, together with 2 or 3 ml of water above the mercury in bottle (*A*). With the sludge inlet tube (*E*) open to the air, the evacuation vessel (*A*) is then completely filled with mercury by raising the second aspirator bottle to a predetermined level. When the sludge inlet tube is filled with water, the lower stopcock is turned and the mercury is allowed to fill the gas chamber (*C*) until the upper stopcock is reached. The bore of the upper stopcock should be left full of water.

In testing for leakage, the upper stopcock is closed and the leveling bottle is lowered about 30 inches below (*A*) so as to create a Torricellean vacuum. In the absence of leakage, the mercury should again fill all of the evacuated space when the leveling bottle is raised to its original position. As a rule, however, a slight air bubble will be obtained on the first trial, owing to the extraction of gas from the water which covers the mercury. The operation is then repeated. If leakage exists, it may be localized by separate tests of the gas chamber (*C*) and of the evacuation vessel (*A*).

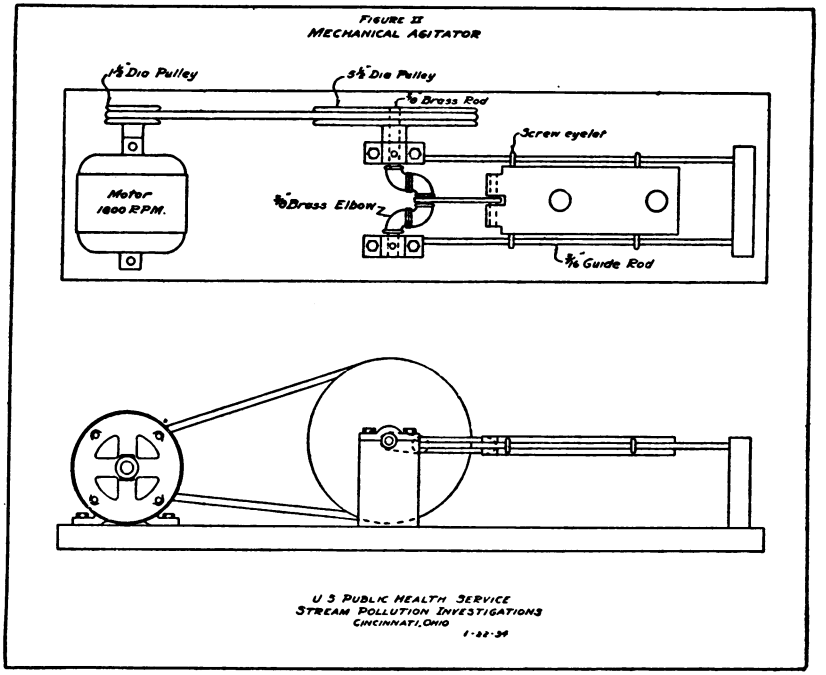
In these manipulations it is advisable to check the upward rush of the mercury by pinching the rubber tubing. It is also important that the lower stopcock be kept open when the upper stopcock is closed; otherwise a closed system is created and the gas chamber will be ruptured by any expansion of the mercury. For convenience and safety in handling, the leveling bottle should be kept in a tray suitably equipped with handles.

For a test, approximately 100 ml of sample is injected into the evacuated apparatus through the inlet tube (*E*). The volume of sample admitted to the evacuation vessel may be judged by markings on the sample bottle, or a more accurate measurement may be based on the liquid remaining after evacuation.

In tests with pure liquids, the extraction may profitably be continued for about 2 minutes, the liberation of the gases being facilitated by the gentle rotation of the evacuation vessel so as to stir the sample. With activated sludge, however, it will be advisable to extract only a fraction of the total gas, as described below. After the extraction has proceeded to the desired degree of completion, the leveling bottle is raised so as to tranfer the gases to the absorption chamber (*C*). The lower stopcock is closed when the liquid portion of the sample is about to enter the gas chamber. In field work the determination may be

interrupted at this stage and the analysis may be completed under laboratory conditions.

For the absorption of the extracted oxygen, 1 ml, or thereabouts, of the usual manganous sulphate solution (480 grams of $MnSO_4 \cdot 4H_2O$ per liter) is placed in the graduated cup (*D*) and 0.5 ml of this solution is admitted to the gas chamber (*C*) by cautiously turning the upper stopcock. The excess of reagent is voided through the outlet tube (*F*) and the cup is rinsed to remove any adhering solution. The alkaline-iodide solution (500 grams of NaOH and 150 grams of KI per liter) is then introduced in similar manner, again adding only



0.5 ml and wasting the excess of reagent. The vacuum which still exists in the gas chamber should then be broken by admitting 3 or 4 ml of distilled water of known dissolved oxygen content.

The gas analysis apparatus is next detached from the evacuation vessel and it is shaken vigorously until the absorption of the oxygen by the manganous hydroxide is complete. Manual agitation is not practical. At least 10 minutes should be allowed for the absorption, even with a mechanical agitator capable of 400 to 500 alternations per minute. A large sputum shaker of the friction-drive type has proved very satisfactory. An easily constructed agitator is shown in fig. 2.

When the absorption of the oxygen is complete, the gas analysis apparatus is again placed in position above the evacuation vessel (*A*)

and the precipitated manganese hydroxides are dissolved by introducing approximately 1 ml of 1:1 sulphuric acid through the cup (*D*). It will generally be necessary to assist the entry of the acid into the absorption chamber by the alternate application of suction or pressure to the cup (*D*) with a rubber bulb. The appearance of a reddish coloration in the acid when the upper stopcock is opened is probably due to the desiccation of manganese salts and not to the decomposition of iodides by strong acid. This coloration disappears on dilution and it does not give a blue color with starch solution. The admission of the acid to the absorption chamber may also be facilitated by the previous removal of the residual gas with suction, so as to create a vacuum in the gas chamber (*C*). This may be done by connecting the cup (*D*) and the inlet tube (*E*) with rubber tubing and creating a vacuum in the evacuation vessel (*A*). The residual gas may then be removed by suitable manipulation of the stopcocks.

The liberated iodine is then transferred to a titration vessel, adding rinsings and distilled water to bring the volume of the solution to about 100 ml. The titration is completed with thiosulphate solution and starch in the usual manner, using a 5- or 10-ml burette.

Most of the purely analytical sources of error in the Winkler method are avoided by working only with the gas. Nitrites will interfere only if acid, as from cleaning operations, is present above the mercury when the sample is introduced. Under these conditions carbon dioxide may also be liberated in amounts beyond the capacity of the 6.5-ml chamber. The iodine liberated in the final stage of the process should not come into contact with mercury which may be held in the bore of the stopcocks by excessive amounts of lubricant. Pipe-stem cleaners are convenient in avoiding this difficulty.

CALCULATIONS

Starting with 100 ml of sample, the calculations are as follows:

A=ml of 0.025 N thiosulphate solution required		=0.75
B=Total milligrams of oxygen	=0.2 A	=0.150
C=Correction for distilled water	$=\frac{4\times 7.50}{1000}$	= .030
D=Milligrams of oxygen extracted from 100 ml of sample		= .120
E=Apparent oxygen content (milligrams per liter)	=10D	=1.20

The correction of 0.030 milligrams is based on the assumption that the vacuum was broken with 4 ml of distilled water containing 7.50 p. p. m. of dissolved oxygen. The possibility of applying a correction for the failure to achieve 100 percent recovery of the dissolved oxygen will presently be discussed.

PRECISION OF THE METHOD

It is suggested that the precision attainable with a given piece of apparatus be determined by preliminary experiments with distilled water of known oxygen content, using different periods of evacuation and of absorption. It can then be readily shown that approximately 97 percent of the dissolved oxygen is removed when the sample is stirred under vacuum for 2 minutes, provided that an efficient system of mechanical agitation is employed for the subsequent absorption of the extracted gas. The discrepancy is due to the partial pressure of the water vapor which, at ordinary temperatures, will account for 2 or 3 percent of the total pressure. A correction for this type of error can readily be applied in dealing with nonputrescible liquids.

Having demonstrated the efficiency of the extraction and, incidentally, the adequacy of the mechanical agitation, tests should next be made to determine the percentage of recovery effected when the period of evacuation is necessarily reduced to a minimum, as in work with stale sewage or activated sludge. With the apparatus at hand, approximately 60 percent of the total dissolved oxygen is removed during the 15 seconds which are required for the injection of 100 ml of distilled water into the evacuated space plus the time devoted to 5 or 6 rapid rotations of the evacuation vessel before transferring the extracted gas to the absorption chamber.

With 97 percent recovery, an apparent oxygen content of 1.20 p. p. m. might accordingly be corrected to read $1.20/0.97=1.24$ p. p. m., although a correction of this magnitude will usually be negligible in sewage work. With a percentage recovery of only 60 percent, the corrected value becomes $1.20/0.60=2.00$ p. p. m., again assuming that the apparent oxygen content was 1.20 p. p. m. A careful examination of various possible sources of error has indicated that any discrepancy introduced by this calculation will be well within the tolerances in sewage work. Repeated tests have shown that the percentage recovery under controlled conditions is dependably constant within a variation of about 5 percent. Using partly deaerated water, it can also be shown that the percentage recovery is sensibly the same whether 2, 4, or 8 p. p. m. of dissolved oxygen are present.

From the foregoing considerations it may be considered that the allowable error in tests for dissolved oxygen by the proposed procedure should not exceed 10 percent. For the purpose at hand, this degree of precision has appeared to be entirely satisfactory. Following the usual technique of working only on the supernatant liquor from the settled sludge, negative results have generally been obtained whenever the true dissolved oxygen content was 2.0 p. p. m. or less. The error in this case is absolute and is not subject even to empirical correction.

SUGGESTED APPLICATIONS

Attempts at reducing operating costs through the avoidance of wasteful amounts of air, or through its more efficient distribution, should evidently be based on accurate knowledge of what constitutes an adequate supply; otherwise the efficiency of the procedure may be impaired through false economy. Theories of "bulking" based on underaeration (or overaeration, for that matter) can never be resolved without accurate information regarding dissolved oxygen values. Systematic studies of the air requirements of the activated-sludge process, now in progress at this laboratory, have already yielded some highly interesting information and have furnished promising results. An accurate method for the determination of dissolved oxygen is likewise a prerequisite to the rational attack of other plant problems, such as the evaluation of the net usefulness of reaeration tanks, the efficient placement of air tubes or plates, the localization of anaerobic conditions, the rating of aeration devices, etc.

From a different angle it has appeared that the apparatus described in this paper might be adapted to the determination of dissolved oxygen in boiler waters and other liquids where a minor degree of reaeration during the collection of the sample may introduce a relatively huge error in the end result. Sampling difficulties should be entirely avoided by direct connection to the evacuated space. Without increasing the size of the apparatus, it should be possible to secure greater precision by combining the gas obtained from the extraction from several 100 ml portions.

ACKNOWLEDGMENTS

Acknowledgment is due to Dr. W. P. Yant, Bureau of Mines, for valuable suggestions in the design of the apparatus, and to Assistant Sanitary Engineer C. T. Wright, for the figures which accompany this paper.

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DEATHS DURING WEEK ENDED MARCH 16, 1935

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 16, 1935	Corresponding week, 1934
Data from 86 large cities of the United States:		
Total deaths	8,741	9,016
Deaths per 1,000 population, annual basis	12.2	12.6
Deaths under 1 year of age	609	627
Deaths under 1 year of age per 1,000 estimated live births	56	58
Deaths per 1,000 population, annual basis, first 11 weeks of year	12.9	12.7
Data from industrial insurance companies:		
Policies in force	67,549,346	67,590,873
Number of death claims	14,022	16,012
Death claims per 1,000 policies in force, annual rate	10.8	12.4
Death claims per 1,000 policies, first 11 weeks of year, annual rate	10.9	11.1

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended Mar. 23, 1935, and Mar. 24, 1934

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Mar. 23, 1935, and Mar. 24, 1934

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934
New England States:								
Maine	----	1	4	1	319	54	0	0
New Hampshire	----	----	----	----	8	255	1	0
Vermont	1	----	----	----	3	17	0	0
Massachusetts	6	15	----	----	447	2,177	4	2
Rhode Island	----	1	----	----	92	7	4	0
Connecticut	8	8	4	1	1,213	26	0	0
Middle Atlantic States:								
New York	38	52	[1] 17	[1] 19	2,433	1,411	15	8
New Jersey	19	30	11	24	1,300	483	2	3
Pennsylvania	53	59	----	----	5,717	2,449	6	2
East North Central States:								
Ohio	33	25	18	29	1,073	904	12	3
Indiana	19	15	42	46	440	1,525	0	3
Illinois	71	32	49	46	3,231	1,908	13	14
Michigan	13	18	6	6	3,825	141	0	0
Wisconsin	3	10	31	41	1,583	1,363	3	2
West North Central States:								
Minnesota	1	4	----	1	1,701	287	0	2
Iowa	12	11	15	12	1,496	291	1	3
Missouri	24	48	115	244	696	881	13	4
North Dakota	5	9	----	----	109	113	0	1
South Dakota	6	5	2	5	53	571	2	0
Nebraska	3	5	13	10	597	225	5	1
Kansas	14	7	10	4	1,694	263	1	3
South Atlantic States:								
Delaware	1	2	2	----	7	221	0	0
Maryland [2]	8	8	23	39	82	1,055	5	1
District of Columbia	19	9	4	----	77	711	12	0
Virginia	18	27	----	----	1,262	1,290	3	6
West Virginia	8	8	79	39	620	92	0	3
North Carolina	12	18	49	47	613	3,384	5	0
South Carolina	7	8	247	586	36	546	0	0
Georgia [3]	6	10	72	----	----	1,995	1	0
Florida [3]	10	7	11	3	68	243	1	0
East South Central States:								
Kentucky	11	8	100	49	1,015	636	7	1
Tennessee	9	13	135	99	75	1,157	8	2
Alabama	9	14	371	118	519	705	4	1
Mississippi [3]	8	5	----	----	----	----	1	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Mar. 23, 1935, and Mar. 24, 1934—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934
West South Central States:								
Arkansas	7	7	110	42	192	681	3	0
Louisiana	28	27	70	18	208	408	0	0
Oklahoma [4]	10	18	163	94	103	563	5	4
Texas [3]	48	109	949	422	131	1,461	0	6
Mountain States:								
Montana [5]	4	2			309	62	2	0
Idaho		1	6		82	179	0	0
Wyoming					169	50	0	0
Colorado [5]	3	3			352	299	0	1
New Mexico	1	5	18	3	18	42	5	1
Arizona	2	1	36	21	29	61	2	0
Utah [3]		1			14	542	0	0
Pacific States:								
Washington	1	4	5	25	203	196	1	1
Oregon	1		85	54	175	142	4	0
California	37	43	83	45	984	1,158	8	2
Total	597	713	2,955	2,193	35,373	33,230	159	80

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934
New England States:								
Maine	0	0	17	8	0	0	4	6
New Hampshire	0	1	18	15	0	1	0	0
Vermont	0	0	26	9	0	0	1	1
Massachusetts	0	0	255	302	0	0	2	1
Rhode Island	0	0	6	16	0	0	0	0
Connecticut	0	0	121	81	0	0	0	2
Middle Atlantic States:								
New York	0	0	1,160	947	0	0	9	6
New Jersey	1	0	166	220	0	0	2	4
Pennsylvania	0	0	756	674	0	0	7	6
East North Central States:								
Ohio	2	2	988	629	0	1	2	1
Indiana	0	0	171	244	0	1	0	12
Illinois	0	0	1,316	712	1	6	6	1
Michigan	0	0	487	913	0	3	4	9
Wisconsin	0	0	459	265	38	37	1	0
West North Central States:								
Minnesota	0	0	258	84	14	2	1	0
Iowa	0	1	102	84	2	4	5	1
Missouri	0	1	79	123	5	7	0	2
North Dakota	0	0	119	38	0	3	0	0
South Dakota	0	0	7	18	3	0	0	0
Nebraska	0	0	42	38	31	4	0	0
Kansas	0	0	52	92	29	5	0	0
South Atlantic States:								
Delaware	0	0	23	11	0	0	0	0
Maryland [3]	1	1	108	92	0	0	4	10
District of Columbia	0	0	144	15	0	0	0	0
Virginia	0	0	54	47	1	0	1	2
West Virginia	0	0	93	87	0	0	7	6
North Carolina	2	0	40	40	0	0	3	1
South Carolina	0	0	5	1	0	2	0	6
Georgia [3]	1	0	6	14	0	1	1	8
Florida [3]	0	0	1	3	0	0	1	6
East South Central States:								
Kentucky	0	0	68	33	0	0	2	1
Tennessee	0	0	20	34	0	3	1	2
Alabama	0	0	12	5	0	0	0	3
Mississippi [3]	0	0	11	4	0	2	3	4

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Mar. 23, 1935, and Mar. 24, 1934—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934	Week ended Mar. 23, 1935	Week ended Mar. 24, 1934
West South Central States:								
Arkansas	0	0	8	6	0	0	1	3
Louisiana	1	0	15	30	1	1	9	14
Oklahoma [4]	0	0	30	16	0	1	1	2
Texas [3]	1	2	74	73	24	27	9	12
Mountain States:								
Montana [5]	0	0	12	11	20	0	1	0
Idaho	0	2	4	1	0	13	2	1
Wyoming	0	0	22	8	19	0	0	0
Colorado [5]	0	0	287	20	0	4	1	0
New Mexico	0	1	14	19	2	0	2	0
Arizona	1	0	22	25	0	0	0	3
Utah [2]	0	0	141	9	0	0	0	0
Pacific States:								
Washington	0	1	50	68	20	5	0	2
Oregon	0	0	50	30	2	8	1	2
California	5	7	240	216	4	3	3	7
Total	15	19	8,159	6,430	216	144	97	147

[1] New York City only.
[2] Week ended earlier than Saturday.
[3] Typhus fever, week ended Mar. 23, 1935, 5 cases, as follows: Georgia, 2; Florida, 1; Texas, 2.
[4] Exclusive of Oklahoma City and Tulsa.
[5] Rocky Mountain spotted fever, week ended Mar. 23, 1935, 3 cases, as follows: Montana, 2; Colorado, 1.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
February 1935										
Georgia	4	39	2,037	128	85	47	0	54	0	11
Idaho		3	125		425		0	142	25	5
Illinois	52	213	309	7	9,622		4	3,983	12	24
Louisiana	4	142	171	28	401	4	3	79	3	43
Maryland	3	33	431		235		1	384		13
Michigan	7	22	103		4,617		0	1,464	1	9
Montana	9	11	1,941		746		0	55	11	3
Ohio	59	307	479	1	3,648		5	4,037	2	20
Oklahoma [1]	17	55	1,588	12	446	5	0	125	7	8
Oregon	1	5	779		350		1	233	17	1
Pennsylvania	27	215		1	13,446		5	2,598	0	40
Rhode Island	1	4	7		199		0	59	0	0
South Dakota	1	6	51		300		1	83	35	3
Texas	15	209	3,297	575	797	25	6	324	212	73
West Virginia	7	74	1,084		2,079			590	1	14
Wyoming	2				462		0	36	24	1

[1] Exclusive of Oklahoma City and Tulsa.

February 1935

	Cases
Anthrax:	
Pennsylvania	2
Texas	5
Botulism:	
Maryland	2
Chicken pox:	
Georgia	245
Idaho	42
Illinois	1,854
Louisiana	46
Maryland	666
Michigan	1,613
Montana	259
Ohio	2,602
Oklahoma [1]	112
Oregon	324
Pennsylvania	4,067
Rhode Island	121
South Dakota	110
Texas	742
West Virginia	253
Wyoming	30
Conjunctivitis:	
Georgia	3
Dengue:	
Georgia	1
Texas	4
Diarrhea and enteritis:	
Maryland	11
Ohio (under 2 years)	6
Dysentery:	
Georgia (amoebic)	6
Georgia (bacillary)	2
Illinois (amoebic)	4
Illinois (bacillary)	1
Illinois (amoebic carriers)	18
Louisiana (amoebic)	1
Louisiana (bacillary)	1
Maryland (bacillary)	3
Michigan (amoebic)	9
Michigan (bacillary)	2
Ohio	1
Pennsylvania	2
Texas	22
Epidemic encephalitis:	
Georgia	1
Illinois	7
Michigan	2
Montana	1
Ohio	4
Pennsylvania	7
Texas	2
Food poisoning:	
Ohio	7
German measles:	
Illinois	3,368
Maryland	33
Michigan	70
Montana	4,450
Ohio	1,214
Pennsylvania	1,989
Rhode Island	2
Wyoming	114
Hookworm disease:	
Louisiana	30
Impetigo contagiosa:	
Illinois	4
Maryland	8
Montana	14

February 1935—Continued

	Cases
Impetigo contagiosa—Con.	
Oklahoma [1]	1
Oregon	34
Jaundice:	
Maryland	2
South Dakota	1
Lead poisoning:	
Illinois	2
Ohio	9
Leprosy:	
Oklahoma [1]	1
Mumps:	
Georgia	146
Idaho	2
Illinois	531
Louisiana	4
Maryland	63
Michigan	551
Montana	264
Ohio	1,286
Oklahoma [1]	95
Oregon	529
Pennsylvania	2,845
Rhode Island	16
South Dakota	269
Texas	223
West Virginia	208
Wyoming	3
Ophthalmia neonatorum:	
Illinois	2
Maryland	1
Ohio	69
Pennsylvania	16
Paratyphoid fever:	
Illinois	5
Louisiana	1
Ohio	1
Texas	1
Puerperal septicemia:	
Illinois	10
Ohio	3
Oregon	1
Rabies in animals:	
Illinois	32
Louisiana	26
Oregon	1
Rhode Island	1
Rabies in man:	
Pennsylvania	1
Rocky Mountain spotted fever:	
South Dakota	1
Wyoming	1
Scabies:	
Maryland	1
Montana	1
Oklahoma [1]	1
Oregon	39
South Dakota	1
Septic sore throat:	
Georgia	33
Idaho	1
Illinois	28
Louisiana	1
Maryland	22
Michigan	51
Montana	13
Ohio	296
Oklahoma [1]	31
Oregon	9

February 1935—Continued

	Cases
Septic sore throat—Con.	
Rhode Island	1
South Dakota	2
West Virginia	4
Wyoming	8
Tetanus:	
Georgia	1
Illinois	2
Louisiana	1
Trachoma:	
Illinois	20
Montana	14
Ohio	3
Oregon	2
Pennsylvania	1
South Dakota	3
Trichinosis:	
Illinois	1
Michigan	15
Ohio	12
Pennsylvania	3
Tularaemia:	
Georgia	2
Illinois	11
Louisiana	1
Montana	1
Ohio	5
Pennsylvania	1
Wyoming	1
Typhus fever:	
Georgia	18
Illinois	1
Texas	16
Undulant fever:	
Georgia	3
Illinois	5
Maryland	3
Michigan	6
Montana	3
Ohio	4
Oklahoma [1]	1
Pennsylvania	2
South Dakota	1
Texas	7
Vincent's infection:	
Illinois	31
Maryland	5
Michigan	30
Montana	4
Oregon	9
Wyoming	1
Whooping cough:	
Georgia	98
Idaho	14
Illinois	954
Louisiana	8
Maryland	103
Michigan	835
Montana	193
Ohio	741
Oklahoma [1]	70
Oregon	79
Pennsylvania	1,894
Rhode Island	24
South Dakota	33
Texas	410
West Virginia	345
Wyoming	26

[1] Exclusive of Oklahoma City and Tulsa.

WEEKLY REPORTS FROM CITIES

City reports for week ended Mar. 16, 1935

[This table summarizes the reports received regularly from a selected list of 121 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table. Weekly reports are received from about 700 cities, from which the data are tabulated and filed for reference]

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0	1	1	0	3	2	0	0	0	3	26
New Hampshire:											
Concord	0	------	1	0	3	3	0	3	0	0	23
Nashua	1	------	0	0	0	0	0	0	0	0	--------
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	0	3
Burlington	0	------	0	48	0	4	0	0	0	1	16
Massachusetts:											
Boston	2	------	1	15	27	70	0	4	1	23	236
Fall River	0	------	1	62	4	3	0	2	0	4	32
Springfield	0	------	0	134	1	16	0	0	0	18	31
Worcester	0	------	0	4	5	15	0	3	0	1	48
Rhode Island:											
Pawtucket	0	------	0	0	0	1	0	0	0	0	16
Providence	1	------	0	40	4	13	0	2	0	7	54
Connecticut:											
Bridgeport	1	2	0	6	3	16	0	0	0	1	18
Hartford	0	------	0	70	4	11	0	3	0	8	54
New Haven	0	------	0	278	6	0	0	1	0	0	44
New York:											
Buffalo	1	------	0	234	18	54	0	8	0	21	147
New York	13	12	6	938	183	621	0	72	2	286	1,550
Rochester	0	1	0	288	5	20	0	1	0	14	73
Syracuse	0	------	1	175	4	12	0	0	0	22	52
New Jersey:											
Camden	3	------	2	1	4	6	0	1	0	5	32
Newark	0	8	0	188	9	10	0	3	1	104	79
Trenton	0	1	0	47	4	11	0	1	0	2	45
Pennsylvania:											
Philadelphia	7	17	7	23	62	96	0	29	2	81	528
Pittsburgh	4	9	9	778	26	31	0	4	0	30	157
Reading	0	------	2	25	5	4	0	1	0	5	37
Scranton	0	------	--------	302	-------	3	0	-------	0	1	--------
Ohio:											
Cincinnati	2	------	3	3	16	25	0	5	0	6	141
Cleveland	15	54	0	244	20	55	0	6	0	33	168
Columbus	7	1	1	85	7	38	0	4	0	1	88
Toledo	0	------	0	79	7	25	0	4	0	7	65
Indiana:											
Fort Wayne	0	------	0	14	0	3	0	0	0	1	--------
Indianapolis	5	------	1	64	14	28	0	8	1	10	--------
South Bend	0	------	0	6	3	14	0	0	0	0	21
Terre Haute	0	------	0	0	0	0	0	0	0	0	21
Illinois:											
Chicago	12	17	6	1,270	68	636	0	29	1	90	717
Springfield	0	3	0	7	6	7	0	0	0	2	38
Michigan:											
Detroit	9	6	6	1,265	39	173	0	19	1	84	263
Flint	2	------	0	620	5	11	0	0	0	4	25
Grand Rapids	0	------	0	79	1	5	0	2	0	0	46
Wisconsin:											
Kenosha	0	------	0	266	0	21	0	0	0	12	8
Madison	0	------	0	-------	1	13	0	0	0	2	22
Milwuakee	1	2	2	444	6	201	0	1	0	34	105
Racine	0	1	1	42	2	4	1	1	0	17	13
Superior	0	------	0	432	2	0	0	0	0	0	13
Minnesota:											
Duluth	0	------	0	393	2	2	0	0	0	0	22
Minneapolis	1	------	1	943	8	85	0	2	0	13	83
St. Paul	0	------	0	13	10	36	0	1	0	12	56
Iowa:											
Davenport	4	------	--------	0	-------	5	0	-------	0	0	--------
Des Moines	4	------	--------	54	-------	24	0	-------	0	0	32
Sioux City	2	------	--------	8	-------	1	0	-------	0	6	--------
Waterloo	1	------	--------	2	-------	7	0	-------	0	2	--------

City reports for week ended Mar. 16, 1935—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Missouri:											
Kansas City	4	2	0	260	19	22	0	4	0	6	111
St. Joseph	1	----	1	4	1	0	0	4	0	0	26
St. Louis	13	----	1	23	20	24	0	14	0	8	242
North Dakota:											
Fargo	0	----	0	----	0	20	0	0	0	1	8
Grand Forks	0	----	----	----	----	1	0	----	0	1	----
South Dakota:											
Aberdeen	0	----	----	8	----	0	0	----	0	0	----
Nebraska:											
Omaha	4	----	1	37	15	10	0	3	0	0	64
Kansas:											
Topeka	----	----	----	----	----	----	----	----	----	----	----
Wichita	1	1	1	693	5	1	0	0	0	3	27
Delaware:											
Wilmington	0	----	0	6	9	15	0	0	0	0	23
Maryland:											
Baltimore	1	6	4	14	30	46	0	17	0	23	237
Cumberland	0	2	0	14	1	2	0	1	0	0	18
Frederick	0	----	0	0	0	1	0	0	0	0	4
District of Columbia:											
Washington	6	----	3	49	28	100	0	13	0	5	213
Virginia:											
Lynchburg	1	----	0	106	2	3	0	0	0	12	20
Norfolk	1	----	0	15	5	1	0	2	0	1	34
Richmond	0	----	2	158	5	2	0	0	0	0	53
Roanoke	4	----	2	52	4	1	0	0	0	0	18
West Virginia:											
Charleston	0	----	0	19	1	0	0	1	0	0	17
Huntington	0	----	----	11	----	1	0	----	0	0	----
Wheeling	0	----	0	129	2	17	0	0	0	5	19
North Carolina:											
Raleigh	3	----	0	0	2	2	0	1	0	1	16
Wilmington	0	----	0	0	1	0	0	0	0	6	7
Winston-Salem	0	----	1	10	0	2	0	0	0	30	19
South Carolina:											
Charleston	0	49	0	5	1	1	0	0	0	3	17
Columbia	0	----	0	0	3	0	0	2	0	0	21
Greenville	0	----	0	0	2	1	0	0	0	0	5
Georgia:											
Atlanta	2	36	1	0	12	1	0	3	0	2	97
Brunswick	0	1	1	0	0	0	0	0	0	0	5
Savannah	0	11	0	0	2	0	0	0	0	1	28
Florida:											
Miami	0	5	0	2	1	2	0	0	1	0	33
Tampa	1	2	2	38	0	3	0	0	1	1	20
Kentucky:											
Ashland	0	----	----	11	----	0	0	----	0	0	----
Lexington	2	----	0	31	2	0	0	1	0	5	19
Tennessee:											
Memphis	3	----	2	2	7	5	0	2	0	3	82
Nashville	0	----	1	4	9	2	0	4	0	5	53
Alabama:											
Birmingham	0	6	3	22	2	6	0	1	0	5	57
Mobile	2	6	2	1	4	0	0	0	0	0	29
Montgomery	1	----	----	39	----	0	0	----	0	1	----
Arkansas:											
Fort Smith	0	----	----	2	----	1	0	----	0	2	----
Little Rock	0	----	0	23	0	0	0	1	0	0	2
Louisiana:											
New Orleans	21	11	2	46	12	14	0	7	2	1	137
Shreveport	1	----	0	7	11	1	1	5	0	2	60
Oklahoma:											
Oklahoma City	1	----	1	0	8	1	0	1	0	0	49
Texas:											
Dallas	5	4	4	----	8	5	0	1	0	5	74
Fort Worth	2	----	1	3	10	6	0	1	0	0	51
Galveston	1	----	0	1	3	0	0	0	0	0	18
Houston	3	----	3	0	11	1	0	6	0	0	80
San Antonio	----	----	----	----	----	----	----	----	----	----	----

City reports for week ended Mar. 16, 1935—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Montana:											
Billings	4	------	0	7	0	1	0	0	0	0	16
Great Falls	0	------	0	31	0	3	0	0	0	0	9
Helena	0	------	0	56	2	0	0	0	0	3	4
Missoula	0	------	0	99	0	0	0	1	0	5	6
Idaho:											
Boise	0	------	0	4	1	2	0	0	0	0	12
Colorado:											
Denver	0	31	2	232	8	237	0	2	1	6	77
Pueblo	0	------	0	176	2	4	0	0	0	7	15
New Mexico:											
Albuquerque	1	------	0	0	4	0	0	4	1	1	18
Utah:											
Salt Lake City	0	------	0	11	1	80	0	1	0	51	35
Nevada:											
Reno	0	------	0	3	0	3	0	0	0	0	4
Washington:											
Seattle	0	------	------	42	------	11	0	------	0	2	------
Spokane	0	1	1	156	2	4	1	0	0	0	38
Tacoma	22	------	0	3	4	0	9	1	0	0	31
Oregon:											
Portland	0	------	1	114	7	13	0	6	0	0	76
Salem	0	2	------	0	------	0	0	------	0	0	------
California:											
Los Angeles	15	64	2	27	19	90	3	19	0	15	363
Sacramento	1	------	0	45	5	9	0	3	0	0	48
San Francisco	1	1	1	11	11	19	0	9	0	9	181

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	1	0	0
New York:			
New York	12	4	0
Pennsylvania:			
Philadelphia	2	1	0
Pittsburgh	1	1	0
Ohio:			
Cincinnati	7	6	0
Cleveland	2	0	0
Toledo	1	0	0
Indiana:			
Indianapolis	1	2	0
Terre Haute	1	1	0
Illinois:			
Chicago	17	5	0
Springfield	2	1	0
Wisconsin:			
Milwaukee	2	0	0
Minnesota:			
Duluth	1	1	0
Iowa:			
Des Moines	1	0	0
Missouri:			
Kansas City	3	0	0
St. Joseph	3	0	0
St. Louis	3	0	0
Nebraska:			
Omaha	4	0	0
Maryland:			
Baltimore	4	2	0
District of Columbia:			
Washington	9	6	1
Virginia:			
Lynchburg	1	0	0
Richmond	0	0	1
West Virginia:			
Wheeling	1	0	0
North Carolina:			
Raleigh	1	1	0
Georgia:			
Atlanta	1	1	0
Tennessee:			
Memphis	1	1	0
Nashville	2	1	0
Oklahoma:			
Oklahoma City	2	0	0
Texas:			
Fort Worth	0	2	0
Galveston	0	1	0
New Mexico:			
Albuquerque	1	0	0
Oregon:			
Portland	2	0	0
California:			
Los Angeles	0	0	5
Sacramento	1	0	0
San Francisco	0	1	0

Dengue: Miami, 1 case.
Epidemic encephalitis.—Cases: New York, 1; Cleveland, 1; Charleston, W. Va., 1.
Pellagra.—Cases: Baltimore, 1; Winston-Salem, 2; Charleston, S. C., 3; Savannah, 2; Los Angeles, 2.
Typhus fever.—Cases: Savannah, 1; Montgomery, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—2 weeks ended March 9, 1935.—During the 2 weeks ended March 9, 1935, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis					2					2
Chicken pox		10	15	297	517	101	80	17	70	1,107
Diphtheria		5	2	29	11	12	10	2		71
Dysentery				3						3
Erysipelas				7	1	3	8	1	1	21
Influenza		724	28	65	315	3			342	1,477
Lethargic encephalitis				1		1				2
Measles		389	44	1,428	4,606	411	408	59	107	7,452
Mumps		37	17		431	87	2	10	24	608
Paratyphoid fever		3								3
Pneumonia		21			54			6	20	101
Poliomyelitis				2		1				3
Scarlet fever		33	13	233	215	31	25	12	49	611
Trachoma							1		2	3
Tuberculosis	2	5	15	154	104	15	4	3	32	334
Typhoid fever			1	19			5			25
Undulant fever					1					1
Whooping cough		4	40	191	243	55	99	7	95	734

Vital statistics—Third quarter 1934—Comparative.—The Bureau of Statistics of the Dominion of Canada has published the following preliminary statistics for the third quarter of 1934. The rates are computed on an annual basis. There were 20.5 live births per 1,000 population during the third quarter of 1934 and 20.7 per 1,000 population in the same quarter of 1933. The death rate was 8.5 per 1,000 population for the third quarter of 1934 and the same rate for the third quarter of 1933. The infant mortality rate for the third quarter of 1934 was 69.8 per 1,000 live births and 66.5 in the same period of 1933. The maternal death rate was 4.5 per 1,000 live births for the third quarter of 1934 and 4.4 for the same quarter of 1933.

The accompanying tables give the numbers of births, deaths, and marriages by Provinces for the third quarter of 1934, and deaths from certain causes in Canada for the third quarter of 1934, and the corresponding quarter of 1933, and by Provinces for the third quarter of 1934:

Number of births, deaths, and marriages

Province	Live births	Deaths (exclusive of still-births)	Deaths under 1 year of age	Maternal deaths	Marriages
Canada [1]	55,792	23,282	3,892	249	20,910
Prince Edward Island	539	191	20	4	153
Nova Scotia	2,882	1,304	183	12	1,049
New Brunswick	2,456	1,051	218	7	991
Quebec	19,490	7,544	1,950	90	6,399
Ontario	15,879	7,839	835	73	7,073
Manitoba	3,479	1,237	170	15	1,414
Saskatchewan	4,969	1,365	248	17	1,209
Alberta	3,693	1,231	178	20	1,222
British Columbia	2,405	1,520	90	11	1,400

[1] Exclusive of Yukon and the Northwest Territories.

Deaths from certain causes in Canada for the third quarter of 1933 and 1934 and by Provinces for the third quarter of 1934

Cause of death	Canada [1] (third quarter)		Province, third quarter 1934								
	1933	1934	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Automobile accidents	346	420	2	11	25	122	201	12	9	19	19
Cancer	2,618	2,587	18	158	111	632	982	164	167	137	218
Diarrhea and enteritis	1,392	1,605	4	31	104	982	322	49	46	43	24
Diphtheria	53	49		3	3	22	6	3	9	1	2
Diseases of arteries	1,578	1,606	14	92	50	325	769	107	87	66	96
Diseases of the heart	3,345	3,508	29	185	131	833	1,452	193	191	206	288
Homicide	41	41		1	2	5	12	4	4	7	6
Influenza	218	180	3	11	10	52	57	11	14	11	11
Measles	44	24			3	19		1	1		
Nephritis	1,214	1,239	12	63	30	510	398	65	50	33	78
Pneumonia	762	821	3	51	43	257	259	50	45	56	57
Poliomyelitis	35	41		1		9	24		3	2	2
Puerperal causes	246	249	4	12	7	90	73	15	17	20	11
Scarlet fever	19	33		3		21	3	1		2	3
Smallpox	1										
Suicide	237	245		11	7	33	89	17	29	26	33
Tuberculosis	1,668	1,404	19	96	70	560	324	88	67	58	122
Typhoid fever and paratyphoid fever	102	90	1		4	44	20	7	5	3	6
Other violent deaths	1,236	1,266	12	72	36	320	441	78	90	92	125

[1] Exclusive of Yukon and the Northwest Territories.

CEYLON

Malaria.—Information has been received, under date of February 4, 1935, regarding the increase in deaths during January, 1935, in two Provinces of Ceylon, due to the malaria epidemic.

Deaths reported in the northwestern Province during the month of January numbered 7,038, about 75 to 80 percent of which occurred among children under 14 years of age. The normal monthly number of deaths for this Province is said to be about 700. During the first 2 weeks of January 1,975 deaths were reported in Kegalla district, Sabaragamuwa Province. At least 1,473 deaths were in children.

The anxiety caused by the malaria epidemic was said to be increased by the continuous drought with the consequent drying up of streams

in many parts of the island, which, it was feared, would lead to a recrudescence of the epidemic during the spring months.

CUBA

Habana—Communicable diseases—4 weeks ended March 16, 1935.—During the 4 weeks ended March 16, 1935, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths
Diphtheria	2	1
Malaria	[1] 17	1
Tuberculosis	29	11
Typhoid fever	[1] 16	8

[1] Includes imported cases.

GREAT BRITAIN

England and Wales—Infectious diseases—Thirteen weeks ended December 29, 1934.—During the 13 weeks ended December 29, 1934, cases of certain infectious diseases were reported in England and Wales, as follows:

Disease	Cases	Disease	Cases
Diphtheria	22,639	Puerperal pyrexia	1,453
Ophthalmia neonatorum	1,068	Scarlet fever	45,768
Pneumonia	9,986	Smallpox	1
Puerperal fever	547	Typhoid fever	277

England and Wales—Vital statistics—Fourth quarter ended December 31, 1934.—During the quarter ended December 31, 1934, 142,634 live births and 114,341 deaths were registered in England and Wales. The following statistics are taken from the Quarterly Return of Births, Deaths, and Marriages, issued by the Registrar General of England and Wales. The figures are provisional.

Birth and death rates in England and Wales, quarter ended Dec. 31, 1934

Annual rates per 1,000 population:	
Live births	14.00
Stillbirths	.60
Deaths, all causes	11.20
Deaths under 1 year of age	[1] 54.00
Deaths from:	
Diarrhea and enteritis (under 2 years)	[1] 5.70
Annual rates per 1,000 population—Continued.	
Deaths from—Continued.	
Diphtheria	.12
Influenza	.11
Measles	.01
Scarlet fever	.02
Violence	.53
Whooping cough	.02

England and Wales—Vital statistics—Year 1934.—During the year 1934, 598,084 live births and 476,853 deaths were registered in England and Wales, with a live birth rate of 14.8 per 1,000 population and a death rate of 11.8 per 1,000 population. The number of stillbirths per 1,000 total births was 40, and the infant mortality was 59 per 1,000 live births.

[1] Per 1,000 live births.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for Mar. 29, 1935, pp. 454-467. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued Apr. 26, 1935, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Iran[1]*—Bushire—Correction.*—The report of 4 cases of cholera with 3 deaths as published on page 420 of the PUBLIC HEALTH REPORTS of March 22, 1935, at Bushire, Persia,[1] is an error. No cholera occurred at this place.

Plague

Hawaii Territory—Maui Island—Makawao District—Kahului.—On March 13, 1935, 1 plague-infected rat was reported 10 miles from the port of Kahului, Makawao District, Maui Island, Hawaii Territory.

India.—During the week ended March 9, 1935, 1 imported case of plague with 1 death was reported at Moulmein, India. During the week ended March 16, 1935, 15 cases of plague with 7 deaths were reported in the North West Frontier Province, India.

Tunisia—Tunis.—During the week ended February 23, 1935, 1 plague-infected rat was reported at Tunis, Tunisia, in the urban district other than wharves.

Smal'pox

Ceylon—Galle.—During the week ended March 16, 1935, 10 cases of smallpox were reported at Galle, Ceylon.

Saudi Arabia.—For the period August 30, 1934, to December 21, 1934, a total of 105 cases of smallpox with 78 deaths were reported in cities of Saudi Arabia.

Typhus Fever

Libya—Tripolitania.—During the week ended February 9, 1935, 2 cases of typhus fever with 1 death were reported in Tripolitania, Libya.

Saudi Arabia.—For the period August 30, 1934, to December 21, 1934, 15 cases of typhus fever with 13 deaths were reported in cities of Saudi Arabia.

Yellow Fever

Brazil—Goyaz State.—During the week ended March 23, 1935, yellow fever was present in 6 localities of Goyaz State, Brazil. There were no known cases in cities or towns.

[1] The name of Persia has been changed to Iran, and the latter name will be used in the future.

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